

The Iron Age.

VOL- 108. 109
1923



Librarian

Uttarpara Joykrishna Public Library
Govt. of West Bengal

The Piron By-Product Coke Ovens

Italian Vertical Downward Combustion
Type Recently Introduced in This Country
—Results Obtained at Woodward, Ala.

A TYPE of by-product coke oven new to American practice has recently been in operation at an Alabama plant for demonstration purposes. The new ovens are the Piron, and 12 of them were constructed about a year ago at the Woodward Iron Co.'s plant, Woodward, Ala. They were built in conjunction with 18 Koppers ovens, having replaced 12 of the latter type in a battery of 30. The following description of the Piron ovens has been prepared from data furnished by the American Italian Commercial Corporation, 2 Rector Street, New York.

Description of the Ovens

The Piron ovens are of the general type of horizontal rectangular by-product coke ovens and constructed according to Mr. Piron's patent, U. S. 1,306,023. Their size has been adapted to the American standards, i.e., 16 to 18 in. in average width, 10 to 12 ft. in height, 39 to 42 ft. in length between the buckstays and 42 to 47 in. from center to center. They have been constructed of silica brick with a capacity for 12.5 tons of dry coal and can be built with a capacity up to 16 tons. Figs. 1 and 2 are cross sections of the side wall and the coke chamber. Fig. 3 is a general view of the ovens.

The most prominent characteristic is the continuous heating from the top downward, without inversion of any kind, and the continuous recuperation of heat instead of the usual regeneration.

The recuperator of heat is composed of joining rows of vertical flues (1) for air and (5) for burned gas. These rows are arranged alternately in such a manner that the wall between two rows is in contact with the burned gas from one side and with the air from the other side and transmits the heat continuously from the burned gas to the air. There are two, four or six rows of flues to each oven.

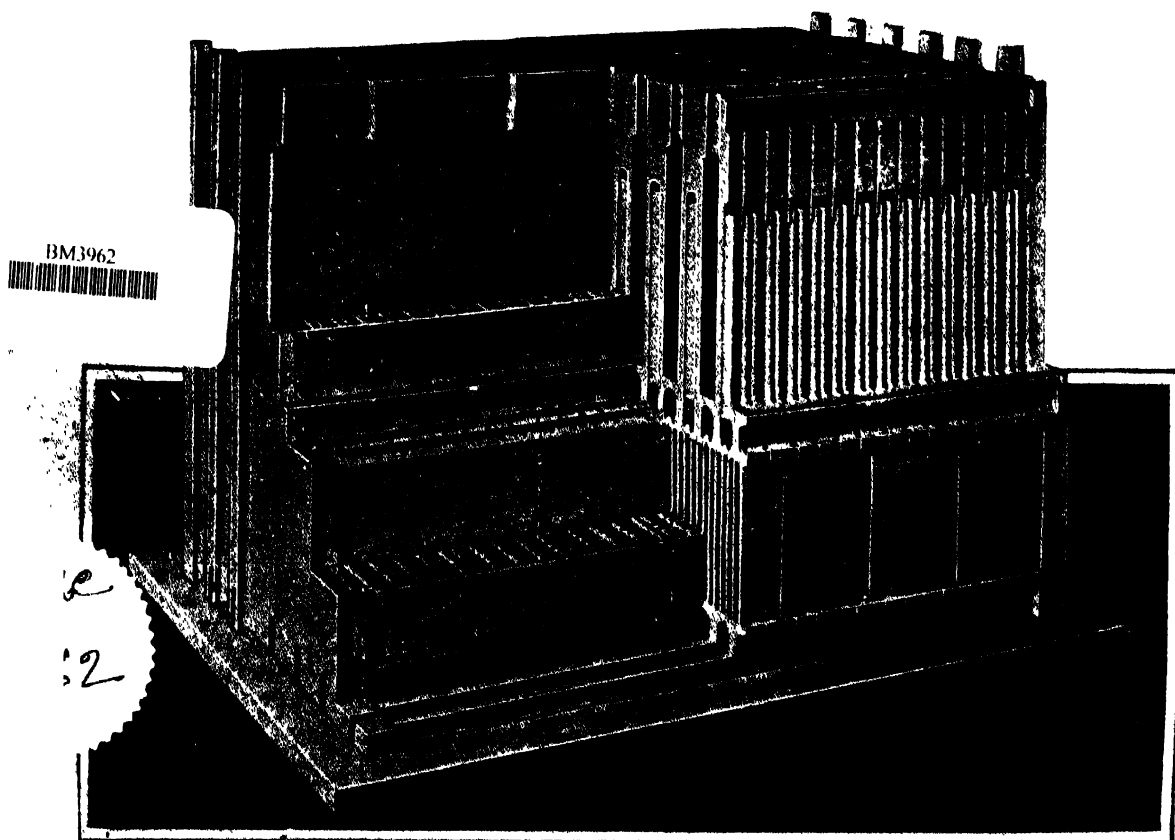
Situated below the rows of vertical flues of the re-

cuperator are horizontal channels (2) for fresh air and (8) for burned gas. The admission of fresh air is regulated by the registers (3) and the suction of the stack channel (9), by the registers (10), so that the regulation and the starting and stopping of operation of each oven is independent. Small orifices (4) and (7) located at the bottom of each vertical flue of the recuperator are intended to secure equal distribution of air and suction of burned gas without causing resistance in the higher part of the ovens.

The air drawn through the registers (3) in the horizontal channels (2) by the natural draught of the vertical flues (1), ascends in these flues growing hot, crosses the horizontal channel (11) and continues its way upward through the vertical air flues (12) provided in the bottle brick of the side walls; and then, upon reaching the upper part of these channels, it changes its direction and descends in the vertical heating flues of the side walls.

The gas is distributed in the heating flues by a distribution pipe (14) located above the oven, with branches (15) (one for each heating flue), through which inspection of the flue can be easily made. Coming into the upper part of the heating flue, the gas meets the hot air and burns while descending. The burned gas passes in the bottom channels through the orifices (13), then continues downward through the vertical flues (5) of the recuperator and passes through the orifices (7), the horizontal channel (8) and the register (10) to the stack channel (9).

The ovens are loaded through four charging holes and one coal larry if the standpipes are situated on the pusher end, or preferably, by two coal larries if the standpipes are situated in the middle of the ovens. The standpipes are 15 to 20 ft. high and are connected to the collecting main by movable elbows. Eventually two collecting mains are provided to separate the rich



The Piron Ovens As They Appear When Assembled, One Portion Being Left Out to Show Various Parts

gas obtained during the first period of distillation from the poorer gas produced later. The coke pusher and quenching cars are standard American make.

Qualities and Advantages

Melting is the most serious accident that can occur to a battery of coke ovens and it is chiefly caused by delaying the inversion. The suppression of the inversion in the Piron ovens does not mean only an easier management of operation but it guarantees against melting, it is claimed. Another device which prevents the danger of melting is the air flue provided in the bottle brick.

The ovens adapted to the American standard size for 12 to 12.5 tons of coal charge, needing only 90 tons of refractory brick per oven and having only a single waste gas channel and no inversion apparatus are less expensive than regenerative coke ovens. The larger size for 16 tons of coal charge weighs only 110 tons.

Theoretically, there is no reason why a recuperator should work differently than a regenerator of heat when both can be built with the same strength in regard to recuperation of heat. The reason why regenerators were preferred to recuperators was because of the leakage of air through the heat-transmitting walls of the recuperators. In the Piron ovens the resistance of the air and gas circuits are so small and the recuperators constructed in such a manner that it is claimed leakage does not occur.

The amount of heat, lost through the top of the ovens when they are heated upward from the bottom, is difficult to measure but is easy to observe. The top of such ovens are so hot that one cannot remain long on top of them. In the Piron ovens the fresh current of gas going downward from the top in the sidewall in an opposite direction to the current of heat going upward, carries this heat back in the sidewall and makes a perfectly cool top.

Regulation of Temperatures

The temperature of the upper part of the oven just below the arch is very important because too low a temperature prolongs the coking time and too high a temperature means a loss of by-products and causes the formation of large quantities of naphthalene. The temperature is very easy to regulate when the flame burns downward.

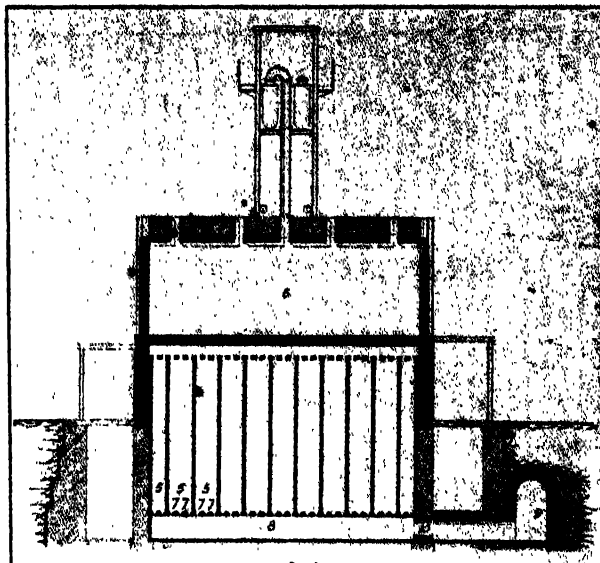
The sidewall being continuously heated by flames along the whole length and height, the transmission of heat is at its maximum during the whole coking time. This fact, together with the cooling of the bottle brick by the air current gives a cooler sidewall than the sidewalls of the regenerative ovens with the same coking time. The accessibility of the gas distribution the whole length of the sidewall is claimed as a guarantee of uniformity of temperature and another factor, which helps obtain this uniformity so important from the viewpoint of the coking time and saving of fuel gas, is the downward combustion.

Large Gas Surplus

The regularity of temperature, the easy transmission of heat through the sidewalls, the relatively low temperature of the sidewall in regard to the coking time, the short coking time, the small loss of heat through the top and stack, the non-admittance of fresh air in the ovens during inversion, or to burn the graphite, are all factors which are pointed to as making these ovens economical in regard to the fuel consumption and giving a larger amount of surplus gas.

The standpipes can be situated on these ovens the same as on every other type of oven and their size can be the same, but it is preferable to take off the gas from the center of the oven, because the lamp black formed at both ends, owing to the small air entrance through the doors remains mostly in the ovens and, therefore, the maintenance of the collecting main is easier.

The collecting main differs from that generally employed in that its section which is comparatively high and narrow so as to provide a better cooling through the high vertical sides and a more effective cleansing



Cross Section of the Coke Chamber

of the bottom, by the circulating tar. The recuperators, composed of rows of vertical chimneys situated below the sidewalls, are claimed to be an ideal foundation for ovens built in silica brick as they freely expand with the ovens without causing any break in the region of their bottom.

Some Results Obtained

The ovens built in this country work regularly with a coking time of less than 18 hr. and a consumption of 4000 cu. ft. of gas per hr. and sidewall, with an average width of 18 in. and a charge of 28,500 lb. of wet coal. Their minimum coking time is 14 hr. The temperature of the sidewall is only 2300 deg. Fahr. The temperature of the heated air is about 1000 deg. C. and that of waste gas about 350 deg. C., despite the fact that the recuperator could not be built its full height because of a high water level in the ground.

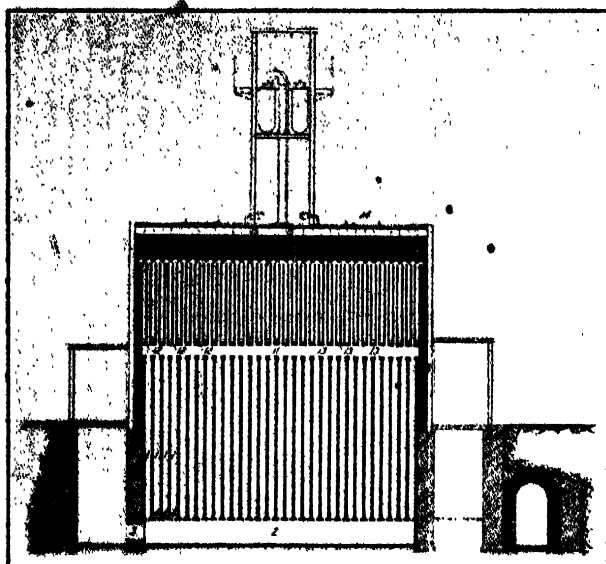
The gas is cooled by a primary and then a secondary cooling before the recovery of ammonia. The primary coolers are of the general type with vertical water pipes. The secondary coolers are mixture coolers from which the ammoniacal cooling water is cooled again in closed tube coolers. The cool gas before passing the exhausters is cleaned of tar by means of centrifugal cleansers which do not increase the resistance of the gas circuit and which operate continuously without need of cleaning. Exhausters of the general type are used but of smaller horsepower, as the resistance of the gas circuit is only about 32 in. of water.

Recovery of Ammonia

The direct process of recovery of ammonia by washing the gas with sulphuric acid was so successful that it will be surprising to find that the old indirect process is here used. Nevertheless, the results justified the change. The better yield of the latter does not depend directly upon the process itself, but upon the fact that the gas circulation is independent of the manufacture of sulphate. When the gas is not taken from the ovens with the greatest regularity a part of the gas passes directly in the sidewall and burns there without giving its by-products to the by-product plant. The loss of ammonia in the gas after passing through the scrubbers is less than 0.03 gr. per meter of gas, or 0.03 lb. per ton of coal, a quantity really too small to be considered.

Benzol and Light Oil Recovery

The recovery of benzol does not differ from any other system except in the type of still for distillation of light oil. For the refining of light oil a continuous operating rectifier is employed which can be built for very large quantities and gives any desired classification of products from the first flow, until almost pure



Cross Section of the Side Wall

benzol, toluol* and xylol, whose chemical purification is, therefore, rapid and economical.

Year's Experience in Alabama

The experience from the use of 12 Piron ovens at the Woodward Iron Co.'s plant in Alabama is given in part as follows:

These ovens were built entirely of silica brick with the exception of the jamb brick and the horizontal channels below the recuperators, which were built of fire clay brick; the old buckstays, tierods, gas mains, etc., were not changed.

The coal used at Woodward contained a large amount of moisture and water was continually running from it on the way to the ovens. If some delay occurred in taking the coal from the bin water accumulated in the bottom of the bin and the next charge contained so much moisture that water sometimes ran out of the ovens through the bottom of the doors.

The 12 Piron ovens were operated within the schedule of 18 hr. pushing time and often they were pushed in 15, 14 and 13 hr. The thickness of the lining ($3\frac{1}{4}$ in.) was criticized at the beginning; nevertheless, it resisted satisfactorily.

Ovens Cooled and Reheated Without Damage

The fact that these ovens could be cooled and reheated again without damage was demonstrated in July when the battery was completely cooled in order to rebuild of clay the jams first built of silica.

Waste gas left the ovens at about 850° deg. Fahr. This should have been lower, but at Woodward there was the handicap of a high water level in the ground and the recuperators could not be built as large as desired.

The weight of the ovens at Woodward, charging 25,000 lb. of dry coal (28,500 lb. of wet coal) is 85 net tons of refractories. The size for 32,000 lb. of dry coal will weigh 100 tons. The recuperators form a substantial basement for the ovens, and the side walls proved to be very strong. The strength of the walls is attributed to the absence of horizontal channels on the upper part and to the cooled bottle brick holding well.

Yield of By-Products Not Yet Proved

The feature which has not as yet been proved is the yield of by-products, as the gas from all the ovens was mixed together before coking, but it is well known that the yield depends upon the regulation of suction and pressure in the coke chamber and side walls. When there is practically no difference between the pressure in the side wall and the coke chamber, there is no loss of by-products by leakage of gas through the brick wall and the lighting power of the distilled gas is not lowered by suction of burned gas from the side wall. The difference between the pressure and suction at the bottom of the recuperators is less than 1 mm. of water.

RAILROAD TROUBLES

President Rea Tells How in His Opinion the Government Could Help

WASHINGTON, June 7.—Pointing out that the Government could materially assist the railroads in their present difficult situation by completing at once payments still due them from the Federal control, President Samuel Rea of the Pennsylvania Railroad, last week told the Senate Committee on Interstate Commerce of handicaps that are being faced by the carriers of the country. He said that under present circumstances the railroads must get the requisite financial results to allow them to exist by postponing all capital expenditures, but curtailing employment, by shutting down all possible activities on the road and in the shops and offices, by stopping the purchase and use of supplies, by postponing for the present even though they will cost more later, all maintenance or replacement expenditures except those requisite for safety. If the Government makes the payments immediately, it was stated, and the roads were allowed to issue 15-year obligations for the amounts spent by the Government for permanent improvements, as would have been done if the carriers themselves spent the money, their position would be greatly improved, Mr. Rea said.

Mr. Rea asserted that in spite of the promises of the President when the roads were taken over, the act of Congress and the contract with the carriers to the effect that the roads would be returned to their owners in as good condition as when they were taken over by the Government, the contention of the railroad administration was such as "result in theoretical maintenance only."

"The railroads believe that it can be shown that the same amount of physical reparation was not produced by the dollars expended in the Federal control period as in the test period, and therefore the pledge of the President and of Congress has not been made good," Mr. Rea stated.

Payments made to the railroads by the Treasury under the terms of the transportation act covering reimbursements of deficits during Federal control and as guaranty payments totaled \$404,949,233 up to June 1. In addition to this sum \$196,508,220 had been paid for loans from the \$300,000,000 revolving fund. While prompt payments such as are urged by Mr. Rea would, it is stated, mean increased purchases of steel and other materials, it is not believed a buying movement of any great proportions now is likely until the carriers have become adjusted further to a better financial basis. Trend in this direction is held to have been facilitated a great deal as the result of the action of the Railroad Labor Board in ordering a wage reduction of 12 per cent, effective July 1, of all railroad employees together with reclassification of workers. While the railroad brotherhoods and other representatives of employees are preparing to protest the reduction, it is believed that it will go into effect without any great difficulty and will mean that the carriers will have approached a point where they will be considerably nearer the time to enter the market for supplies. In its final report on deficiency in construction of homes, railroads, etc., the Senate Committee on Housing, of which Senator Calder is chairman, stated that an expenditure of \$6,000,000,000 will be required for railroad construction.

Until the financial condition of the railroads has improved it is claimed by railroad executives that there can be no general reduction in railroad rates, a subject, which, with a number of others concerning the railroad situation, was taken up by President Harding last week with members of the Interstate Commerce Commission, Director General Davis and Senator Cummins, chairman of the committee which is conducting the railroad inquiry.

The proceedings in the inquiry, with the closing of testimony from the railroad interests, now turns to the matter of taking evidence from shippers, representatives of railroad security owners and the employees.

FOUNDRIY EXHIBITION IN 1922

A Return to the Old Practice of Holding Spring Meetings

The uncertainties which for some time have surounded the 1921 exhibition of the American Foundrymen's Association have been cleared up in a statement just issued by C. E. Hoyt, secretary, of the association, from its offices at 140 South Dearborn Street, Chicago. Both the time and place of the exhibition of this year have been under consideration and there has also been discussed the question of postponement. At a meeting of the executive committee of the association held in New York, May 28, it was decided to hold the next convention and exhibit in April or May at a place to be selected by the Committee on Convention and Exhibits. The statement of Secretary Hoyt is as follows:

"From the date of organization to 1911 the conventions of the American Foundrymen's Association were held in May or June of each year. In 1912 it was found necessary to postpone the convention scheduled for June at Buffalo until late in September, due to delay in completing the building in which the exhibits were to be placed, and since that time the annual meetings have been held in the fall.

"At the annual meeting of the board of directors of the association, in Rochester, N. Y., Dec. 7, 1920, invitations for the next convention were referred to the committee on convention and exhibits. When this committee met in Cleveland on March 30 to consider the place of the next meeting it was found that in none of the eight cities considered was it possible to find, during September or October, adequate hotel accommodations and exhibition facilities to properly care for such meetings as were held in 1919 and 1920.

"Confronted with this situation and taking into consideration general industrial conditions, the committee adopted a resolution recommending to the board of directors that the convention be held in New York in October or November of this year, without exhibits.

"This recommendation was referred by letter to the members of the board and expressions of opinion requested. On May 28 the executive committee of the board met and after due consideration of the recommendations of the committee and expressions of opinion by the members of the board, it was unanimously resolved that the next convention and exhibit of the American Foundrymen's Association be held in April or May, 1922, at a place to be selected by the convention and exhibits committee.

"With the hotels disposed to reserve a larger percentage of their rooms for a convention in the spring than in the fall, and with the probability that better exhibition facilities can be secured in the spring of 1922, it is hoped that no difficulty will be experienced in making satisfactory arrangements for the next convention and exhibit, the place and date of which will be announced later."

The Steel Treaters' Convention and Exhibition in September

Lt.-Col. A. E. White, national president of the American Society for Steel Treating, has made the announcement that Prof. H. L. Campbell, 1103 E. Huron Street, Ann Arbor, Mich., has been appointed chairman of the meetings and papers committee of the society, to secure papers for presentation at the Indianapolis convention and exhibition to be held Sept. 19 to 24. Associated with Professor Campbell on this committee are: George Q. Desautels, president Imperial Drop Forge Co., Indianapolis, Ind., and Victor Hillman, metallurgist, Crompton & Knowles Loom Works, Worcester, Mass.

The board of directors has authorized the awarding of a gold medal for the best paper presented at the Indianapolis convention and a silver medal for the second best paper. While the awarding of these medals for this year has been made to apply to those papers presented for this year's convention, the policy in

future years will be to award the medals to the first and second best papers presented before the society during the year, including local chapters.

Chairman Campbell has just issued a list of some of the subjects it is proposed to discuss at the convention, and the 3200 members of the society have been requested to prepare and submit papers either upon one of the subjects listed below or upon any subject of their own choosing. Already a large number of papers has been received, and many have indicated their intention to submit papers to the committee before the date of the convention.

"Inverted" Chilled Castings

BY C. A. HEISE*

An interesting phenomenon in foundry practice, for which no satisfactory explanations were forthcoming until recently, was frequently noticed in Germany during the war. Gray iron castings having a white core were often obtained in the ordinary sand casting process, thus exhibiting the typical feature of the chilled casting—but for the reversed order of layers, the chill being located inside the casting. Various reasons of a more or less satisfactory nature were advanced at the time in explanation of that phenomenon but on the whole no definite clues were ascertained pointing to the true causes of the trouble except the fact, that such "inverted" chilled castings, as they were termed, were almost invariably obtained whenever oxidized scrap was used at the foundry.

It was held by some authorities that the reversed order of layers was primarily due to a high content of phosphorus but this view proved incorrect, since the same feature was observed in castings, the analysis of which showed a normal phosphorus content. In all cases, however, the Baumann sulphur pressure test pointed to an exceptionally high sulphur content and a corresponding low carbon and manganese content and at last a clue was found. While sulphur usually occurs in form of manganese sulphide, the low manganese content of the castings caused the surplus sulphur to enter a chemical combination with the iron. Sulphide of iron, however, melts at 950 deg. C. and the separation of the gases when cooling down was found to prevent a separation of the graphite which in any case is already greatly reduced by the presence of sulphur. Owing to its relatively low melting point, the sulphide concentrates at the core of the casting, as the result of which white cast iron is produced.

With a view of counteracting the "inversion" effects, an increase of the manganese content is suggested since manganese sulphide has a higher melting point than iron, manganese or iron sulphide. An increase in the lime percentage as well as caution in the use of oxidized scrap is also recommended.

*Berlin, Germany.

Rev. Alva W. Taylor, professor in Columbia College, Columbia, Mo., who is touring the country under the auspices of the Interchurch World Workers, discussing the steel strike of 1919 before a large audience at Newport, Ky., on Sunday last, stated that the strike was not called for the purpose of securing an increase in wages, but to obtain collective bargaining agreements with the employers. In speaking of the request of President Wilson that the workers defer the strike, Mr. Taylor declared that the reason this was not done was that union leaders saw in the strike a chance to organize all steel workers.

The Chateaugay Ore & Iron Co. has engaged Freyn, Brassert & Co., engineers, Chicago, for the work of remodeling the blast furnace plant at Standish, N. Y., and for the construction of a Dwight & Lloyd sintering plant at mines at Lyon Mountain, N. Y. The sintering plant will supplement the ore concentrating plant and will produce a low phosphorus copper-free sinter for shipment to the blast furnace at Standish.

Sheet Rolling Mills at Baltimore

Built for Needs of Automobile and Furniture Trades—Top Rolls of Roughing Mills Driven by Independent Motor

ONE of the most modern specialty sheet mill plants for the manufacture of high grade sheets for the automobile and furniture trades and for other finishes is that of the Eastern Rolling Mill Co., Baltimore, which was put in operation in May, 1920. All departments are operated entirely by electric drives and are laid out so that there may be no lost motion in the moving of stock from one to the other. Possessed of excellent railroad and tidewater facilities, the site has further advantages by reason of the availability of labor and also electric power transmission from the Susquehanna River. Not alone does the location insure good service for the domestic market but it is strategically suitable for export trade as well.

The present equipment includes 12 finishing hot mills and eight stands of roughing mills, which are operated by two 1500-hp. General Electric motors and are of the National Roll & Foundry make. There are also 20 stands of cold rolls furnished by the Hyde Park Foundry & Machine Co., and driven through a Falk gear by a General Electric 800-hp. motor. The top roll of the roughing mills is driven by an independent motor with a reduction gear connection, thus doing away al-

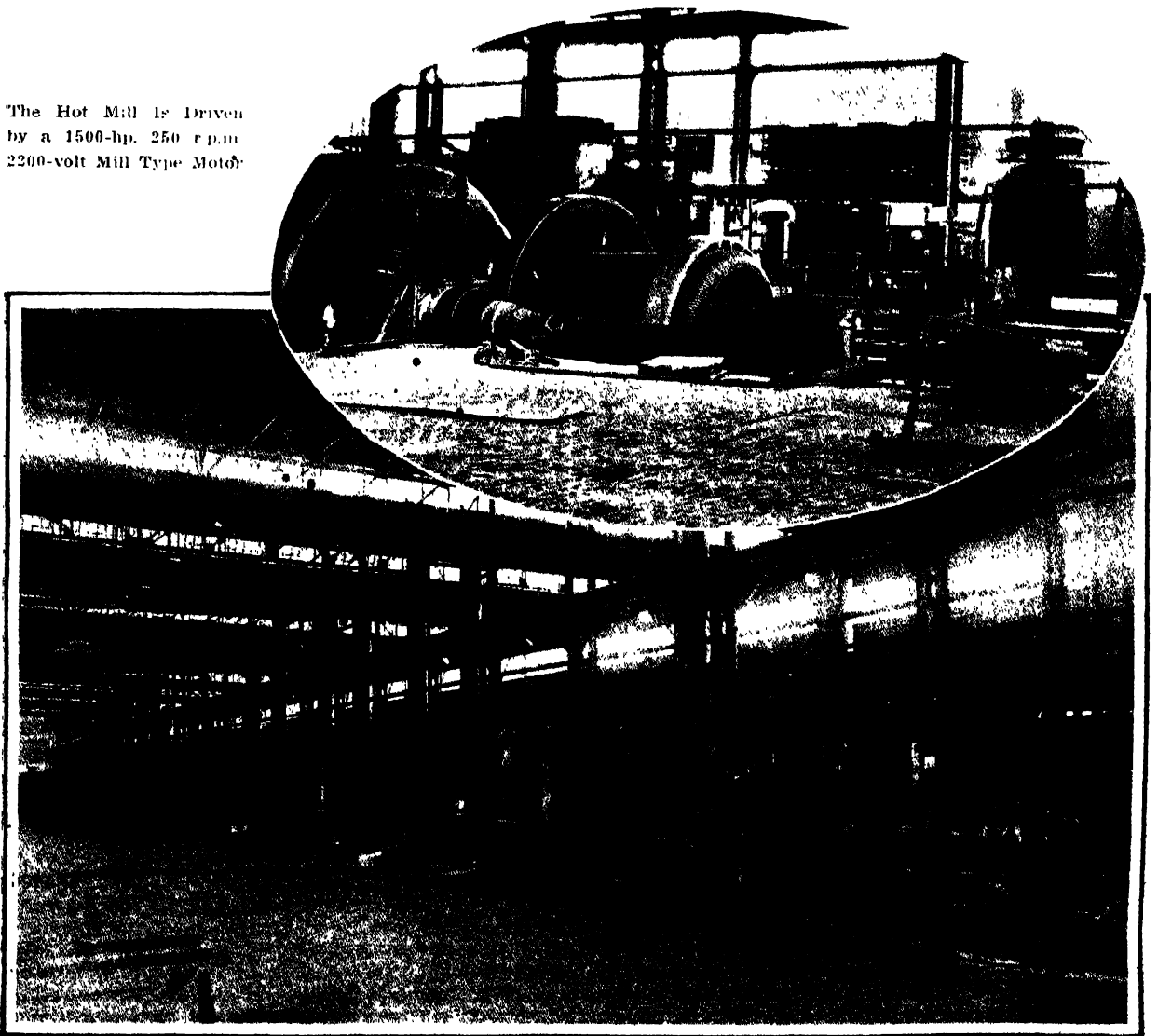
together with pinions and top spindle drives. This device is the invention of Joseph Hirschmann, the engineer who built the plant.

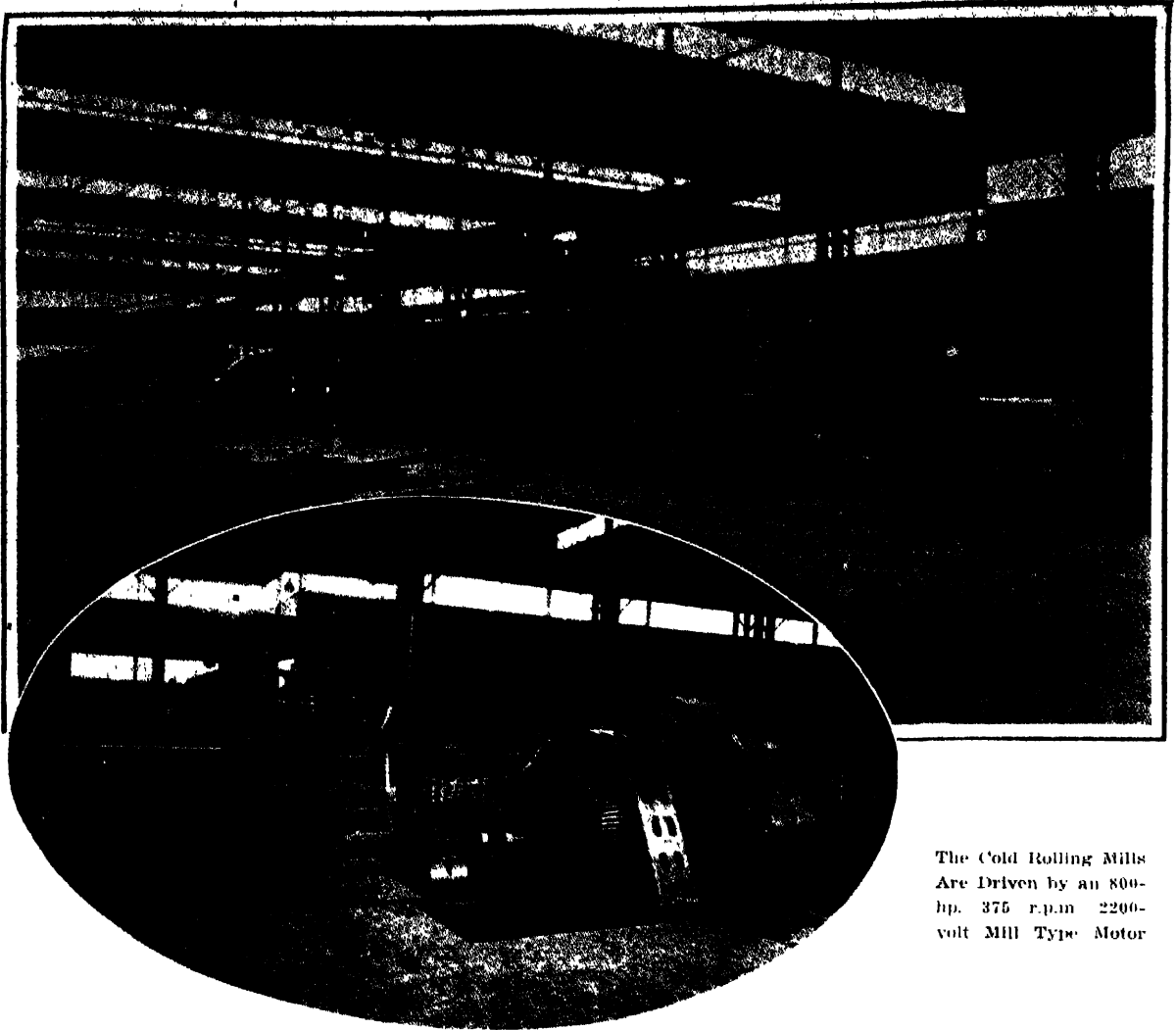
All the mill buildings cover an area of 375 x 1000 ft. with the main bays of 80-ft. span and are of all-steel construction with roof of the Aiken type (high and low trusses with provision for greatly increased window space and ventilation, thus to provide a cool interior).

The mill is equipped with nine Chesapeake cranes, one of 5 tons, two of 10 tons, two of 15 tons, three of 25 tons, and one of 35 tons. Railroad spurs on both sides of the building give provision for unloading raw products and removing the finished steel. When working to capacity the mill is designed to turn out 6000 tons a month. Sheets are being made in widths of 18 in. to 48 in. and lengths up to 144 in.

As a nucleus for its working organization 90 per cent of the skilled men have been brought in from the Pittsburgh and Ohio districts. The remainder of the 1200 employees, when the plant is in full operation, come from Baltimore and vicinity. J. M. Jones, president, declared a first class type of workmen has been ob-

The Hot Mill is Driven by a 1500-hp. 250 r.p.m. 2200-volt Mill Type Motor





The Cold Rolling Mills
Are Driven by an 800-
hp. 375 r.p.m. 2200-
volt Mill Type Motor

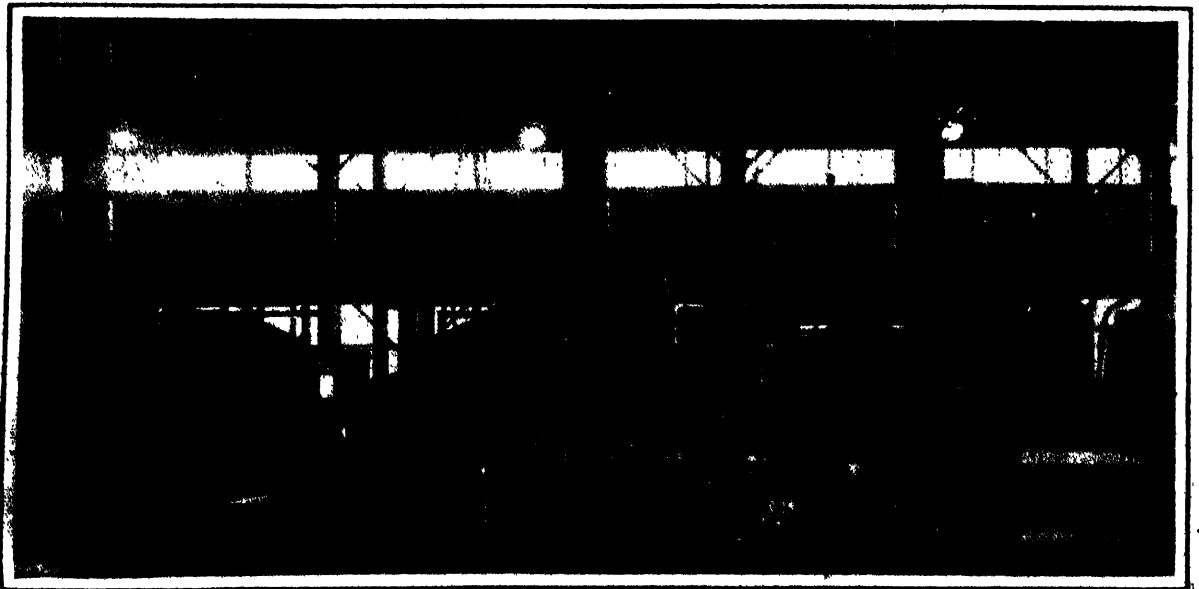
tained and no housing troubles have been experienced.

The yard for storing sheet bars is in the southwestern corner of the hot-mill building. One of the railroad spurs runs directly into this part of the building, so that the raw material can be moved with ease to the mill floor.

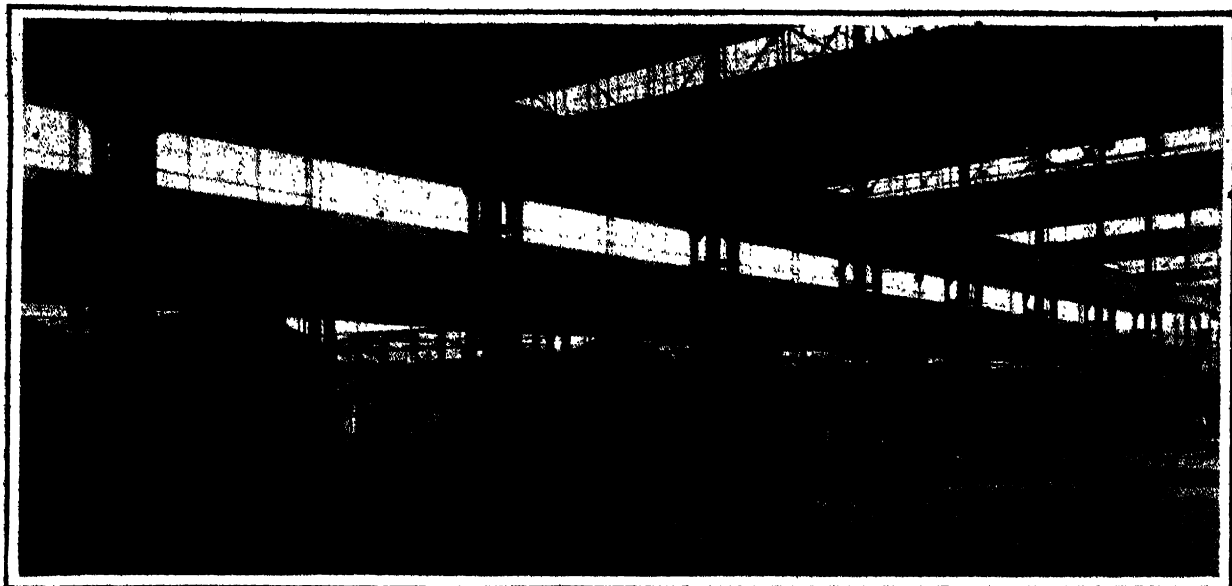
There are 36 mill furnaces of George Hagan Co. make. They are stoker fired and equipped with pushers for charging the sheet bars. Of four Mesta picklers one is employed to treat the bars before heating.

A steam power plant consisting of two 250-hp. Heine boilers with brick stack 150 ft. high furnishes steam for the picklers and the acid vats.

The twelve stands of finishing mills are two-high 30-in. diameter rolls 34 to 54 in. long, contained in massive housings each weighing 42,000 lb., with screws 9 in. in diameter. The rolls are of chilled iron each weighing 15,000 lb. and equipped with a steam spraying and other devices for controlling the temperature of the rolls. The mills are mounted on massive con-



Balance Sheet Mill Drive of the Hot Mill



Annealing Department of the Eastern Rolling Mills

crete foundations supporting the cast iron shoe plates, which weigh 650 lb. per ft.

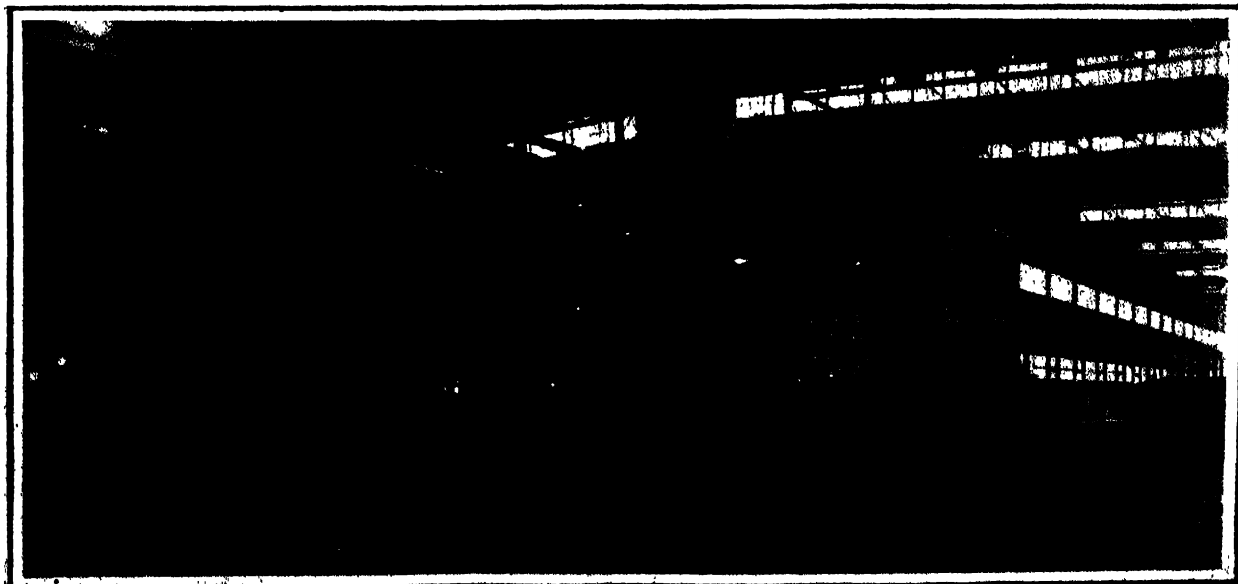
The two 1500-hp. General Electric motors which drive the hot mills operate at 250 r.p.m. and take 2200-volt alternating current. They are equipped with cast-iron bases and two steel-mill pedestals for carrying the bearings and are connected to the mills through single reduction Mesta made gear drives. The control for the motors is of the reversible automatic type, providing seven automatic current limit accelerating points and one plugging point (for quick stopping), both forward and reverse.

Maximum torque push buttons are provided, the use of which causes the proper contactors in the secondary circuits of the motors to close, thus enabling them to develop maximum torque at standstill in case the motors are stalled when trying to start with cold pieces of metal in the rolls or under similar cases of obstruction. An independent "stop" push-button station is employed from which the equipment may be shut down on occasions of emergency.

The annealing furnaces are of the double type, six in number, affording a capacity for 24 sheet annealing boxes. The cold roll department consists of 16 sets of finishing and four sets of flattening rolls made by the Hyde Park Foundry & Machine Co., and driven through a Falk gear by an 800-hp. General Electric induction

motor. The cold rolls are 26 in. in diameter and the housings for these rolls weigh 10 tons each.

A mechanical department consisting of machine shop, blacksmith shop and electric shop and equipped with tools and machines for performing all necessary repair work is on the north side of the cold rolling mill. The mill equipment also includes two scrap handling presses made by the Galland-Henning Mfg. Co., a 140-in. Hyde Park hot-mill shear, and a 144-in. Hyde Park shear for cutting cold sheets. Besides the large motors for operating the cold and hot mills previously mentioned there are 100 other General Electric motors. A prominent feature of the installation is that all of the motors in the mill are equipped with automatic starters and push-button stations. The substation equipment includes three 1667-kva. 3 phase, oil-insulated, self-cooled transformers, 13,200-2300-v, 25-cycle; three 200-kva, single phase, 25-cycle, 13,200-460-v transformers, three 25kva, single phase, 25-cycle, 13,200-115-v, lighting transformers; one 300-kw., 750 r.p.m., 250-v compound wound rotary converter, six-phase, with three 100-kva, 13,200-v-185-v transformers and one 5½-kw. motor generator for charging the storage batteries used in the operation of the oil switches, all of which are solenoid operated, remote control. A 22-panel switchboard completes the installation of the substations. All of the equipment is of General Elec-



Pickling Department of the Eastern Rolling Mills

tric make. The Eastern Rolling Mill Co. is capitalized at \$5,000,000, of which \$3,000,000 has been issued. J. M. Jones, president and general manager, was formerly president of the Baltimore Sheet & Tin Plate Co., which was bought by the Bethlehem Steel Co., with which he served as general manager of its sheet and tin plate department at Sparrows Point. Previously Mr. Jones was vice-president and general manager of the Massillon Rolling Mill Co., and at one time was general manager of the Lalance & Grosjean Mfg. Co.,

Harrisburg, Pa. Other officers are: C. E. F. Clarke, vice-president; L. J. Jones, secretary; J. A. Downey, treasurer; C. A. Pennock, general superintendent; J. E. Cook, assistant general superintendent; A. J. Hazlett, sales manager, and H. A. Thompson, assistant sales manager. The following constitute the board of directors: J. M. Jones, Waldo Newcomer, F. B. Cahn, F. W. Wood, L. J. Jones, J. T. Hill, C. C. Pusey, all of Baltimore; J. E. Aldred, C. E. F. Clarke, R. M. Smith of New York; and A. W. Thompson of Pittsburgh.

COAL-DUST HAZARDS*

Causes of Explosions in Industrial Plants— Preventive Action

Since the introduction of pulverized coal as a substitute fuel for natural gas in the various types of heating furnaces used in steel mills, a number of fires and explosions have occurred, resulting in the loss of life and property. L. D. Tracy, of the Bureau of Mines, has completed investigations of plants where such explosions occurred, with a view to learning causes and preventing future accidents.

What the Investigation Showed

A lack of knowledge of the explosive and inflammable qualities of pulverized coal was found to exist among some of those employed about the furnaces. Investigations revealed that a small stream of pulverized coal leaking from a defective joint in a coal transport line did not attract much attention, although if the dust cloud should come in contact with an open flame or hot metal the effects would be as disastrous as if it had been gas.

Experiments also demonstrated that a mixture of 30 per cent pulverized coal dust and 70 per cent of finely powdered shale is explosive. This is analogous to conditions which may be found in industrial plants, as they show that coal dust which may have settled on the floors and girders of buildings is not necessarily rendered inert by the incombustible matter with which it may have become mixed.

One of the most serious troubles with which users of pulverized coal have had to contend has been the prevalence of fires in storage bins for pulverized coal. It has been somewhat difficult to determine the exact cause of these fires, but undoubtedly spontaneous combustion has played an important part in the origin of some of them.

In some of the systems used in drying and pulverizing coal, the fine coal, about 90 per cent of which will pass through a 100-mesh screen and 70 per cent through a 200-mesh screen, is delivered to the storage bins at a temperature of 125 to 130 deg. F. It is possible, however, for the person running the drier to permit the fire to become hotter than normal and thus overheat the coal in the drier. The coal may be thus delivered to the storage bins at a temperature at or above 150 deg. If left in the bin for a comparatively short time, it is very probable that the temperature of the coal will rise to such a point that when mixed with air the coal will burn rapidly.

Overheating of the coal is especially likely to happen in the type of drier known as "direct heat" drier, where the fire on the grates is permitted to continue after the drier has stopped running.

What the Safeguards Are

In connection with the foregoing the following suggestions are made by Mr. Tracy: Care should be taken that pulverized coal is not delivered to storage bins at a high temperature. Storage bins for pulverized coal should not be placed in any position where they may become heated from furnaces, steam pipes or hot flues. If a plant has been shut down for several days, delivery of coal from the storage bins through transport lines to the place of consumption should not be permitted before the temperature of the coal is taken. This can be done by pushing iron rods into the interior of the stored coal.

It is of extreme importance to see that no opportunity is given burning particles to get into the transport line, either from the storage bin or by a "backfire" from the furnace. Frequent inspection should be made of the burners and any coked particles thereon should be immediately removed. As often as practicable, at night when the plant closes down if possible, all furnaces should be cut off the supply line, the gate from the pulverized fuel bin closed and the transport line thoroughly cleaned by allowing the fan to force a current of air through it until all the pulverized coal is blown out.

Where furnaces are equipped with individual fuel bins and the coal is delivered into the primary air line by means of screw conveyors, the fuel bins should be placed away from the furnaces. Every effort should be made to prevent any accumulation of dust in the building that houses the pulverizing apparatus. Certain manufacturing plants, in which explosive dust is prevalent, have installed vacuum cleaners to keep the buildings free from dangerous quantities of explosive dusts. In examining storage bins and other places where coal dust may exist, an electric light, protected by a wire guard, should be used.

To obtain the best results, as regards safety, in the use of pulverized coal as a fuel in industrial plants, it is important that both officials and men be educated to the idea that coal dust is explosive and therefore dangerous; and that under certain conditions it will ignite as readily as gas.

Organization of Technical War Service

In connection with the organization, under the direction of General Pershing, of the reserve armies of the United States, it is proposed informally to associate members of the Army Ordnance Association and the ordnance officers of the Reserve Corps. The Army Ordnance Association, of which Benedict Crowell is president, has as members some 2400 technical and business experts who, during the war, served either as officers of the Ordnance Department or as executives of industries engaged in ordnance manufacture. There will be a meeting at the Engineering Societies' Building, 29 West Thirty-ninth Street, at 8 p. m. June 15, to form in Greater New York a local organization of the Army Ordnance Association which shall include as members all ordnance officers of the Officers' Reserve Corps. All who served as officers in the Ordnance Department during the war, and all who are interested in ordnance as a factor in preparedness, are invited to attend.

A modern and completely-equipped club house and recreation grounds for the employees of the Electric Storage Battery Co., Philadelphia, are nearing completion. The employees will assume entire charge and responsibility for the club house and grounds, including the cost of maintenance. The equipment will provide for sports, entertainments, social gatherings, educational features and dining. The site is picturesque and the company has added artistic features.

The annual meeting of the National Sheet Metal Contractors of the United States will be held at the Fort Pitt Hotel, Pittsburgh, June 14 to 17, inclusive. The convention committee includes Louis Luckhardt, W. C. Markle, W. F. Angermeyer, W. J. Fortenbacher, E. W. Scarborough, S. N. Wilcox, D. E. Kendig, W. H. Scholes, J. S. Dougherty, John Graff and W. J. Keist.

New Type of Downcomers

A new type of downcomer has been patented by Arthur G. McKee & Co., Cleveland. It is noteworthy for being low and compact, as indicated by the accompanying drawing and the reproduced photograph of one of the actual installations.

The gas and particles of stock travel initially in the direction of the inclined outlet from the furnace, but the gas must then turn at a sharp angle from this direction in order to enter the vertical branch. Moreover, this gas must pass the baffle as indicated in the drawing. It has been demonstrated that the fine material, except the very small particles, strikes the end of the inclined pipe and rolls back into the furnace. It has been found in other words that the diverted flow of gas has not sufficient carrying power to cause a



How the McKee Downcomer Looks in Place Is Shown and the Phantom Drawing Shows It in Cross-Section

change upward from its original direction of the fine stock in suspension.

The high downcomer was of course constructed to reduce to a minimum the amount of stock thrown out of the furnace, especially during slips. The McKee company emphasizes that in comparison with the new downcomer the high types are expensive in material and construction and in obstructing the space on the furnace top, and they perform their service of reducing the amount of material lost by forcing the stock to travel upward as far as practicable—in short, depending on the length of the upward movement to bring about a gravity separation.

Completes Purchase of Steel

The American-Foreign Steel Corporation, Grand Central Terminal Building, New York, announces that it has completed the purchase of all the steel remaining in the United States, which was purchased for export to France during the war, consisting of billets of various sizes, sheet bars, rods, angles, beams, steel bars, plates, puddled iron, Bessemer and foundry pig iron, etc., amounting in all to about 70,000 tons. The material is located at Marietta, Baltimore, Army Base-Norfolk, Army Base-Kearney, and other Atlantic sea-ports.

Cost of Living Declining

Figures of the Bureau of Labor Statistics show that, while rents in May were higher than at any time during 1920, all other items of the family budget have decreased. The report is for five cities—New York, Chicago, Philadelphia, Detroit and Cleveland—having, in 1920, a total of 11,936,051 inhabitants, or 11.3 per cent of the population of the United States. Averages for these five cities show that food, clothing and house furnishings were higher last June than in any other month quoted; while fuel and lighting and the miscellaneous list were highest in December. Basis is 100 for December, 1914.

Item	Per Cent of Total Expenditure	Index of Expenditure		
		June, 1920	Dec., 1920	May, 1921
Food	38.2	216	172	140
Clothing	16.3	312	275	237
Housing	15.3	142	163	171
Fuel and light ..	5.2	171	193	184
Furniture, etc. ...	4.9	289	276	235
Miscellaneous	20.1	212	223	221
Totals		220	204	183.6

Duplex Planing Tool

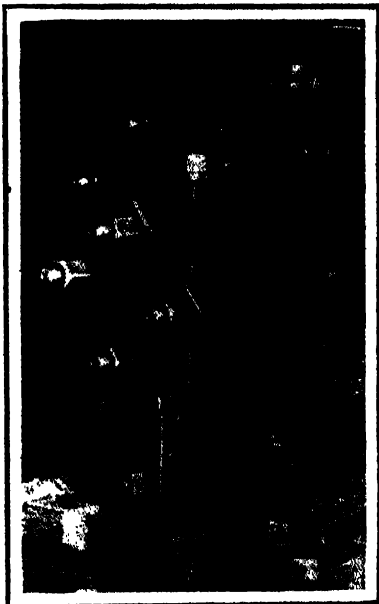
A tool for metal planers containing two regular high speed tool bits and so constructed that a chip can be cut, not only during the regular cutting stroke but also during the return stroke has been placed on the market by the Waltham Machine Co., Waltham, Mass. This tool, known as the Dusenbury duplex planing tool, is used to equal advantage in the different operations of planing, such as horizontal, vertical, or inclined surfaces, also slots and dovetail bearings.

The position of the tool bits is such that the result is the same as that which is obtained when using an underhung tool. All surfaces subjected to wear are hardened. To use the tool, the planer clapper must be fastened down. The recommended practice is to put a taper pin through both the clapper box and clapper, near the lower end. By so doing the planer head is in no way injured and the taper pin is easily removed when required. Another way, when the planer has not been drilled and reamed for pin, is to clamp a Dusenbury clapper bracket under the clapper box swivel, clamping bolts and tightening a jack screw brace between the bracket and the lower tool clamping strap.

The tool bits, set facing each other, are clamped in two opposed clappers hung in the tool head, which can, when the bind nut at the top of the

tool shank is loosened, be swiveled in a sidewise direction and by means of the adjusting screws which bear against the graduated foot of the tool shank, any desired position is obtained. This motion swings the cutters by each other and the amount they are moved regulates the thickness of the chips and the amount of feed needed, so that each tool will have an equal cut or one may be given a heavy roughing cut and the other, set slightly lower, a light one for finishing.

All parts of the tool are case hardened and are interchangeable.



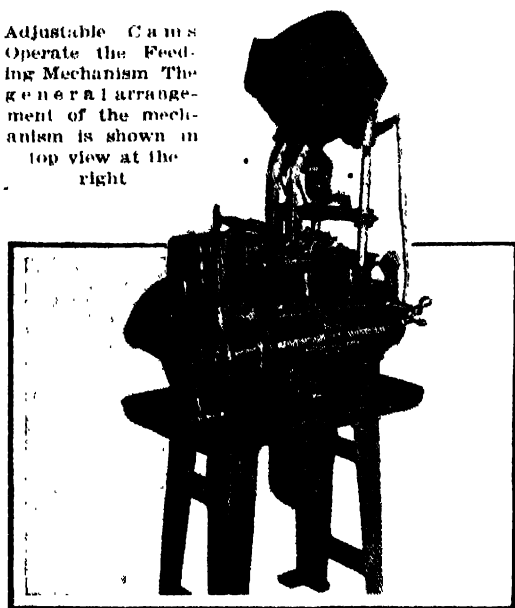
Two High Speed Tool Bits Are Used, the Cutting Being Done on Both Forward and Return Stroke

Automatic Nut Tapping Machine

The Anderson Die Machine Co., Bridgeport, Conn., is putting on the market a double spindle automatic nut tapping machine which represents a departure from previous designs. Instead of the clutches, a gear segment meshing into a train of gears and oscillated back and forth by a crank motion is used for advancing and reversing the tapping spindles.

The throw of the crank is adjustable to give any desired number of revolutions to the spindles in either direction, within the capacity of the gear train and the length of segment. The machine illustrated is geared to give 15 revolutions of the tap, which on a 32 pitch tap will give at least 10 complete threads through a thickness of 5/16 in., although the machine is designed and built for use on work not exceeding 3/16 in. The crank motion which controls the oscillation of the seg-

Adjustable Cams Operate the Feeding Mechanism. The general arrangement of the mechanism is shown in top view at the right



ment should never be any greater than actually necessary for the complete tapping of the nut.

The crank disk is mounted on the horizontal shaft running through the machine and is driven by a worm gear inclosed in an oil-tight case, the worm being driven by a constant speed motor running at 1750 r.p.m. The horizontal shaft and crank runs at 56 r.p.m., the spindles completing 56 cycles per min. which for two spindles gives 112 pieces tapped per minute. In machines intended for work up to 6/32 in., in brass, a worm and wheel can be furnished to give 68 cycles or 136 pieces tapped.

The horizontal shaft carries the cams for operating the feeding mechanism. The cams are adjustable so that the machine may be timed accurately and as the cam and crank disk are on the same shaft the timing of the feed with the direction of rotation of the spindle will remain accurate. The hopper will feed either hexagon or square nuts. Push rods carry the nuts from the feeding position in the chutes into engagement with the taps. The construction of the chute is intended to eliminate possibility of nuts leaving the chute until they are completely tapped. The hopper is provided with an agitator in the form of a disk which oscillates through a crank motion mounted on the horizontal shaft. A vibrator is also provided to prevent the nuts from sticking in the chutes during transfer.

The machine will tap square or hexagon nuts ranging from 3/16 to 1/2 in. across flats and from 1/16 to 3/16 in. in thickness, from the smallest diameter tap up to 10/24 without providing special chutes and at the rate of 112 pieces per minute. No special taps are required. In tapping nuts of various sizes the only change necessary is in making two small blocks that form the entrance for the nut into the chutes, two push rods of cold rolled steel 1/2 in. square and approximately

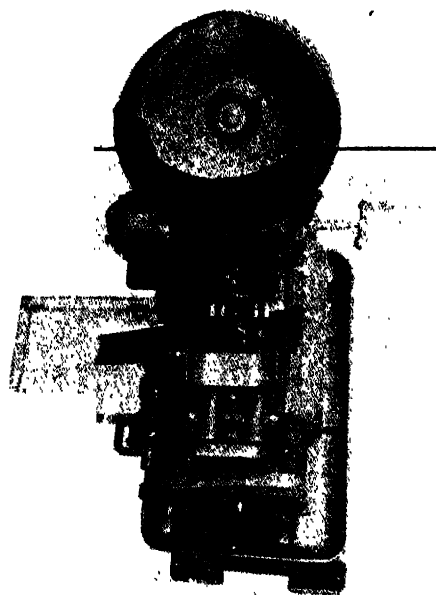
4 in. long, and two fingers that hold the nut while it is being transferred from the feeding position of the chute into engagement with the tap.

The machine is driven by a 1/4 hp. standard motor, alternating or direct current. The floor space required is 18 x 24 in.; the height from floor to spindle being 43 1/4 in., and the overall height, 66 in. An oil pump and reservoir are built into the machine. The net weight is 500 lb.

British Trade in Machine Tools

The British Board of Trade has issued a report on that country's export and import trade in machine tools, showing that exports for the first three months of this year were the largest on record for any similar period, greatly exceeding the pre-war average. The total weight of the machine tools exported from Great Britain in the first quarter was 7231 tons and the value £1,046,605 sterling. The 1911-1914 pre-war average was 3826 tons, value £282,964 sterling.

The total tonnage of imports during the same period dropped considerably from preceding years, though it was greater than the pre-war average of imports. The total for the three months was 1454 tons, value £377,-



447 sterling, compared with 3171 tons, value £705,226 in the corresponding period of 1920. The pre-war average, 1911-1914, was 828 tons, value £80,335.

Trade Commissioner Wilbur J. Page, in transmitting this report from London to the Bureau of Foreign and Domestic Commerce, comments as follows on the report: "In these days of trade depression it comes as rather a surprise to note the strides which the British machine-tool industry is making in the expansion of its export market. The statistics indicate that Great Britain has not only regained all lost ground in the production and export of heavy machines, but is also extending its trade in the finer machines, which are of much higher value per ton."

At the meeting of the Rail Steel Products Association, which includes the leading rerolling mills in the United States and Canada, held at the Hotel Biltmore on Friday, May 27, the following officers were elected: E. E. Hughes, vice-president Franklin Steel Works, president; D. E. Sawyer, sales manager Pollak Steele Co., secretary; Arthur S. Hook, vice-president Calumet Steel Co., treasurer.

The June meeting of the members of the National Association of Sheet and Tin Plate Manufacturers was held at Wheeling, W. Va., June 6 and 7. The Wheeling Steel Corporation acted as host for the visitors, and obtained for the meetings the use of the Country Club at Wheeling.

DECREASED PRODUCTION

Steel Production of Independents Less Than 20 per cent in Mahoning Valley

YOUNGSTOWN, OHIO, June 7.—Steel production with independent interests in the Mahoning Valley is less than 20 per cent of normal this week. A severe recession is noted in sheet mill production, which has declined to 18 per cent, with only 20 of the 105 mills of the Valley under power.

Grace blast furnace of the Brier Hill Steel Co. has been blown in, after a suspension of three weeks. There are now only nine stacks out of 46 pouring in the Mahoning and Shenango Valleys—two of the Carnegie Steel Co. at the Ohio Works, Youngstown; two of the same interest at the New Castle plant; two of the Youngstown Sheet & Tube Co. at its East Youngstown group, and one of the Republic Iron & Steel Co. in the Haselton group.

For the first time since the depression started, not a rolling mill of the Trumbull Steel Co. at Warren is under power. Aside from the Youngstown Sheet & Tube Co., idle the past week to a large extent and therefore under an accumulation of orders, other important independent groups are doing little better than the Trumbull interest. Only 16 of the 51 independent open-hearth furnaces are charged, or a total of 26 out of 66, including the Carnegie Steel Co. units. Six of the 17 pipe furnaces are fired; none of the four plate mills is active, while all of the independent bar mills are idle.

The Carnegie company is maintaining blast furnace, open-hearth and Bessemer production at its Youngstown district plants sufficient to support fully 40 per cent finishing schedules. The bar mills at the McDonald and Upper and Lower Union mills are partially operating.

Though the Newton Steel Co. has reduced the number of its active sheet mills from ten to eight, the company is endeavoring to maintain the same production rate on the smaller number of units. Other sheet mills are being operated by the Republic company, which has six under power at its Niles plant, and by the Brier Hill company, which has six in commission.

At its Girard plant, the A. M. Byers Co., Pittsburgh, is operating 22 puddling furnaces and a skelp mill.

Plant Operations

The Worcester Electric Tool Corporation, Worcester, Mass., which recently increased its manufacturing space, plans to expand its business 50 per cent. The company is manufacturing a combination electric drill and valve grinder.

The Universal Winding Co., South Auburn, R. I., plant has gone on full time with 1025 employees. Some departments have been on a three-day per week schedule. Prior to the business depression the company employed approximately 1600.

The new 90 x 320 ft. Smith Springfield Body Co., West Springfield, Mass., plant unit is expected to be finished June 15. When completed the plant capacity will have been increased 50 per cent. An additional 100 employees will be taken on. The company at present is employing 150 hands.

The Osgood Bradley Car Co., Worcester, Mass., has taken additional orders for more than 31-man electric cars from Detroit and Elmira, N. Y., roads at a total cost of approximately \$250,000. The company now has sufficient business on its books to keep its plant running at present capacity until fall. Some 950 employees are on the payroll.

The summary of the monthly employment survey made by the Cleveland Chamber of Commerce shows a slight increase in employment in that city. On May 1 there were 20,330 employees in 41 plants engaged in the manufacture of iron and steel and their products as compared with 19,434 on April 30, or a gain of 4.6 per cent. The number of employees in eight automobile and automobile parts plants increased from 9949 on April 30 to 10,310 on May 31, or a gain of 3.6 per cent.

The Bangor & Aroostook Railroad Co., because of

a decided slump in passenger and freight receipts, has suspended about 700 men for thirty days. The locomotive and car repair shops at Derby and the car repair shop at Houlton, Me., are closed, 400 men being affected.

The Belmont Stamping & Enameling Co., New Philadelphia, Ohio, which has been shut down since before the holidays, has resumed operations at about one-third of capacity.

The Western Malleables Co., Beaver Dam, Wis., manufacturer of railroad and automotive castings, shut down its plant June 1 with the expectation of resuming operations June 8 on a schedule of three days a week.

The Shenango and New Castle plants of the American Sheet & Tin Plate Co. resumed operations on June 2, after a shutdown of 10 days, 20 of the 40 hot mills at the former plant going on and 12 of the 20 at the latter plant. It is not expected that the plants will be in operation for more than a few weeks.

Says New York's Industries Have Passed Low Point

"Every New York industry under my observation is showing definite signs of improvement," states Arthur E. Allen, manager New York office, Westinghouse Electric & Mfg. Co. "These signs are faint in some cases, it is true, but nevertheless they are there. The low point has been passed."

"Practically all of the fundamental difficulties, such as the German indemnity payments, the general labor situation, and the railroad problem, are being cleared away, and in addition, there is a rapidly growing confidence in the present administration at Washington, which is a favorable factor of the greatest importance. It is, in fact, impossible to find a really threatening cloud on the horizon; and since everybody now wants to get to work, and since the need for goods of every description is universal, a speeding-up of industry is inevitable. No abrupt improvement can be looked for, but a gradual acceleration of all kinds of activity will occur until all hands should be busy by the first of the year."

All Frick Ovens Idle

UNIONTOWN, Pa., June 7.—Operations in the Connellsville bituminous coal region were marked by a further decrease during the week just closed. All Frick ovens in the region remain banked. Coal operations of The H. C. Frick Coke Company are maintained at about 40 per cent, a large percentage of this being from the by-product fields in the Southern Connellsville region.

W. J. Rainey, Inc., which has been operating at 80 per cent coke and 100 per cent coal, had a one-day lay-off this week at its coke plants. Coal operations were continued unchanged.

Only a very little coal for lake trade has gone out of the region this season, but such shipments have been almost completely suspended.

Smoke Prevention Association

The appointment of a public service committee to compile information relating to smoke abatement and to disseminate such information monthly to smoke prevention officials in every city in the United States and Canada was decided upon at the fifteenth annual convention of the Smoke Prevention Association, which met at Hotel Statler, St. Louis, May 31 to Jun 3.

Joseph M. Lonergan, chief sanitary officer of New York, president of the association, in opening the convention, said that during the war a laxity of enforcement of all regulatory laws became apparent, but that now a period of readjustment is at hand and that old safeguards built around health, life and property are again being sought out to exercise a controlling effect upon the unrest under which the country and the world at large is laboring.

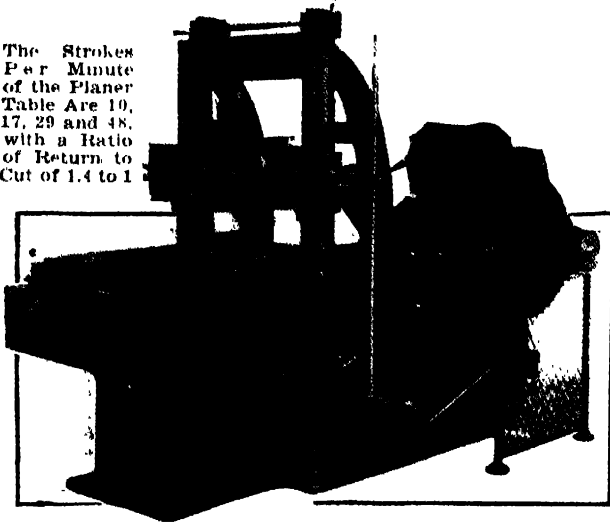
The New Britain Iron Works, New Britain, Conn., has been sold at public auction to Bernard Miller of that city.

Crank Planer

A 24x24x24 in. crank planer, particularly adapted to forge shop work on such pieces as die blocks, rod straps, gibs, shoes, wedges, crossheads and slide valves, has been recently put on the market by the Woodward & Powell Planer Co., Worcester, Mass.

Massive and well ribbed construction of the bed, housing and crossrail is incorporated to insure ample rigidity, and the table has been given large bearing surfaces on the top of the bed and is gibbed its full length. The arch rests on and between the housings which are lipped on the bed. The stroke is adjustable by a removable crank operating a screw in the crank disk. Any length of stroke up to 24½ in. can be taken over any portion of the table, the position of the stroke be-

The Strokes Per Minute of the Planer Table Are 10, 17, 29 and 48, with a Ratio of Return to Cut of 1.4 to 1



ing adjusted by means of a shaft located at the front end of the table. This adjustment can be made while the table is in motion. The machine can also be furnished with a stroke of 28½ in.

The head is graduated in degrees and can be swivelled to either side for angular planing. The crossrail gibs are secured by nuts upon studs which are threaded into the rail and the rail screw and rod are squared at both front and rear ends to take a crank. The feeds for cross, vertical and angular travel are operated automatically by power or by hand and, taking place on the return stroke, do not require a longer stroke than is necessary for the cut.

The drive is by pulley connected to a four-speed gear box or by a 5 hp. motor mounted on top of the gear box with a pinion on the motor meshing with a gear on the gear box as shown in the accompanying illustration. The planer can also be operated with a four-step cone pulley in place of the gear box. The handle for operating the starting and stopping clutch of a gear box driven planer also operates a brake for stopping the table when the clutch is thrown out. All gears and revolving parts are safeguarded.

The table working surface is 40x21 in. The strokes per minute of the table are given as 10, 17, 29 and 48, with a ratio of return to cut of 1.4 to 1. The floor space occupied is 80x120 in., or 70x120 in. depending on the type of drive; and the weight is given as approximately 8,000 lb.

A contract has been signed by Topping Brothers, heavy and marine hardware jobbers, 122 Chambers Street, New York, with the White Construction Co. for the erection of a four-story and basement reinforced concrete warehouse and office at Varick and Vandam streets. This building will have 67,000 sq. ft. of floor space, according to the present building plans, and will be constructed so that three additional stories may be added. A feature will be a 30 x 70 ft. loading platform inside the building to expedite the handling of pick-up orders for city deliveries among the trade. Topping Brothers have been located on Chambers Street for 36 years.

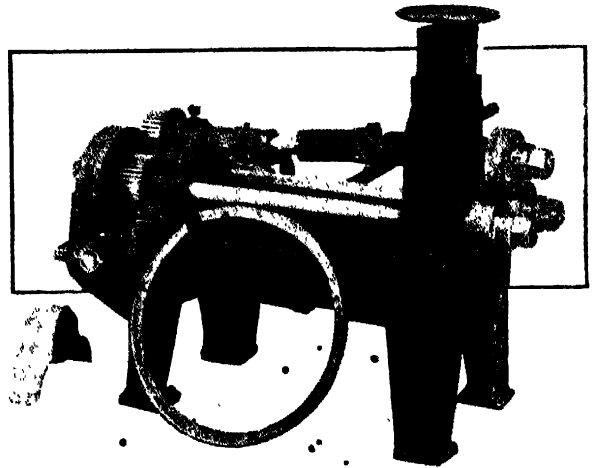
Regional Meetings of Machine Tool Builders

Regional meetings of the National Machine Tool Builders' Association held at Boston and Worcester, Mass., and Hartford, Conn., June 1, 2 and 3, respectively, were well attended in each instance. At each meeting Ernest F. Du Brul, general manager, with the aid of charts, covered in a general manner the relation of price movements, demand for and production of various commodities and applied the same principle, as far as is possible, to the machine tool industry. He stated prices for machine tools necessarily must be governed entirely by individual conditions bearing on the individual line of machinery produced. The maintaining of high prices on a fictitious basis invites competition and Mr. Du Brul believes it equally unwise to cut prices without a thorough knowledge of the relation of such action to the cost of doing business. The real purpose of these talks was to show what the association is endeavoring to accomplish in the matter of securing statistics which will have some value to the members.

It was pointed out the task of compiling statistics costs money and the question of an increase in the annual dues of the association was discussed. Nothing definite has been decided which will increase the revenue of the association. General opinion among those attending these New England meetings appeared to be that the association is accomplishing something of real value. The regional meeting idea was endorsed.

Ring Coiling Machine

A new adjustable coiling machine for the manufacture of rings and coils to various diameters has been



Ring Coiling Machine on Which Angles 2 x 2 x ¼ in. Can Be Bent Cold to a 30-in. Diameter Circle

recently put on the market by the Wallace Supplies Mfg. Co., Orleans Street, Chicago. The machine is known as the No. 3.

The rolls are removable and can be arranged to suit the section of the material that is to be bent, viz.: pipe, angles, channels, tees, squares and other sections. The machine may also be used for manufacturing spirals out of reinforcement bars. Angles 2 x 2 x ¼ in. can be bent cold to a 30 in. diameter circle and lighter sections can be bent to smaller diameter.

The machine is operated by a lever engaging friction clutch pulleys for forward and reverse drive. The upper roller is adjustable by means of hand screw to secure any diameter of coil desired. Rollers can be furnished for any shape or section of material. The floor space occupied is 42 x 54 in., and the weight is 1200 pounds.

The Ordnance Salvage Board of the War Department has sold approximately 211,500 loaded brass fuses to the Rochester War Salvage Co., Inc., New York, at a price of 0.06789 cents each.

AUSTRIAN MARKET

Materials Plentiful but Shortage of Skilled Help —Protective Tariff Asked

(Special Correspondence.)

VIENNA, AUSTRIA, May 14.—The Austrian foreign trade returns for the year 1920, recently published, reveal the rather marked dependence of the Austrian iron industry on Czecho-Slovakia. Iron ores, chiefly Styrian and Carinthian, had to be shipped to Czecho-Slovakia in return for coke for domestic blast furnaces. In machinery, the trade balance is in Austria's favor.

A time extension has been arranged for the compensation agreement with Poland until March 31, 1922. Among other things the Austrian Government pledges itself to permit the export of 35 new locomotives and 550 railroad cars, as well as to provide for the repair of 500 Polish locomotives for a period of four years. Poland is furthermore to receive 50 truckloads of magnesite.

No Iron Shortage

The demand for tariff protection by the iron industry and the rapid improvement of the iron market are the two paramount topics in industrial circles. The improvement in the iron market has been astonishing. Not only has the shortage considerably abated but there is an actual surplus of iron on the market, partly due to increased production, but more to the influx of German iron. The increase in production is attributable to the interest agreement concluded some time ago between the Alpine Montan Gesellschaft and the German Rhein-Elbe-Union (Stinnes) by which the former was insured a sufficient supply of coke to resume operations on a larger scale. Coke supplies from Czecho-Slovakia have been so large lately that acceptance has been refused of any shipments exceeding contract tonnage since the housing shortage renders employment of additional labor impossible. A housing plan running into several hundred million kronen has been drawn up, but with building costs 160 times pre-war prices and a shortage of skilled and other labor, it seems doubtful whether all plants will operate to capacity before 1922.

Tariff Protection Demanded

The improvement of the iron and steel industry has given rise to a demand for tariff protection. The steel industry is determined to maintain the present high price level at any cost and is making strenuous efforts to persuade the Government to re-establish the customs barrier which was broken down by the revolution. No attempt is being made to conceal the fact that this action is primarily directed against German iron imports.

American Capital in the Machine Industry

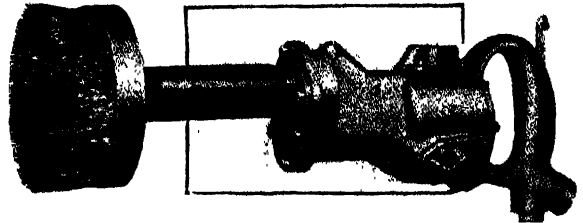
One of the problems of the machine and engineering industry awaiting solution is the reconstruction and adaption of the former Government ordnance and war material plants, including the Vienna arsenal and other plants at Woellersdorf, Woerth, and Fischamend, all of which were converted in the spring of 1920 into the "State Industry Works." Most of these plants were erected during the course of the war and are equipped on modern lines. Operated at normal, they offer employment to more than 70,000 workers.

Some months ago, the arsenal at Vienna was converted into a communal undertaking, operating with a capital of 550,000,000 kr. and similar action will shortly be taken with the plant at Fischamend. This venture, however, will represent a combination of private and state capital. The proposed company is to be formed with an operating capital of 200,000,000 kr., of which the state will hold 80,000,000 and the remaining 120,000,000 kr. will be furnished by an American company, 20,000,000 kr. in cash and the balance in patents. It is intended to manufacture linotype machines and the American group is said to have guaranteed annual earnings of \$100,000, agreeing to sell a certain minimum output for a period of 15 years.

This plan by no means exhausts the productive possibilities of the plant, but nothing definite has been decided upon with a view to a 100 per cent operation.

Air Operated Wire Brush

A wire brush for use in connection with its standard No. 6 Little David drill has been recently put on the market by the Ingersoll-Rand Co., 11 Broadway, New York. The combination is intended for use in removing paint, rust, scale and dirt from tanks, steel cars, structural steel and all sheet metal surfaces. It is also



Air-Operated Wire Brush for Cleaning Paint and Scale from Metal Surfaces

said to be useful for cleaning iron, steel and aluminum castings.

The wire brush has a face diameter of 5 in., and is made up of wires of special heat treated steel. The drill has bearings to take up end thrust when pressing down on the work; and the motor is of high speed and light weight design. The weight of the drill and brush complete is 11½ lb.

No Shortage of Oil Feared

To offset recurrent predictions of approaching depletion of the oil fields of the United States, resolutions have been adopted by the Western Petroleum Refiners' Association, National Petroleum Association, American Independent Petroleum Association and Independent Oil Men's Association, affirming an abiding faith in a long future for the industry. After referring to the deterrent effect of pessimistic predictions, in preventing prospective consumers from adopting oil as a fuel, the resolutions call attention to new fields being developed continually, and express "confidence in the ability of the petroleum industry of the world to supply the needs of the world indefinitely. The oil-consuming world need have no more fear for the supply of oil in the future than for the supply of coal."

Interesting ancient history pertaining to iron making in Virginia appears in the April number of William and Mary College Quarterly, a historical magazine, Williamsburg, Va. The article is entitled "Anthony Langston on Towns and Corporations; and on the Manufacture of Iron." It was written about 1660, the original manuscript being in London, a copy of which rests in the Library of Congress and which has never been published before. The article is a prospectus of resources, equipment and men necessary for making "500 tunns of iron."

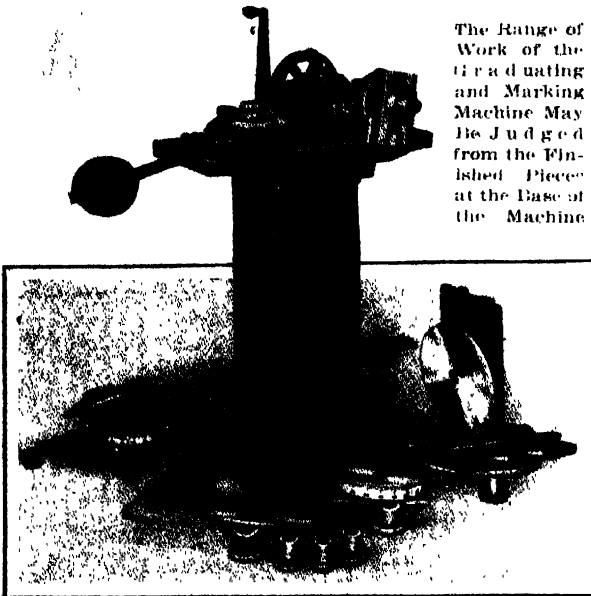
"A Method of Accounting for Scrap" is the subject of a bulletin for May of the National Association of Cost Accountants, 130 West Forty-second Street, New York. The early part of the bulletin discusses the theory of proper scrap accounting; then follows the application of the theoretical principles to four cases. On four loose bulletin service sheets are discussed the distribution of crane costs.

W. H. Weingar, representing the Pratt & Whitney Co., Hartford, Conn., addressed an open meeting of the American Society of Mechanical Inspectors at Hotel Sherman, Chicago, on June 7. His subject was "Measuring and Manufacturing in Millionths of an Inch." On June 6, he delivered the same address before the Western Engineering Societies, Rockford, Ill.

Graduating and Marking Machine

To provide for the performance of graduating operations where accuracy of the product and speed of operation are required the Noble & Westbrook Mfg. Co., Hartford, Conn., has recently developed the machine shown in the accompanying illustration.

Hand and power machines are furnished. On the power-driven machine, the placing of pieces of work in the machine and removing them when the operation has been performed, are the only duties required by the operator. With the hand machine, one turn of the handle completes the work. Provision is made for



The Range of Work of the Graduating and Marking Machine May Be Judged from the Finished Piece at the Base of the Machine

holding the work in the proper relation to the graduating die and the depth of the marking is governed by means of a foot lever, cam and weight, which are governed by a positive stop that is adjustable to provide for making any desired depth of lines. This insures making even and accurate impressions. The machine is equipped with steel spindles, adjustable bearings, and is fully automatic in operation, being stopped by means of a clutch on the spindle which drives the marking die.

An idea of the range of work for which the machine is adapted will be gathered by referring to pieces illustrated. Parts of various diameters can be graduated by changing the position of the intermediate gear located on the adjustable sector. Practically all types of modern machine tools are equipped with micrometer adjustments, and this machine is adapted for the graduation of the dials used on micrometer adjusting screws, also graduating and numbering cross slides and compound rests for lathes. The graduating and numbering are completed in one operation.

Eugene Schneider Awarded Fritz Medal

The John Fritz Medal Board of Award has awarded its gold medal and diploma to Charles Prosper Eugene Schneider, the distinguished French engineer, scientist, and man of affairs, head of the Creusot and other works in France. The following cable has been sent to his home in Paris: "John Fritz Medal Board of Award representing national societies of civil, mining and metallurgical, mechanical, and electrical engineers, has awarded you the John Fritz gold medal for achievement in metallurgy of iron and steel; for development of ordnance, especially the 75-mm. gun, and for notable patriotic contribution to the winning of the war."

Born Oct. 29, 1868, at Le Creusot, he has devoted his life to the development of the great industries which his forefathers founded. Upon the death of his father in 1898, he became the head of the company, when only thirty years of age. He was a member of the Chamber of Deputies of the French Parliament from 1898 to 1910. He has received many honors in his own

and other countries for noteworthy achievements. While in the United States in November, 1919, he was presented the gold medal of the Mining and Metallurgical Society of America.

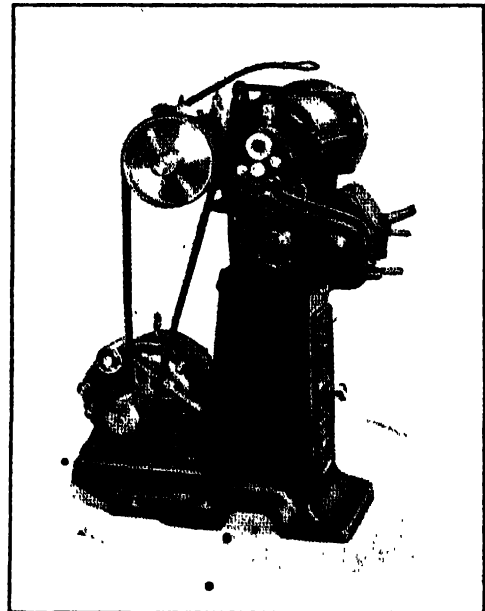
The medal and diploma will be presented to Mr. Schneider in France by a party of distinguished American engineers, who will go to Europe in June. This party is led by Ambrose Swasey, chairman of the board of award, and will include several other officers and past officers of the national societies of engineers. They will bear greetings to the engineers of England and France from the engineers of America. At a large gathering of the English engineers in London in June, the American party will present the John Fritz gold medal and diploma to Sir Robert A. Hadfield, awarded sometime ago "for the invention of manganese steel," so useful in the war and in the industries of peace.

The John Fritz gold medal has previously been awarded to sixteen eminent American and foreign engineers and scientists.

Changed Design of Economy Lathe

The Rockford Lathe & Drill Co., Rockford, Ill., has developed a geared head and motor-drive for its Economy 14-in. swing quick change lathe.

The headstock is driven by a single pulley running at 400 r.p.m. and provides twelve spindle speeds in geometrical progression with the use of but thirteen gears. These are of large diameter, wide face and coarse pitch, cut from solid steel and run in oil. Spindle and shafts are of high carbon steel, ground to size. The spindle has a special thrust bearing of alternate collars of hardened steel and bronze. All bearings are



14-In. Swing Engine Lathe with Motor Mounted on Extension of Cabinet Leg

equipped with sight feed oilers. The quick change gear box is of new design and has thirty-two changes of threads and feeds obtained through sliding steel gears and hardened steel clutches, controlled by two convenient handles in connection with tumbler.

The motor may be of any standard make, preferably of 1½ or 2 hp. with constant speed having a maximum of 1200 r.p.m. The motor is mounted on a detachable plate which is fastened to a base cast integral with the cabinet leg, driving by means of a 3-in. belt kept at proper tension by an adjustable idler pulley. The intention of this design is to provide a quiet and flexible drive, and also to eliminate necessity of removing the motor in case lifting the cover of the headstock for inspection or adjustment becomes necessary. The motor may also be placed on the floor, wall or ceiling and belted direct to headstock pulley.

Metal Jobbing Problems Discussed

General Business Situation Given Consideration by Meeting at Cleveland of Metal Branch of National Hardware Association

BUSINESS conditions were discussed at considerable length at the tenth annual meeting of the metal branch of the National Hardware Association, held at the Hotel Cleveland, Cleveland, June 3 and 4. The meeting was attended by about 100 members, including manufacturers of sheet and tin plate and hardware jobbers who handle sheet metal. The general trend of the sentiment of speakers was optimistic. The opinion was expressed that the turning point had been reached and that a slow but steady improvement in business may be looked for. However, speakers avoided predictions as to when business would again become normal.

Representatives of sheet mills expressed confidence that orders would be better during the latter part of the year and that not much, if any, decline in prices could be looked for until there is a reduction in railroad rates and until there are further wage readjustments. Some opinion was expressed that consumers thought prices are still too high and that business will not pick up until there is a change in this attitude of buyers, or prices are further reduced.

The meeting was presided over by W. H. Donlevy, of Carter, Donlevy & Co., Philadelphia, chairman of the metal branch, who spoke briefly regarding industrial conditions. He said that the readjustment in prices was a step in the right direction but the failure of this readjustment to bring out business indicates that buyers are afraid that there will be further price reductions. He referred to several factors that should result in an improvement in business conditions particularly the good crops and the greater efficiency of labor.

A. H. Decatur, Boston, Mass., president National Hardware Association, discussed the business situation briefly. The cost of distribution for years has been greater, he said, than it should have been and this cost must come down, as selling values of products declined. He expressed an optimistic view regarding the future, asserting that the country has become almost bare of goods and that an enormous amount of money must be spent for repairs and replacements.

Campaign for Metal Roofing

The subject that brought out the greatest amount of discussion was that of a national publicity campaign in behalf of sheet metal roofing and exterior work. This was led by A. K. Raub, Raub Supply Co., Lancaster, Pa., who attributed the decline in the use of metal for roofs and exterior work in buildings to poor material and particularly poor workmanship. He declared that the people want better roofs and a campaign in this direction should be started by sending men out to educate the tinner.

H. N. Taylor, N. & G. Taylor Co., offered a resolution to be sent to the National Sheet Metal Contractors Association asking that special attention be given to the development and training of apprentices with the object of increasing the use of sheet metal products and elevating the standards of the entire industry. This resolution was adopted. Considerable discussion developed as to how a publicity campaign should be handled, as there are three interests involved, the sheet metal manufacturers, the jobbers and the sheet metal contractors. John Follansbee, Follansbee Brothers Co., said that the manufacturers had recently decided not to start a publicity campaign. After considerable discussion it was decided to appoint a committee of two distributors to confer with a committee of the Sheet Metal Contractors Association, which meets in Pittsburgh June 13, and take up the subject of publicity. F. O. Schoedinger and A. K. Raub were named as that committee.

E. T. Sproull, Trumbull Steel Co., Warren, Ohio, discussed the probable developments in the sheet metal market during the balance of 1921. In his opinion considerable brightness will develop in the steel industry before the end of the year. He said that the condition to-day is not due to the lack of demand but because of the lack of buying. Consumers are waiting for readjustments. He thought good business would be restored when people think the time is right to buy and prices are right. Considering freight rates, labor, etc., sheet mills, he thought, might make a little profit at present prices if running at 100 per cent capacity. Taking everything together he believed that the turn had been passed in the period of industrial depression and he predicted a gradual but substantial improvement over the remainder of the year. Representatives of some other sheet mills also expressed the belief that there would be improvement in business later in the year.

F. O. Schoedinger, Columbus, Ohio, presented a paper in which he compared the decline in prices of farm products with the decline in steel prices, showing that the former had declined to a much greater extent than the latter. He said that there must be a gradual deflation in prices and that when labor and freight rates are deflated, farm products will be on the same basis as pig iron.

Copper and Tin in Jobbing Trade

Considerable time was devoted to the discussion of various phases of the copper situation. An address on "The Copper Producers' Problems" was made by Thomas D'Arcy Brophy, Anaconda Mining Co., Anaconda, Mont. He said the one problem copper manufacturers had neglected was the problem of distribution and that was the greatest problem of the producers to-day. The producers had not co-operated as they should with the fabricators and the producers and fabricators had not co-operated with the distributors. The greatest demand comes from the electrical industry, and next to this comes the building industry. He stated that the manufacturers will use all their efforts to increase the use of copper, brass and bronze in the building industry, and referred to a sales promotion campaign that will be started with a view of popularizing copper in the building industry.

B. Goldsmith, president National Brass & Copper Co., Lisbon, Ohio, said that the spread between copper cakes and finished sheets is only 20 per cent greater than during the pre-war period, which he regarded as a remarkably low increase. W. D. Taylor, president of the George Worthington Co., Cleveland, declared that jobbers were not being allowed enough profit to permit them to handle copper, and similar sentiments were expressed by representatives of some other jobbing houses.

Isadore Davis, M. Lissberger & Son, Brooklyn, N. Y., protested against the proposed tariff on pig tin that is included in the pending Longworth tariff bill. Some of the tin plate manufacturers present also voiced their sentiments in opposition to a tariff on pig tin and a resolution was adopted by unanimous vote protesting against any tariff on this metal.

Exchanging Stocks Among Jobbers

A discussion of "The Position of the Distributor in the Present Market" was led by F. A. Heitmann, F. A. Heitmann Co., Houston, Texas. He said that many jobbers have large stocks and should be protected by the manufacturers. However, stocks must be liquidated. In his own town a plan of exchanging excess stocks had been placed in effect and had proved satisfactory. Under this plan jobbers exchanged surplus stocks

rather than placing new orders and in this way surplus stocks are being reduced more rapidly. He did not think that price reductions would stimulate business.

H. H. Riddle, George Worthington Co., Cleveland, said that his company had followed a similar policy in making exchanges with other hardware jobbers.

Reducing Overhead Expenses

The reduction of overhead expenses was discussed at some length, the discussion being opened by Clifford E. Pierce, Betz-Pierce Co., Cleveland, jobber in sheet iron and steel. He told how his company had cut down expenses by eliminating dead wood in labor, checking telephone calls, eliminating supplies for automobiles, etc., and reducing expense accounts. A survey of members prepared previous to the meeting indicated that overhead expenses were being reduced by reductions in salaries and wages, increased efficiency, elimination of bonuses and in the reduction of the number of employees.

Reports from members showed that the average overhead expenses during 1920 were 14.36 per cent on selling price and 16.79 per cent on cost price. During the first four months of 1921 the overhead expense was 20.05 per cent on selling price and 25.08 per cent on cost price. In this connection T. J. Fernley brought up the subject of high hotel rates and said that a great deal of the overhead expense could be cut down by securing a reduction of these rates. Steps that are being taken to attempt to induce hotel proprietors to reduce rates were referred to.

Zinc Roofing

E. H. Wolff, Illinois Zinc Co., Peru, Ill., read a paper on zinc roofing in which he gave a brief history of the zinc industry. He said that more zinc is being rolled in Europe than in this country and that it is being used very largely abroad for roofing purposes. In the past there has been a lack of education on the subject of zinc roofings, but now the zinc manufacturers have an organization, plan to do educational work and will dis-

tribute a zinc users' handbook. He said that producers are now doing more to meet the demands of consumers than formerly. Zinc is being used for more purposes, and manufacturers are making zinc of different qualities to meet requirements. Corrugated zinc sheets are now being made in all sizes. He exhibited a zinc shingle which his company is just bringing out and which will be sold through the jobbing trade.

It was decided to appoint a committee of distributors and manufacturers of sheet copper in order to effect a closer co-operation between the two interests and to see if a larger commission on sales cannot be secured for the jobbers.

H. H. Riddle led in a discussion on the subject of equipping salesmen with sales information. In his opinion something should be done and done quickly to educate salesmen. Various plans he suggested included talks by manufacturers, visits to manufacturing plants, the use of house organs and bulletins. He said that his company recently took 25 salesmen to a manufacturing plant, showed them the processes and the results have been very effective.

A statement was made during the discussion that best results can be obtained by calling in salesmen and keeping them posted on conditions and products and in this way keeping in closer touch with the salesmen. Clifford Pierce said a questionnaire was sent to salesmen which was found to be very effective. If the salesmen did not answer the questions properly they were corrected, and in some cases salesmen supplied information that was not known by the men higher up in the organization.

The following new members were elected to the metal branch: Peck-Stow-Wilcox Co., Cleveland; J. M. & L. A. Osborn Co., Cleveland; National Brass & Copper Co., Lisbon, Ohio; Superior Sheet Steel Co. and Eller Mfg. Co., Canton, Ohio; Faible & Co., Philadelphia. The arrangements for the Cleveland meeting were under the direction of a local committee, of which Clifford E. Pierce was chairman. The entertainment was limited to an informal dinner and theater party Friday evening.

Heat Treatment of Ordnance and Locomotive Forgings

Speaking at a meeting of the Washington Chapter of the American Society for Steel Treating, May 19, at the Harrington Hotel, Washington, P. E. McKinney, metallurgist Washington Navy Yard, discussing "Heat Treatment of Ordnance Forgings," called attention to the inadequacy of the ordinary inspection reports covering surface conditions of the metal and chemical composition in defining the quality of steel for high-grade forgings. Melting and forging records of an electric furnace heat of chrome-nickel steel having an abundance of non-metallic inclusions and of inferior physical properties, but within the requirements as to composition and surface, were shown. Examination of the melting chart revealed unsatisfactory slagging conditions which at once characterized the metal as questionable.

A few of the factors having serious bearing on the quality of steel and which are not apparent from a casual examination of raw material inspection reports were given as follows:

- Method used in refinements of steel
- Metallurgical control of conditions of slag.
- Methods of introducing ferroalloys, degasifying agents, etc.
- Condition of metal previous to tapping from furnace.
- Temperature of metal during refining and finishing.
- Size of nozzle used in teeming of ingots
- Method of pouring ingots.
- Size of ingot used for given purpose.
- Type of ingot used as regards chilling effect, etc.
- Rate of speed in pouring ingots
- Temperature of metal entering the ingot
- Shrinkage of the ingot on cooling.
- Behavior of the ingot during solidification

At the same meeting Lawford H. Fry, superintendent of production, Standard Steel Works, Burnham, Pa., in describing general practice in the heat treat-

ment of wrist pins, connecting rods, piston rods and axles, in a paper, "Theory and Practice in Quenching Large Locomotive Forgings," also emphasized the importance of "pre-natal" influence on the quality of finished product.

Data were given relating to the rate of heat dissipation in various quenching media, as follows:

	• Btu. Conducted per Sq. In. of Surface per Min.
In air	1.0
In heavy oil	2.7
In cutting compound	3.0
In light oil	3.6
In water	7.0

While these average figures hold for both large and small sections, the hardening is dependent upon the rate of temperature drop. Vigorous circulation of the quenching bath not only materially cuts down the time of cooling but may result in greatly improved elastic properties.

At the next meeting of the Washington Chapter, June 17, Enrique Touceda will be the principal speaker and will discuss malleable iron.

Judge Cochran, in the United States District Court at Covington, Ky., issued an order, in a suit filed by the Houston, Stanwood & Gamble Co., machine tool manufacturer, against Harry Meyers and other members of the machinists' union, which prohibits pickets from being stationed at the company's plant at Covington, Ky., interfering in any way with the present employees of the company or congregating of former employees, or anyone representing them, near the plant. At the preliminary hearing some time ago on the application for the injunction, Judge Cochran ordered that two pickets would be permitted to patrol the vicinity of the plant.

To Determine Status of Trade Associations

National Administration Will Not Tolerate Violation of Law, but Will Encourage Proper Activities—Statements by Secretary Hoover and Attorney-General Daugherty

WASHINGTON, June 7.—Clear understanding of the legal status of trade associations and trade institutes, such as are common to all important industries of the United States, is being sought by the Harding Administration as one of the underlying motives of the Department of Justice in announcing last week that those which engage in so-called "open price" practices will be prosecuted. That legitimate organizations will not be molested, but rather may be encouraged by the Government, it is desired to establish a plain distinction between those which are and those which are not operating within the law. In order to dissipate any alarm that business interests may have exhibited over the policy of the Administration, statements have been made both by Attorney General Daugherty and Secretary of Commerce Hoover that the great majority of such organizations are both complying with the law and rendering a national service. But there is at the same time a well-fixed opinion on the part of the Administration that a small minority of national associations which, encouraged during the war to gather statistics as to prices, stocks, consumption and related facts, and for other purposes, have continued the practice and are making use of the data for their own purposes to the detriment of the public interest. It is the latter which will be the subject of legal proceedings.

There is the old question, however, of drawing a difference between practices that constitute violations and those which do not. The so-called "twilight zone" enters into the situation and the Administration is endeavoring to have it defined clearly, precisely as has been attempted in the past, but so far without the desired degree of success.

Secretary Hoover issued a statement advocating that Congress empower the Federal Trade Commission with the constructive function, subject to review by the Attorney General, of removing the uncertainties from the mind of business "between the field of co-operation for promotion of production and trade in public interest and the field of practices against public interest." Attorney General Daugherty, pointing out that investigations of the associations have been conducted and that while it was not the policy to institute a general dragnet, those which are thought to be violating the law will have proceedings brought against them in courts. It was stated that practices and plans of associations which gather trade information are being inquired into for possible violation of federal statutes. The Attorney General said there are about 400 such associations. Of these 100 are reported to be under scrutiny. The Department of Commerce, Secretary Hoover said, wishes to co-operate and assist with all which are performing a public service as against "a small minority who have degenerated into ways that make for restraint of trade."

Cases Pending in Courts

Aid in ascertaining the differences between violation of and compliance with the anti-trust laws is hoped for from pending decisions by the United States Supreme Court in the hardwood lumber case and by a federal court in St. Louis in the yellow pine case.

While certain so-called "open price associations" are to be the object of action by the Department of Justice, which has not revealed the names of any in mind, other organizations also are under investigation.

"What the department intends to do," said Mr. Daugherty, "is to proceed vigorously against those classes of business which are violating the law. The department will begin its actions against violators by selecting a particular association which it holds is violating the law. The department will agree upon this procedure within a few days. I shall not name the

association that we have in mind. Our steps may include both the bringing of indictment and the filing of a bill under the civil statutes."

This statement of the Attorney General was made following the cabinet meeting on Tuesday of last week, when discussion was made of the Administration policy as to its attitude against combinations which are said to still maintain "open price" arrangements for the interchange of information such as was put into effect during the war. The fact that such practice was encouraged during the war, Mr. Daugherty said, does not mean that the Administration must acquiesce in its continuance. The view was expressed by the Attorney General that while such a practice may have served a good purpose during the period of the war, the effect now is to stifle competition and to result in unfair prices being charged to consumers. While there might not be definite agreements, he stated, "a wink of the eye and a nod of the head" were sufficient to accomplish the result desired.

Comprehensive Statistics

Mr. Daugherty has discussed the matter with Secretary Hoover, who is holding a series of conferences with representatives of leading industries in an effort to obtain their co-operation in the publication of comprehensive trade statistics by the Government, and that information and advice on the subject had been exchanged. Data given the Department of Commerce at these conferences are treated as confidential as to names of producers, etc., and will be used to aid both the Government and business, it is stated, as a guide to conditions in given industries and methods for promoting them for producers and consumers alike.

Mr. Daugherty said that it still is the policy of the Department of Justice, as was pursued under the Wilson Administration, to encourage the discontinuance of alleged violations by voluntary action, among associations, with a view to keeping at a minimum the amount of litigation brought by the department. He said that there are many instances reported to the department of such practices being discontinued. There is no intention, he stated, on the part of the Government to attack business associations, but there is considerable doubt, due to conflicting court decisions, as to how far business men could go in their organizations without violating the laws. He added that the object of the movement by the Department of Justice is to have the law definitely determined so that both the Government and the business men would know where they stand.

Secretary Hoover's Views

The attitude of Mr. Hoover accords with that of Mr. Daugherty, as denoted by the following formal statement issued by the former:

The relations of trade associations and trade institutes to the anti-trust laws have been discussed at great length in the Administration. Of the many thousands of such organizations there are a small minority which have degenerated into ways that make for restraint of trade.

All are agreed that the purposes and actions of the vast majority of all contribution of public welfare. Their activity in promotion of better business practices, advancement of technical processes, simplification of production, standardization of quality, extension of foreign trade, commercial arbitration, etc.—all make for more efficient industry and business. Many of them collect information as to the production stocks of raw and other material, percentage of industry in active operation, total orders in hand—all of which when available to the public, contribute both to stability and the increasing efficiency of industry and to the protection of both the

smaller manufacturer and the consumer. The Department of Commerce wishes to cooperate and assist with all of this sort of effort.

A smaller number of such associations have been engaged in the collection of data on the prices for the exclusive use of their members. Some of these associations have been argued with delimiting areas of commodity distribution among their members and other misuse of information.

Whether these latter practices constitute a violation of the national anti-trust laws must be determined by the courts, and this the Attorney General is vigorously proceeding to find out.

All this raises anew the question of the authority of the Federal Trade Commission. The original conception of the

commission was that it should, amongst other things, advise business men as to what constituted a violation of the restraint of trade laws, but these powers were struck out in the course of original legislation. It seems to me that the seven years' experience with the commission should now enable a reconsideration of its powers with a view to giving it a more constructive function, subject to review by the Attorney General, by which it could remove the uncertainties from the mind of business men as to the line between the field of cooperation for promotion of production and trade in public interest and the field of practices against public interest. There is nothing so destructive of business as uncertainty, and business has inherently enough to deal with, without this one.

CZECHO-SLOVAKIA DEPRESSED

Exports Decline—Labor Difficulties—Trade Agreement with Italy—New Export Association

(Special Correspondence)

PRAGUE, CZECHO-SLOVAKIA, May 18.—The depression in the Czechoslovakian market in the past few months continues and has even been gaining in volume of late. Mills in Bohemia and Moravia comment upon the lag in demand and the steadily declining export business to Poland and Austria. The situation is aggravated by strikes and lock-outs in the north Bohemia metal industry and the slump in production is naturally reacting upon the market. Among other works, the Iron Industry Co. at Prague has had to lay off men, declaring that it was impossible to operate collieries and smelting plants on a revenue-paying basis with the present high labor cost. Two shafts have been closed down and production at the furnaces considerably curtailed. A tendency toward wage reduction is clearly evident in the iron and steel industry, but attempts in this direction are meeting with stubborn resistance from labor, despite the fact that the level of living costs has been lowered. Practically all the larger plants are operating at about 50 per cent of capacity; several works producing for stock while others are planning to introduce part-time. The industry generally is anticipating a revival of export business following the conclusion of an agreement with Austria, under negotiation, but even with this, stiff German competition in the Eastern market must be considered.

Steel Production Still Low

The figures on steel production during 1920 are now available. An aggregate of 972,976 tons of steel was produced, of which 163,663 tons (16.82 per cent) was basic Bessemer, 792,794 tons (81.48 per cent) was open hearth and 16,519 tons (1.7 per cent) was electric furnace. Compared with 1919, the total output shows an increase of 186,954 tons or 23.8 per cent, which is principally because of improved fuel supply as well as resumption of operations at Slovakian plants. A study of the figures for former years reveals, however, that the 1920 figures are still behind pre-war and war production, the output of plants in what is now Czechoslovakia during 1913 having amounted to 1,237,021 tons, while 1,610,079 tons were produced in 1917 and 1,019,032 tons in 1918.

Trade Agreement with Italy

A trade treaty has been signed between Italy and Czechoslovakia valid for one year beginning April 15. Under its terms Czechoslovakia, among other commodities, is permitting the import of the following maximum quantities: 1000 automobiles, 300 motorcycles, 1000 pedal bicycles, 15 tons of bicycle accessories, 100 tons of cables and electric wires, 250 tons of electrical material which includes ventilators, motors under 1 h.p., direct and alternating current motors up to 2000 h.p., pumps, fans, etc., and 25 tons of dough-mixing and kneading machinery. Italy in return permits the import of 1000 automobiles and 100 motor plows as well as the export of 10,000 tons of iron ores and 6000 tons of pyrites.

Slackness reported in the coal industry is beginning to react upon certain branches of the machinery

manufacture, as is evidenced by the reserved attitude of collieries, coke oven plants, etc., which have always been regarded the best customers. Conditions in the agricultural machinery line also leave much to be desired. Whether the recent reduction of the export levy from $\frac{1}{2}$ per cent to $\frac{1}{4}$ per cent of the invoice value will act as a stimulus to the export market, remains to be seen. Except for some activity in vehicle and rolling stock manufacture, there is very little improvement.

Increased attention is being devoted to stimulating export business and eight of the leading firms, including the Skoda works, Rustan and Laurin & Clement, recently organized an export association for the promotion of Czechoslovakian machinery sales abroad. The total capital represented in the association amounts to 274,000,000 kr. while the number of workmen employed by affiliated firms is about 44,000. Another association being organized will handle the export of railroad ties. A certain percentage of the production is to be placed at the disposal of the domestic railroads at lower prices while surplus output is to be exported. Part of the rolling stock industry is occupied with orders for parlor cars for the Egyptian railroad administration, four coaches having arrived at Antwerp en route to Egypt some time ago.

British Steel Exports Still Small in April—Imports Continue Heavy

British steel exports in April this year, excluding iron ore and including scrap, were 161,508 gross tons as compared with 149,847 tons in March, with 167,158 tons in February and with 233,144 tons in January. The April exports last year were 274,337 tons. The average per month in 1920 was 274,881 tons per month while in 1913 it was 420,757 tons per month. The 1919 rate was 188,519 tons per month. The April outgo is therefore less than even the 1919 monthly average and close to the smallest in the war years. Imports in April were 111,536 tons, which contrast with 196,945 tons in January, with 181,565 tons in February, with 179,610 tons in March, and with 128,685 tons per month in 1920. The 1913 imports were 195,264 tons per month.

Expressed as a table the exports and imports this year and in previous years were as follows in gross tons:

	Exports	Imports
January, 1921	233,144	196,945
February, 1921	167,158	181,565
March, 1921	149,847	179,610
Aver. per mo., first quar., 1921	183,373	186,040
April, 1921	161,508	111,536
Average per month, 1919	188,519	50,801
Average per month, 1920	274,881	128,685
Average per month, 1913	420,757	195,264

The trend of some of the principal exports is shown by the following data in gross tons:

	Average per Month 1913	1920	April, 1920	April, 1921
Pig iron	78,771	33,505	52,095	7,218
Steel rails	41,676	11,213	7,408	25,000
Steel plates	11,162	16,571	12,393	13,949
Galvanized sheets	63,506	34,244	36,206	9,659
Steel bars	20,921	30,322	27,825	10,592
Tin plates	41,208	29,418	32,951	13,667
Black plates	5,679	3,026	2,261	878

The April exports of steel rails exceeded the 1920 monthly rate, all others showing a pronounced decline.

Pig iron imports in April were 33,662 tons as compared with 11,216 tons in April, 1920. The monthly

average imports in 1920 and 1913 were 12,705 tons and 18,069 tons respectively.

Iron ore imports in April were only 123,588 tons as compared with 541,742 tons per month in 1920. In April, 1920, they were 748,418 tons. The total for the first four months was 1,234,261 tons as compared with

2,073,737 tons in the first four months in the year 1920.

Manganese ore imports were only 7694 tons in April against 37,717 tons per month in 1920 and 50,098 tons per month in 1913. The total to May 1 this year was 112,186 tons against 109,482 tons for the same four months last year.

TARIFF LEGISLATION

New Causes for Delay Develop—Duty May Be Placed on Manganese Ore

WASHINGTON, June 7.—Permanent tariff legislation is in a state of confusion. Members of the House Committee on Ways and Means still have differences of opinion as to certain schedules, including those relating to silk, cotton, wool and chemicals. Several items in the metal schedule also remain to be acted upon, including ferromanganese, though it is said this is due to a request of members of the sub-committee having charge of this schedule rather than to any sharp divergence of views. It is claimed that some further consideration is being given these particular items in the metal schedule, yet it also is indicated that the full membership of the committee does have conflicting opinions on them. The recommendation of the Payne-Aldrich rate of \$2.50 a ton is said to have been made by the sub-committee on ferromanganese when it presented its schedule, but it remains to be seen whether this may not be increased. There is an absence of clear evidence, however, that an advance will be suggested. Such a move, it is believed, would mean the fixing of a duty on manganese ore, which has been both opposed and defended, with the result that the recommendation of the sub-committee is reported to have been that manganese ore be continued on the free list.

The differences within the committee itself are apparently not so important as are those of the full Republican membership of the House over the Longworth joint resolution giving the Ways and Means Committee discretionary power to make any or all duties in the forthcoming permanent tariff bill effective from the day the latter is reported to the House. The conference of the House Republicans last Wednesday over the resolution developed vigorous opposition to the resolution. Part of the protest was against the entire purpose of the resolution, while some of the opposition was to the form of the resolution. This takes the character of an argument that the resolution gives too much power to the Committee on Ways and Means by permitting it within itself to determine the rates to be put into effect without first letting Congress pass upon them. It is likely that, in pressing the Longworth resolution further, a compromise will have to be effected, if it is to succeed in passage, which, at present, seems to be doubtful. For not only is there opposition in the House Republican membership, and practically the entire Democratic membership, but the Senate appears to be hostile to such legislation, both as to Republicans and Democrats, though a real test might develop more support of the resolution in the Senate than has been indicated. Not a great deal of support has been given to the claims of opponents of the resolution that it is unconstitutional.

Perplexing Features

It can not be denied that the tariff is proving to be a perplexing problem with some new features of difficulty. The so-called differences cannot be accepted, however, as proof that Republicans as a whole are lukewarm regarding a protective tariff. The great majority favor it and with old-time vigor, though taking into consideration present-day economic conditions, such as the high cost of living, world-wide trade depression and disturbed international exchange, calling for careful procedure. Some are especially urgent in insisting upon passage of the Longworth resolution and say that unless it or some other sort of ad interim legislation is enacted the country will be made the dumping ground for imports despite anti-dumping leg-

islation. They also still are in sympathy with the plan to enact exchange legislation based on American valuation to replace the provision attached to the emergency tariff act.

The disagreements over the tariff legislation leaves as much doubt as ever as to when the permanent bill will be ready for reporting to the House. Dates are set only to pass by without action, and, while suggestions now are made that the measure will be ready by June 15, expressions are heard that the actual date will be nearer July 1. So uncertain are some members of Congress that they have reached the point where they favor the idea of Congress taking a recess for a month or so before anything further is done regarding either tariff or taxation or other important legislation. The program before Congress still is so great that it is apparent it will have a long, difficult grind ahead of it before the work is done, and some members think this session will practically merge into the new one before the program can be completed.

Lake Iron Ore Shipments in May Small

Shipments of iron ore from the Lake Superior region in May were 2,594,027 gross tons or 62.81 per cent less than in May, 1920, when the total was 6,976,085 tons. This is a decrease of 4,382,058 tons for May this year. In May, 1920, there was increase of 5.45 per cent over May, 1919. The comparative shipments by ports for May, 1920, and May, 1921, and for the season were as follows in gross tons:

	May, 1920	May, 1921	To June 1— 1920	1921
Escanaba	795,673	72,048	795,673	72,048
Marquette	375,036	13,985	375,036	13,985
Ashland	1,013,049	208,390	1,013,049	217,539
Superior	1,983,660	730,708	2,189,246	842,556
Duluth	1,662,971	1,199,457	1,688,239	1,226,888
Two Harbors	1,115,696	369,439	1,145,696	397,222
Total	6,976,085	2,594,027	7,206,939	2,770,238
Decrease		4,382,058		4,436,701

The decrease to June 1 this year is 61.56 per cent as compared with the same date in 1920, or 4,436,701 tons. A year ago there was a decrease as compared with 1919 of 820,641 tons. The Duluth and Superior percentage of the total to June 1, this year, was 74.70 per cent against 53.80 per cent last year. The Escanaba proportion of the total was only 2.61 per cent as compared with 11.04 per cent last year. Duluth's percentage of the total this year was 44.29 as compared with 23.42 per cent to June 1, last year.

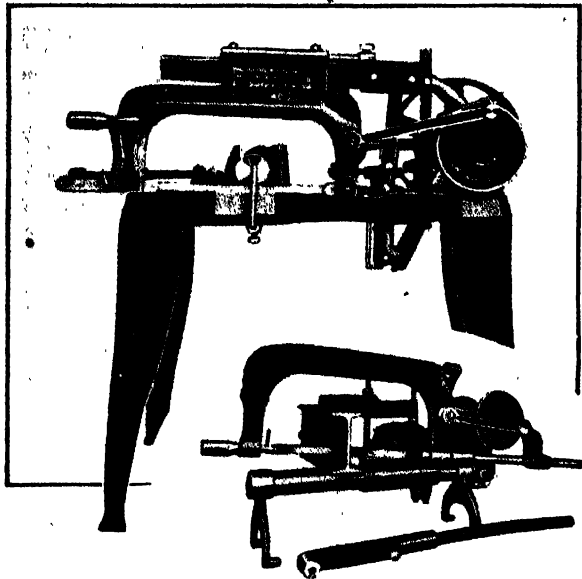
To provide against collisions between locomotives and either vehicles or pedestrians, the Illinois Steel Co. has installed a safety reflector device at a blind corner in its South Chicago works, according to the *National Safety News* for June. Drivers and pedestrians going north and engineers proceeding east on the narrow gage tracks were previously unable to see each other until face to face, accidents being narrowly averted. Since the mirror was installed, approaching parties can see each other at 60 to 70 ft. apart. In addition, the square corner of the open-hearth building has been rounded off.

The Bureau of Supplies and Accounts, Navy Department, is asking for bids on 90 gross tons of ferromanganese, 75,000 pounds of nickel in shot form, 446 gross tons of foundry pig iron, 90 gross tons of lump Bessemer ore and 23 tons of 50 per cent ferrosilicon, all for delivery at the Navy Yard, Washington, as may be ordered during the period ending June 30, 1922. The tonnages asked for are estimates only and the Government will not be obligated to order any specific quantity of the material contracted for.

Power and Portable Saws

Two new machines have been added to the line of saws manufactured by the W. Robertson Machine & Foundry Co., Buffalo, N. Y. They are the No. 2, 1921 model Economy power saw with 6' x 6 in. capacity and the Economy portable machine, illustrated in the accompanying illustrations.

The No. 2 saw is a draw cut machine and is equipped with an oil lift pump for relieving the teeth of the blade of drag on the idle or return stroke. This feature consists of a two cylinder pump submerged in oil, one plunger of the pump being timed with the crank shaft and the other plunger connected to the frame. At the end of the cutting stroke, the plunger connected to the crank shaft is on the down stroke, which forces the



Power Saw Equipped with Oil Lift. The insert shows a general utility portable saw, hand or power operated.

oil under the plunger connected with the frame, thus raising the frame from the work. At the beginning of the cutting stroke the pump timed with the crank shaft has just passed a port allowing the oil to escape, thus permitting the frame to lower while on the cutting stroke. This feature is employed in a larger machine described in THE IRON AGE of Jan. 25, 1917.

With the oil lift blades cannot be broken by the frame falling on the work and it is claimed that upward of 200 per cent more service is obtained from the blade. A swivel vise is provided for cutting angles up to 45 deg. The machine is driven by a friction clutch and stops automatically when the cut is completed.

The Economy portable saw is hand or power driven and is designed as a general utility machine in the shop or elsewhere when the two legs are applied. Used in steel yards or warehouses the current is taken from lamp sockets and where current is not available a lever is provided for hand operation. The machine has a capacity of 8 in. using 17 in. blades. The motor is mounted on a bracket supported from the bed and is coupled to a shaft on which there is a steel worm running in oil. This worm drives a gear on which there is a crank wheel which in turn is connected by a rod to the frame. The feed is by gravity.

The Youngstown Sheet & Tube Co. advises that W. E. Manning, vice-president and general sales manager of that company, was incorrectly quoted in a report of the annual meeting of the National Pipe and Supplies Association in the May 26 issue of THE IRON AGE. Remarks attributed to Mr. Manning were to the effect that his company's orders for welded pipe had increased since early in the year. Mr. Manning states that he did not discuss the plant operations of his company in the course of his remarks at that meeting.

Steel Workers Decrease

WASHINGTON, June 7.—Employment in the iron and steel industry in May showed a decrease of 8781 workers below the number in April, according to the United States Employment Service. Based on actual payroll returns from 428 of the larger firms in 14 lines of industry in 65 principal industrial centers, each nominally employing 500 or more, a total of 1,600,000, the net decrease was 7211 workers, or 0.5 per cent. The total decreases in seven industries was 27,383, of which 21.9 per cent represented the iron and steel industry, and the increase in employment in seven industries was 20,172.

Among the latter industries were railroad repair shops, leather, automobiles and textiles. The net decrease in employment since January 31, has been 54,596, or 3.3 per cent.

Some of the iron and steel centers showing decreases in employment in May, and the number affected, follow: Buffalo, 1920; Cincinnati, 1017; Johnstown, Pa., 714; Birmingham, Ala., 1222; Chicago, 4892. A slight increase in employment was shown in other steel centers, as in Youngstown, where the increase was reported to be 265; Cleveland, 586, and Pittsburgh, 511 men.

New Line of Drilling Machines

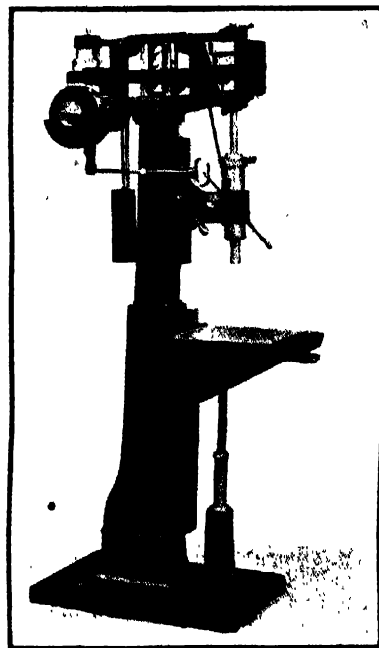
A line of drilling machines has been developed by the Cincinnati Hy-Speed Machine Co., Cincinnati, and are being marketed under the name of Hy-Speed. The accompanying illustration shows the general construction.

Among the features of the line are the single pulley direct overhead drive and the dry-plate clutch operating in connection with an external clamping adjustable air-cooled brake. A single handle directly in front of the operator is provided for convenient starting and stopping. The table elevating mechanism is arranged to allow taps, etc., to pass through the center of the table, a feature which with the use of a quick release chuck permits tapping without reversal at high spindle speeds. Spindle speeds are controlled by a handle outside of the column. Automatic power feed and automatic tapping attachment can be arranged on any spindle.

Unit construction is embodied in the machine, the entire clutch, brake and initial driving gear being a separate unit that is set into the top bracket. For accessibility the counter weight for the spindle is hung on the outside of the machine. A narrow face idler pulley is carried directly on the belt shifters and moving intermittently with the shifters helps lead the cone belt from one step to another. Aluminum pulleys are used throughout.

The pump and tank is a separate unit, attached to the base of the machine. S. K. F. ball bearings are used.

The line includes floor and bench type machines; single speed purpose, belted motor drive, automatic power feed and automatic tapper.



The Table Elevating Mechanism is Arranged to Allow Taps to Pass Through the Center of the Table

United States Steel Corporation's Answer

Makes Specific Denial of Many Allegations of Complaint in Pittsburgh Plus Case and Plants Itself Upon Decision in Dissolution Case

THE United States Steel Corporation last Saturday filed at Washington its answer in the so-called Pittsburgh plus case of the Federal Trade Commission against the United States Steel Corporation, American Bridge Co., American Sheet & Tin Plate Co., Carnegie Steel Co., National Tube Co., American Steel & Wire Co., Illinois Steel Co., Minnesota Steel Co., Clairton Steel Co., Union Steel Co., Lorain Steel Co. and Tennessee Coal, Iron & Railroad Co. The answer of the corporation consists of a denial of many of the allegations of the complaint and rests to a large extent upon the decision of the Supreme Court of the United States in the dissolution case, findings of that court being carefully stated in the thirteenth paragraph of the answer.

Paragraph 5 of the complaint, which is denied as to every allegation, inference and argument, charged that for more than seven years the corporation had issued quotations of prices covering the products of its respondent subsidiaries, which schedules were accepted by the subsidiaries and their competitors and that this practice of fixing uniform prices succeeded the custom which formerly prevailed whereby manufacturers openly met and agreed upon prices. •

Paragraph 8 of the complaint, likewise denied, consisted of an attack upon the Birmingham price as unfair and unlawful.

Paragraph 10 set forth in detail the alleged results of the Pittsburgh basing plan, charging that it gave Pittsburgh steel manufacturers unfair advantages in extending their trade to the detriment of others, and enabled steel manufacturers outside of Pittsburgh to increase their profits unduly.

Probable Course of Procedure

The Washington representative of THE IRON AGE sends the following statement as to the present status of the case:

"Study is being made by the Federal Trade Commission of the reply of the United States Steel Corporation to the commission's complaint in the so-called Pittsburgh plus case with a view to determining the procedure that will be followed. Any points of agreement by the commission and Steel Corporation will be eliminated as topics for discussion at the approaching hearing, while the points of dispute, together with new angles that the commission may consider the Steel Corporation has developed will be made the objects of attack and defense. In the absence of completion of its study the commission is unable to state the precise character of its program, such as the steel centers where hearings will be held. It is believed, however, that they will largely revolve around Pittsburgh, Chicago, Duluth, Minn., and Birmingham, Ala.

"The formal conduct of the case, however, is outlined automatically by the act creating the commission. It will, upon scrutiny of the reply, negotiate with the Steel Corporation for the purpose of setting a date when the hearings shall be begun. An examiner and an attorney will be selected by commission to have charge of the proceedings for it, and it is believed that Attorney Stienhaur, who drew the complaint, will conduct the hearings for the commission. The name of the examiner in charge is said not to have been decided.

"At the conclusion of the hearings, which promise to be of a protracted character, each side will file

briefs, summarizing the evidence adduced, and making contentions each respective side considers to be of the most importance. This will be followed by formal arguments before the entire commission, which will take place in Washington. The decision then will come next and should it be in the nature of a "cease and desist" order, appeal undoubtedly will be made to the United States Supreme Court. Should the commission find that the use of the so-called Pittsburgh plus plan in selling steel does not constitute an unfair method of competition, the case would come to an end and the practice left undisturbed.

"So far none of the independent steel companies has asked to intervene in the case. It will remain with the discretion of the commission, if they make such request, to decide whether it shall be granted or denied."

Text of the Answer

The answer of the Steel Corporation and subsidiaries follows:

UNITED STATES OF AMERICA. BEFORE THE FEDERAL TRADE COMMISSION.

Federal Trade Commission vs. United States Steel Corporation, American Bridge Co., American Sheet & Tin Plate Co., Carnegie Steel Co., National Tube Co., American Steel & Wire Co., Illinois Steel Co., Minnesota Steel Co., Clairton Steel Co., Union Steel Co., The Lorain Steel Co., and the Tennessee Coal, Iron & Railroad Co

The above named respondents come now and answer the complaint herein as follows:

I. Respondents admit that United States Steel Corporation is a corporation organized and existing under and by virtue of the laws of the State of New Jersey, and that it has offices in the City of New York, State of New York. They refer to the certificate of incorporation of said United States Steel Corporation annexed hereto and marked "Exhibit A" for a statement of the purposes for which said corporation was organized. They admit that said United States Steel Corporation acts as a holding corporation of substantially all of the capital stock of the corporations named in paragraph one of the complaint as subsidiaries thereto, and they are hereinafter referred to as such. They admit that said subsidiaries are engaged in the manufacture and sale of iron and steel and the products thereof as in said complaint stated, except that they say that the plant of the Clairton Steel Co. is leased to and operated by the Carnegie Steel Co., and the plants of the Union Steel Co. are leased to and operated in part by the Carnegie Steel Co., in part by American Steel & Wire Co. and in part by the American Sheet & Tin Plate Co.

II. Respondents aver that United States Steel Corporation sustains no relation to any of said subsidiaries except as a stockholder as aforesaid, although it does from time to time make recommendations to said subsidiaries with respect to the conduct of their several business and exercises such control over them as is incident to such stock ownership. Except as herein admitted, respondents deny the allegations contained in paragraph two of the complaint.

III. Respondents admit the allegations contained in paragraph three of the complaint with respect to said subsidiaries except the Clairton Steel Co. and the Union Steel Co., but deny the same with respect to the United States Steel Corporation and said two subsidiaries.

Ore and Limestone Deposits

IV. Respondents deny that United States Steel Corporation through its said subsidiaries or otherwise owns

or controls over 75 per cent of the total iron ore deposits in the Lake Superior district; deny that it or its subsidiaries own or control the greater part of the iron ore deposit in the State of Alabama; deny that it and its subsidiaries own or control the ultimate iron ore supply of the United States; deny that it and its subsidiaries own or control the major number of the railroad and lake transportation systems which carry the iron ore from the mines to the manufacturing plants of said subsidiaries and their competitors; and deny that, except to a limited extent, it or its subsidiaries own or control the coal mines which furnish the necessary coal employed in the manufacturing processes of said subsidiaries. They admit that said subsidiaries control sufficient limestone quarries to furnish the limestone employed in their manufacturing processes, as do substantially all other steel manufacturers, but say that limestone is found in such vast quantities in all parts of the country as to be readily available to anyone. Respondents say that United States Steel Corporation and its subsidiaries do not own or control over 30 per cent of the total iron ore deposits in either the Lake Superior district or in the State of Alabama; and that altogether they control only two ore carrying railroads in the Lake Superior district out of nine such railroads operating therein, and only one out of seven such railroads operating between the lower lake ports and the manufacturing plants of said subsidiaries and their competitors, and that said railroad, so controlled by respondents are obligated by law and do in fact serve all interests alike and without discrimination and at rates fixed by the Interstate Commerce Commission.

Transportation and Other Activities

Respondents further say that the lake transportation system controlled by them or some of them and referred to in said complaint is employed solely in transporting ore, coal and limestone for the subsidiaries of the United States Steel Corporation and does not transport said materials or any of them for any other interests, the ore, coal and limestone of other manufacturers being transported to and from the Lake Superior district by various other transportation systems. Respondents also say that they do not, nor do any of them, own or control coal mines with a sufficient output to furnish all the coal necessary in the manufacturing processes of said subsidiaries; on the contrary, said subsidiaries are compelled in normal times to purchase a substantial quantity of their coal requirements from outside sources. Respondents admit that United States Steel Corporation has capital stock outstanding of the par value of \$868,583,600, and of a book value exceeding one and one-half billion dollars. They also admit that the gross assets of said United States Steel Corporation and of all of its subsidiary companies aggregate over two billion dollars. They say that said United States Steel Corporation does not itself manufacture or sell any steel products, but admit that the total annual business of its subsidiaries, including inter-company business, has at times amounted to approximately one and one half billion dollars. Respondents admit that said subsidiaries manufacture approximately 47 per cent of crude steel in the form of ingots, but say that said subsidiaries sell practically none of the crude steel manufactured by them in that form. They admit that at times said subsidiaries manufacture approximately 45 per cent of the semi finished rolled steel in the form of billets, blooms, slabs, sheet and tin plate bars, and furnish rolled steel in the form of rails, plates, sheets, structural shapes, bars, wire rods, skelp, hoops, bands and cotton ties, manufactured in this country, some of which is sold by them in interstate commerce. They say, however, that the percentage of these products manufactured, as well as the percentage sold, by said subsidiaries varies from time to time and is dependent upon business conditions. They deny that said subsidiaries manufacture or sell approximately 60 per cent of other steel products, such as wire and the products made therefrom, pipes and tubular goods and tin plate, and allege that the total capacity of the subsidiaries to produce these materials is much less than 60 per cent, and that the percentage of such products

manufactured and sold by them varies from time to time, depending upon business conditions.

Some Buy Steel

Respondents admit that some of the competitors of said subsidiaries do not manufacture steel but purchase semi-finished steel from the manufacturers thereof, and make and fabricate therefrom various kinds of steel products, some of which are made and fabricated by said subsidiaries. They say, however, that numerous of said competitors do in fact manufacture their own steel and finish the same into various products, and that there is an open and unrestricted market for the supply of those who do not so manufacture their requirements of steel. Respondents deny that United States Steel Corporation owns, controls or utilizes, directly or indirectly, 145 plants for the manufacture of steel products. They say that the total number of plants of said subsidiaries engaged in the manufacture of both steel and steel products and the fabrication of the latter does not exceed 125, and that no plants or such subsidiaries are located in the States of Maryland, Kentucky, Kansas, and Washington.

V. Respondents deny each and every allegation, inference and argument contained in paragraph five of the complaint.

Practice as To Quoting

VI Respondents admit that, with certain exceptions mentioned in the complaint, said subsidiaries usually quote their products on what is commonly called the Pittsburgh basis, which represents their prices for such products in Pittsburgh plus the freight to the point of sale and delivery. This is the practice among steel manufacturers generally. Respondents deny that said price is arbitrarily fixed or arrived at, and say that it varies from time to time, and among the different manufacturers, and represents the judgment of each manufacturer as to the market conditions affecting or likely to affect his particular products. They further say that said quoted prices are seldom adhered to strictly, either by said subsidiaries or their competitors; that steel is sold by all of them, subsidiaries and competitors, in the different consuming localities, at the market prices prevailing therein as determined by the law of supply and demand and the competition among the manufacturers, which competition now is and for a long time last past has been vigorous and unrestrained and extends to prices, quality and service, and to every article of production in every locality in which the same is sold. They also say that said market prices are frequently materially lower than the prevailing Pittsburgh price plus the freight rate from Pittsburgh to point of destination, particularly when the supply from the territory outside of Pittsburgh equals or exceeds the demand in such territory.

Convenience of Customers

The practice of quoting a base price is largely for the convenience of customers and is not confined to the steel industry nor to this country but exists throughout the world, and is followed in many, if not most, of the more important lines of production and sale. In the steel industry it has obtained from the beginning and became a settled custom long before the United States Steel Corporation was formed. Pittsburgh was made the basing point in the early days because at that time nearly all steel was manufactured in the Pittsburgh district. It has remained the basing point simply because, notwithstanding the construction of steel manufacturing plants in other localities, the country outside of Pittsburgh is still dependent upon the Pittsburgh market for the major part of its requirements of steel excepting rails.

Respondents deny that said subsidiaries, other than the Tennessee Coal, Iron & Railroad Co., sell their products of steel in Birmingham, Alabama, or any other basis than elsewhere, or that they sell in Birmingham at the Pittsburgh price with the addition thereto of \$5 per ton. They admit, however, that the Tennessee company does sell certain of its products in Birmingham on the basis stated in said complaint, and say that the price so arrived at represents a temporary concession

made by the Tennessee company to the Birmingham manufacturers in order to enable the latter to develop certain industries which would be of great benefit to the South, and would furnish an additional market for the products of said company.

Costs at Various Points

VII. Respondents deny that steel is manufactured in either Chicago, Ill., or Birmingham, Ala., more cheaply than in Pittsburgh, but admit that the price charged for steel by the said subsidiaries in each Chicago and Birmingham exceeds the Pittsburgh price by more than the difference in the cost of production in the respective localities. They deny, however, that the price charged in Chicago, Birmingham and the other localities mentioned in the complaint is either unfair or unlawful, and aver that with the exception mentioned at the end of paragraph VI it is the market price prevailing in each locality regulated by the law of supply and demand and the free play of competition in the locality affected, and varies from time to time in accordance with the market conditions obtaining therein.

Respondents deny that purchasers of rolled steel outside of Pittsburgh are unable to secure such steel from any steel manufacturer in the United States at any price other than the Pittsburgh plus price, and repeat the averments contained in paragraph VI above in that regard.

VIII. Respondents deny each and every allegation, inference and argument contained in paragraph eight of the complaint.

IX. Respondents admit that the different prices charged by said subsidiaries for their various products as between different localities and communities are not made on account of differences in the grade or quality of such products and that such differences in price are not based on differences in the cost of selling such products or on differences in the cost of transportation. They aver, however, that such different prices are made in good faith on account of the quantities furnished or to meet competition in the different localities and communities, and represent the market prices prevailing therein from time to time. They deny that such differences constitute discrimination within the meaning of Section 2 of the Clayton act or any other law of the United States.

X. Respondents deny that they or any of them utilize Pittsburgh plus price to accomplish or that they do accomplish any of the purposes stated in paragraph 10 of the complaint, and they deny each and every allegation of fact, inference and argument contained in the various sub-divisions of said paragraph.

No Unfair Advantage

XI. Respondents deny that the practice of said subsidiaries under the Pittsburgh base plan as described in paragraph VI. above now has, or ever has had, the effects stated in paragraph 11 of the complaint, or any of them. They deny that such practice gives to the Pittsburgh fabricators, including said subsidiaries, an unfair or undue advantage over fabricators in other parts of the United States. They say that the fabricators located outside of the Pittsburgh district are and always have been free to locate wherever it appeared to them that their business could be conducted most profitably; that everyone of them, whether situated at Chicago, Duluth, Birmingham, Fort Dodge or elsewhere, chose his location and erected his plant after the Pittsburgh basing practice had become an established custom in the steel industry, and that while, by reason of difference in freight rates, rolled steel delivered at their plants generally costs them more than it costs the Pittsburgh fabricators, they have other countervailing advantages on account of which they have prospered more and increased in number much faster than the Pittsburgh fabricators.

Respondents deny that the Pittsburgh basing practice tends to lessen competition with or create a monopoly for the Pittsburgh fabricators including said subsidiaries. They say that on the contrary its tendency is to stabilize the fabricating industry, increase competition and distribution and prevent monopoly therein and in the steel trade generally, and that such

has been its effect notwithstanding the increase in railroad freight rates referred to in said complaint.

Respondents deny that the possession of fabricating plants as well as steel plants in Pittsburgh or elsewhere gives to said subsidiaries an unfair, undue or illegal advantage over their competitors anywhere, either by reason of said Pittsburgh basing practice or otherwise, or that it tends to lessen competition with or create a monopoly for said subsidiaries. They also deny that said Pittsburgh basing practice provides a method whereby the steel manufacturers of the United States maintain uniform prices among themselves. Respondents say that as matter of fact uniform prices are not and for a long time have not been maintained among the steel manufacturers; that on the contrary steel prices do now and for a long time past have varied widely between all manufacturers in all parts of the United States and in substantially every line of production. Such prices are fixed by the several manufacturers independently and there is not now and for many years has not been any agreement or understanding, expressed or implied, between such manufacturers with respect thereto.

Does Not Violate Clayton Act

XII. Respondents deny that in following the Pittsburgh basing practice or otherwise said subsidiaries have been or are using an unfair method of competition in commerce within the intent and meaning of Section 5 of the Federal Trade Commission act or have been or are discriminating in price between the different purchasers of their products in violation of Section 2 of the Clayton act.

The Dissolution Suit

XIII. Respondents further aver that on October 26, 1911, the United States of America filed a petition in the United States District Court for the District of New Jersey against respondents other than Minnesota Steel Co., Illinois Steel Co. and The Lorain Steel Co., but making the Federal Steel Co. a defendant as the owner of all the capital stock of said three companies. Said petition alleged that United States Steel Corporation and said subsidiaries and the Federal Steel Co. constituted a combination in restraint of trade under the first section of the Federal anti-trust act of 1890 and a monopoly under the second section of said act, and prayed for an injunction restraining the further maintenance of said combination and monopoly and a decree dissolving the same and the said corporations respectively. The said defendants filed an answer denying the allegations of said petition, whereupon a large amount of testimony was taken by the respective parties, after which the cause was brought to a hearing before said court on such petition, answer and proofs. After due deliberation, the court on Sept. 15, 1916, made a decree dismissing said petition on the merits. The United States took an appeal from said decree of dismissal to the Supreme Court of the United States, which appeal was duly argued and resulted in the affirmance of said decree on the first day of March, 1920. The record of said proceedings in the District Court of the United States for the District of New Jersey and in the Supreme Court of the United States are now on file in the offices of the clerks of said respective courts and respondents are ready to produce and prove the same when and where this honorable commission may direct, and pray for leave so to do.

Respondents aver that in said cause, as appears by the record thereof, the following facts were found, established and adjudged as between the United States of America and these respondents, that is to say:

Findings of Supreme Court

(a) That respondents did not have a monopoly of the iron ore deposits, either in the Lake Superior District or in the State of Alabama or in the United States at large.

(b) That respondents did not own or control the ultimate iron ore supply of the United States.

(c) That respondents did not own or control a monopoly of the coal suitable for steel making purposes in the United States.

(d) That respondents did not possess a monopoly of the railroad and lake transportation systems which carry ore from the mines to the manufacturing plants of said subsidiaries or competitors or, through such systems as it did control, possess the power to monopolize the raw material from which steel is manufactured.

(e) That respondents did not own or control a sufficient amount of any branch of steel manufacturing to constitute a monopoly thereof, or so large a percentage as to constitute a violation of law.

(f) That respondents did not possess the power to fix or control, and did not in fact fix or control, the prices of steel or the products thereof.

(g) That respondents did not possess the power to either control or destroy their competitors.

(h) That respondents did not control the prices of steel products nor fix the prices charged by their competitors.

(i) That respondents did not either singly or in combination constitute a monopoly or possess the power to monopolize the steel trade in the United States or elsewhere.

(j) That competition in the manufacture and sale of steel and the products thereof in the United States was free and unrestricted by any agreement, combination or understanding between the manufacturers or sellers thereof.

Requested to Have Hearing in Milwaukee

MILWAUKEE, June 6.—The construction industries committee of the Milwaukee Association of Commerce has requested the Federal Trade Commission to hold a hearing in Milwaukee in its proposed investigation of the Pittsburgh plus question. Resolutions adopted by the committee say in part: "It has been represented to this committee by fabricators of structural steel that from \$6 to \$8 a ton is added to the cost of their product by the rolling mills through the operation of the so-called Pittsburgh plus method of pricing steel, and that they would be able to reduce their bids immediately to that extent if this practice were abolished." The resolutions were adopted as a part of the function of this committee to investigate the cost of building and to take such steps as it sees fit to bring about a revival of the building industry.

Pittsburgh Basing Point to Be Discussed

H. G. Pickering, counsel for the Western Association of Rolled Steel Consumers and W. L. Chandler, president the National Association of Purchasing Agents, will speak on "Pittsburgh Plus" at an open meeting of the Chicago Purchasing Agents' Association to be held at Hotel Sherman, Chicago, on June 9. The National Association of Purchasing Agents is an organization of over 4000 members. The Chicago Purchasing Agents' Association was the first to oppose the Pittsburgh basing point on rolled steel prices, having its first meeting devoted to the subject Feb. 19, 1919. The St. Louis and Milwaukee associations held similar meetings shortly thereafter and subsequently the national association took a definite stand in opposition to the basing practice and presented the following resolution before the Federal Trade Commission on Nov. 16, 1920:

"Resolved, That in our opinion all lines of trade could be stabilized by establishing a standard of cost finding plus a legitimate profit to sustain their industry and base the selling price at point of production according to supply and demand."

Evils of Picketing

WASHINGTON, June 7.—That picketing is wrong for the employee as well as for the employer was the statement of Judge Dan Thew Wright, former judge of the Supreme Court of the District of Columbia, at a hearing last week before a special sub-committee of the House District committee in connection with a bill introduced by Representative Blanton of Texas to prevent picketing. The measure is not believed to stand much chance of being passed by Congress.

Respondents aver that there has been no material change in the constitution, holdings, powers or practices, or in the relative capacity or output of the respondents or any of them since the said adjudication and the said dismissal of the Government's petition; that the matters of fact so as aforesaid found, established and adjudged in said cause were each and all of them within the issues joined and tried therein, and respondents plead the said findings and adjudication in bar of the allegations contained in paragraphs 4, 5, 7, 8, 9, 10, 11 and 12 of said complaint to the contrary thereof.

XIV. Respondents further submit that an order of the kind or effect suggested in said complaint would be unwarranted by any law of the United States; that such an order would constitute an interference with respondents' liberty of contract and would amount to the taking of respondents' property without due process of law, contrary to the Fifth Amendment to the Constitution of the United States.

WHEREFORE, respondents pray that said complaint may be dismissed.

WILLIAM W. CORLETT,
Attorney for respondents.

RICHARD V. LINDABURY,
CORBENIO A. SEVERANCE,
of counsel.

Judge Wright declared that picketing is "nothing else but concerted coercion." He said that the public is against it, and that it is bad for the unions, because in order to win they must have support. In characterizing picketing as coercion, he stated that when employees have a grievance against any particular concern, they have a right to publish it in any way they see fit, but when this publication assumes the character of coercion, it is wrong.

Judge Wright said that the only time when peaceful picketing has been upheld was when prosecution has been brought under municipal ordinance, such as disturbing the peace, blocking the sidewalk, etc., and not with reference to an anti-picketing law. The court upholds the right of the employer to exclude union men in the selection of employees, if he so desires, it was declared.

"There is no question," Judge Wright added, "of the right of the men to be unionized. The employer has a right to exercise his preference in the selection of employees in the conduct of his own business. If the public recognizes the right of men to organize a union, it must recognize this principle."

Failed to Agree

The conference at Atlantic City between the Western Bar Iron Association and the Amalgamated Association of Iron, Steel and Tin Workers adjourned last Saturday without agreement on the new wage contract. The present agreement expires June 30. In the meantime, further efforts will be made to negotiate a new contract covering the bar iron scale. Employers asked the elimination of a number of extras and the 15 per cent advance on 1.50c. iron and higher, which was granted last year.

Conferees are considering the sheet and tin mill wage scales this week, representatives of the Amalgamated meeting with manufacturers who are members of the Western Sheet and Tin Plate Manufacturers' Association.

The Massachusetts State Employment office reports an increase in orders for employees of 3 per cent in May, as against April, but a decrease of 46 per cent as compared with May, 1920. People wanted by employers increased 14 per cent over April, and decreased 50 per cent as contrasted with May, 1920. Positions filled increased 13 per cent and decreased 36 per cent respectively. The principal demand in the men's skilled department was for painters and easily satisfied. There is an occasional call for men in the building lines, with the supply far exceeding the demand.

Modern Steel Works Power Plants¹

Centralization and Economy of Units Stressed
—Attention to Details Urged as Source of Savings—Waste Heat Boilers—Preheated Air

BY WALTER N. FLANAGAN

MOST of the new plants show to some extent investment efficiency, that is, greater capacity is being obtained from a given amount of equipment; practically all show labor efficiency, in that each new plant built produces more boiler horse power or more kilowatt hours per man than older plants. It is now realized that the greatest fuel saving with present equipment can be obtained in the boiler room, and that more care is needed to maintain that efficiency than anywhere else in the power plant. Efficiency of product is obtained in various ways, one of which is superheating the steam, thus rendering a given amount of heat able to produce more work.

Investment, fuel and labor efficiency are all increased by the use of large boiler units, as less space is required for a given capacity; the radiation loss is lower, since the wall exposed surface is less per boiler hp. with modern stokers or other fuel burners one man can handle one or more large units with almost the same facility as the same number of smaller units; and control apparatus, instruments, and attention can be applied to a large boiler at a much lower cost per boiler hp. than to a small one, and these pay big dividends on a small investment.

Importance of Boiler Settings

The design of the boiler settings has become the subject of as much study as the open-hearth furnace. This is due to the number of factors which must be taken care of in the case of a large boiler to be operated at high ratings. The setting of the boiler can limit its capacity and economy by limiting the flame temperature that can be maintained in the combustion chamber. This means that excess air is used merely to keep the brickwork cool; for the same reason, the total heat that can be generated in the combustion chamber

¹From a paper presented at the regular spring meeting of the American Iron and Steel Institute in New York, May 27. The author is steam engineer, Ohio Works, Carnegie Steel Co., Youngstown, Ohio.

is limited, and therefore the capacity of the boiler. Unless expansion and contraction are cared for, large cracks open up every time the boiler is cooled off, and even during operation, on account of the great difference in temperature between the inside and outside wall surfaces. The walls bulge inwardly and eventually fall in. With forced draft stokers, the jet action of the flame cuts grooves or niches in the walls and the spouting or piled-up ash adheres to the side walls until it interferes with the movement or distribution of the fuel bed, causing excess air and unburned fuel loss.

The following table shows losses resulting from air leakage in actual operation in one modern gas-filled boiler plant under test conditions, most of the excess air being due to infiltration.

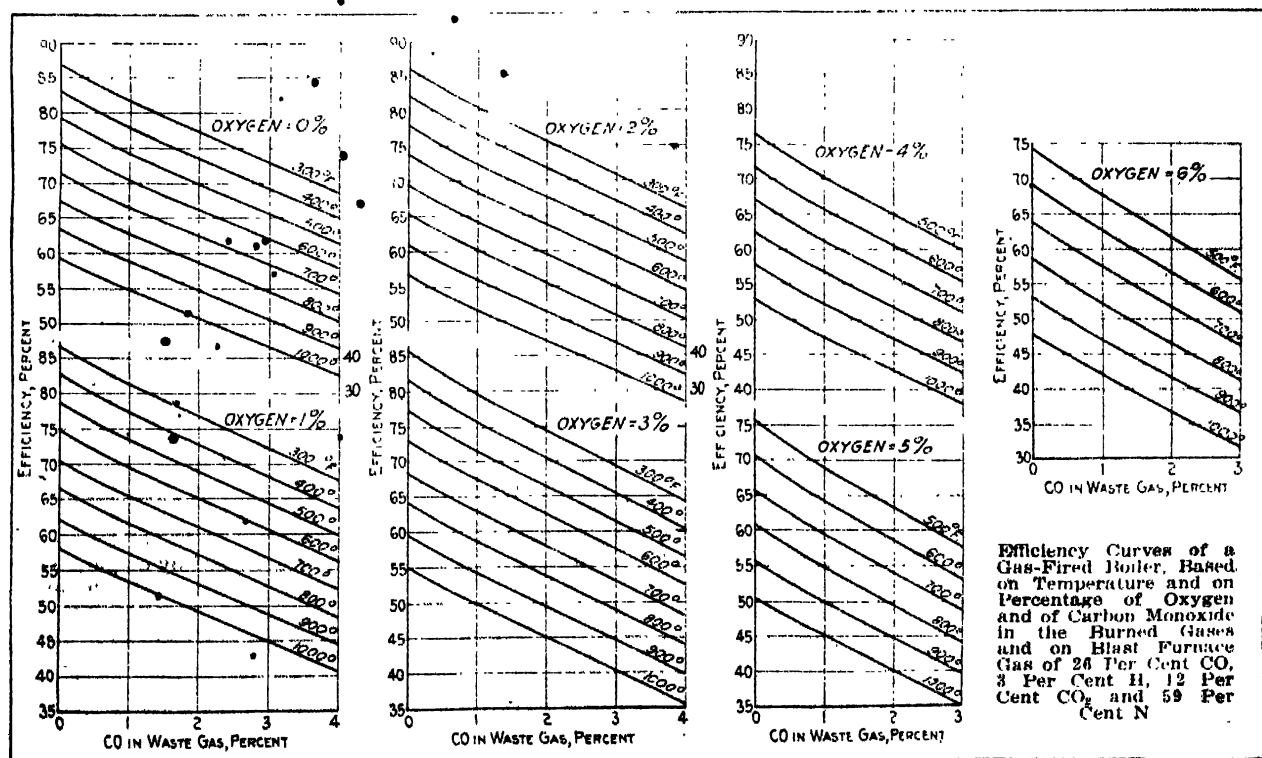
Effect of Excess Air in Blast Furnace Gas Fired Boilers, Showing Percentage Loss in Boiler Efficiency for Various Percentages of Excess Air

Stack Temp.	25%	50%	100%	125%	150%	175%
500° F.	1.50	3.00	6.03	7.53	9.04	10.50
550° F.	1.69	3.39	6.78	8.47	10.14	11.84
600° F.	1.88	3.77	7.53	9.40	11.30	13.18
650° F.	2.03	4.07	8.13	10.20	12.20	14.25
700° F.	2.24	4.48	8.98	11.20	13.45	15.70
750° F.	2.41	4.82	9.65	12.05	14.50	16.86

Ten per cent difference in efficiency in a 1300-hp. boiler amounts to \$15,000 or more difference in fuel cost per year, while a complete steel casing could be installed for about \$5,400. The latter figures are based upon 14-in. plate, riveted and calked, and covering not only the four sides but also the top of the boiler. This would last as long as the boiler and require practically no repairs. A cheaper casing, which would save the above losses, could be installed for half that amount, but it would need considerably more attention.

Waste Heat Boilers

The fact that enormous quantities of heat are thrown away in steel works is clearly recognized. The only question is, does it pay to install means for saving this heat; does the expense of installation and of the



Efficiency Curves of a Gas-Fired Boiler, Based on Temperature and on Percentage of Oxygen and of Carbon Monoxide in the Burned Gases and on Blast Furnace Gas of 26 Per Cent CO, 3 Per Cent H₂, 12 Per Cent CO₂, and 59 Per Cent N

operating costs more than overbalance the saving? The fuel to melt and heat steel has in many cases been better utilized by the installation of waste heat boilers, since that is at present the most logical method of preventing this waste.

Waste heat boilers early acquired a bad reputation in many plants, which upon analysis seems due, in addition to improper selection of equipment, to poor installations, i.e., cramped, dark and inaccessible locations, too light or too small fans, air leakage and poor auxiliary equipment.

Some of the more modern installations have been very successful on account of the following:

Proper location for room, access and repairs; preferably grouping to insure attendance.

Proper selection of boiler and setting with a view to obtaining an air-tight setting.

Use of steel jackets, or the coating of settings with plastic covering. On account of high draft in waste heat boilers, namely, boiler draft loss plus furnace draft, the amount of air leakage is far greater than on separately fired boilers, unless settings are tight.

Selection of rugged fans and drives of ample capacity. Fans can now be obtained that will not require inspection or overhauling any oftener than the source of waste heat.

Installation of special boilers, designed particularly for waste heat service.

Installation of reliable accessories, such as feed water regulators in duplicate, thus reducing attendance and danger to the minimum.

Attention to and means for cleaning.

In most plants where the waste heat is not utilized, the boiler power has to be developed by burning coal. In the modern coal-fired boiler plant the cost of the boilers and settings amounts to only 20 per cent of the total plant cost. Waste heat boilers require no expensive buildings with coal bunkers, no coal and ash handling systems, including the requisite space, and do not require wide spaces between boilers or between boilers and walls for operating. They also require no stokers, ash pits, or forced draft fans. Therefore, even if a coal-fired plant can be operated at an average rating of 200 or 250 per cent and waste heat boilers can average only 70 per cent rating, it still pays from purely an investment standpoint to install waste heat boilers, on account of the saving in auxiliary equipment and buildings, even though more heating surface has to be installed.

Heaters to Preheat the Air

The use of preheated air is not new, neither is the idea of its use in connection with boilers, but until recently it was very little considered, probably on account of the low price of coal. The air heater for a boiler must not be confused with the recuperator on a heating furnace, where extremely high temperatures make its life short and require a fairly expensive construction, although even here it pays good dividends if properly taken care of. In connection with boilers the tubes are required to handle gases at from 500 to 750 deg. Fahr., as against 1300 deg. or more in a heating furnace.

The advantages of the air heater over an economizer are—cheaper and lighter construction, no pressure to resist, small building space, freedom from soot or dust, and safety. With fairly clean blast furnace gas no dust adheres to the tubes, if properly designed, i.e., if gas velocities of over 300 ft. per minute are used and the tubes are vertical. One air heater has been in operation for two years with no deposit of dust on the tubes.

Gas Burners Not Always Satisfactory

Increasing attention is being paid to burners. The ordinary burner requires constant adjusting to proportion the air supply to the varying gas pressures. Even if this is watched closely, such burners do not attain thorough enough mixing to insure combustion before the gases strike the tubes, unless the combustion chamber is abnormally large, with consequent radiation loss. The unburned gases are chilled, thus either burning in

the last pass, causing high stack temperature, or causing high CO in the stack gases, with accompanying loss, or both.

Recent burner development is along either of two lines: first, with an aspirating type of burner which uses the gas velocity to draw in the correct amount of air for combustion at all ratings; or secondly, an air fan combined with an automatic regulator to supply air to the burner independently of draft, and in correct proportion to the gas flow. In both cases the air and gas ports are subdivided, giving alternate thin layers of air and gas, and attention is given to securing proper gas velocities for thorough mixing. The second type of burner is fairly complicated and expensive where there are numerous small boilers, but is well worth the expense for large units. The aspirating burner is well adapted to small units, as it can be installed for very little more than a common "gas feeder," requires no expert attention, and has no maintenance costs.

For example, a 300-hp. boiler at about 120 per cent rating equipped with goose neck burners, while running with 6 per cent oxygen showed 2 per cent CO in the stack, and a stack temperature of over 800 deg. Fahr., or a boiler efficiency of approximately 46 per cent. Equipped with aspirating burners, the same boiler averaged day after day 23 per cent CO₂, no CO and 600 deg. Fahr. stack temperature, giving a boiler efficiency of 73 per cent.

Efficiencies Possible With Good Burners

The curves in Figs. 1 to 7 show boiler efficiencies when burning blast furnace gas with various flue gas analyses and stack temperatures. They also show the efficiencies possible with good burners, proper baffling of boilers, and by economizers or air heaters. Seventy per cent efficiency is being obtained by modern burners under ordinary installations of small boilers, while higher efficiencies are obtained with larger units and boilers with longer gas travel.

The following shows how well it pays to install efficient burners, even in an old installation with only a few years more life. A 400-hp. boiler at 125 per cent average rating equals 500 boiler hp. If the boiler efficiency is increased only 10 per cent, say from 60 to 70 per cent efficiency, which is quite possible, as seen from the curves, the saving per hour is:

$$\begin{aligned} & (\text{tons of coal per hour at 60 per cent}) - (\text{tons of coal per hour at 70 per cent}) \times (\text{price of coal}) = (\text{saving}) \\ & \left(\frac{500 \times 33479}{0.60 \times 13500 \times 2240} - \frac{500 \times 33479}{0.70 \times 13500 \times 2240} \right) \times \$5.00 \\ & = \$0.66 \end{aligned}$$

At 300 days of operation, the saving per year is $300 \times 24 \times \$0.66 = \$4,752$.

Aspirating burners for a 400-hp. boiler can be installed complete at present prices for \$800. Thus there is a yearly saving of about 600 per cent on the investment, and no repairs ever to be charged against the installation. In addition, there is a saving in labor, since hand regulation is practically eliminated. The 10 per cent saving is very conservative, as the difference between ordinary and good burners is usually higher, due not only to better combustion, but also to lower stack temperature on account of quick combustion. Because of rapid combustion and with dry cleaned gas, higher capacities are obtainable from the same setting, and troublesome boilers can often be eliminated by the installation of modern burners under the other boilers.

Pulverized Coal Theoretically Ideal

It has often been suggested that the future utilization of coal for power will consist entirely of the manufacturing of coke in by-product ovens, the gas being used in engines or as domestic fuel, and the coke being burned under boilers, full value of all the by-products being realized. This scheme is entirely logical, but at the present price of coal and demand for by-products it is not as yet attractive to power plant owners in this country, whether steelworks or public service corporations, on account of the tremendous outlay involved. Coke ovens are used only where there is a direct demand for coke or gas.

Theoretically, the next most nearly ideal way is to

burn the coal in powdered form. With this system cheaper buildings, excellent control, perfect mixing, and elimination of ash and excess air losses are obtainable, as well as extremely high efficiencies by the use of air heaters which are considerably less expensive than economizers. However, due to operating difficulties encountered, these advantages are not being fully attained in boiler practice.

When powdered coal is burned with the theoretical amount of air, a very high flame temperature is produced, which is hard on brickwork and which liquefies the ash produced. To eliminate brickwork trouble, and also the liquid ash, which in earlier installations coated the tubes, large quantities of excess air were used which did away with some of the operating trouble, but also with one of the advantages, namely, increased efficiency due to the elimination of excess air loss, which amounts to from 5 to 10 per cent in an average stoker installation.

How Powdered Fuel Should Be Used

The ideal and readily attainable installation will consist of a combustion chamber not any larger than for stoker practice, the burners being pointed downward, allowing the flame and gases to reverse through 180° before striking the tubes. The burner should be so designed that velocities above the critical will be obtained, which will give good mixing and perfect combustion with practically no excess air. The boiler should be equipped with integral air heater at the stack, using the heat in the waste gases.

The high flame temperature will slag a large part of the ash, which will be dropped into the bottom of the combustion chamber, from which it can be run out in liquid form. The balance of the ash will pass through the boiler and out of the stack, or can be removed in powdered form from soot pockets in the setting. The combustion chamber walls can be protected by passing the air from the air heater through them.

The present disadvantages of pulverized coal are:

- (1) The initial expense of the pulverizing plant required.
- (2) The labor necessary to operate safely the pulverized coal installation is as great as for stokers, unless the installation is very large.
- (3) Danger of explosion or spontaneous combustion.
- (4) Pulverized coal bins are required at the furnaces or boilers.
- (5) Feeders and fans require power, same as stokers.
- (6) Present feeders do not proportion correctly, i.e., for a given speed the feed varies due to different density, or aeration, and to varying moisture and fineness of coal.
- (7) High cost of pulverizing.
- (8) Coke breeze cannot be pulverized economically on account of its abrasive nature.

Engines and Turbines

To obtain the economies of electric drive in the steel works, and to meet the increasing electrical demand, larger turbines are being installed than formerly. While there are no exceedingly large units in steel plants, still there are many installations of from 10,000 to 20,000 kw., which sizes give good economy and compare quite favorably with central station practice. Units up to 45,000 k.w. in a single casing, and up to 60,000 k.w. in a three-casing machine, have been installed in some of the largest central stations, but turbines of this size are not required as yet for the steel industry on account of the immense amount of steam-driven equipment in the plants and the desirability of having spares rather than tying all of the generating capacity up in one large unit.

The same conditions that have increased steam pressures for turbines and fostered the use of electric drive have caused pressures and temperatures for engines to approach those used in turbine practice. For instance, the latest reversing engine installation is designed for 225 lb. per sq. in. pressure and 125 deg. Fahr. superheat at the throttle. A noticeable feature of this engine is its simplicity and accessibility.

While the twin-tandem engine is standard in the United States at present, it seems as though, in order fully to utilize higher pressure and superheat, triple-tandem compound or multi-cylinder uniflow reversing engines may be the future competitors of electric drive. Triple-tandem engines have the advantage of lower inertia forces, in addition to being better able, on account of smaller cylinders, to use higher pressures and temperatures. Reversing uniflow engines have been built for locomotives and for boats, but not as yet for rolling mills in this country, although the manufacturers appear to be willing.

For continuous running mills the uniflow engine is rapidly coming into prominence. The early installations have shown great reliability, while the economy of the uniflow over wide load ranges is almost an accepted fact. In this country last year there were three new installations for driving rolling mills, two of which were duplex engines; also several electric power installations. Two 40 in. x 48 in. duplex uniflow engines, which have just been completed for hot mill drives, will develop an average of 2500 hp. and a maximum of 5000 hp. each. Two more uniflow engines, one a 28 in. x 42 in. duplex and the other a 40 in. x 48 in. single engine are now being built.

Governors have been developed with a very reliable and easily operated speed-changing device, so that all conditions of service can be met. In view of the numerous installations of electric mill drives, the status of the steam engine for roll drives appears to be dependent upon how much use is made of the economies to be effected by high steam pressures and temperatures, either by the use of pressure reducing turbines, or by direct application to the engine.

Blast Furnace Gas Engines

The modern blast furnace gas engine shows much greater reliability and a somewhat higher thermal efficiency than formerly; but the steam turbine plant, when high pressures and superheat are used, and all auxiliaries, such as gas washers, are taken into consideration, runs a pretty close second in regard to economy, and can be installed at a much lower figure. However, all of the possibilities of the gas engine have not been taken care of, although some work has been done along this line in this country and considerable in Europe.

By utilizing the heat of the exhaust and the heat of the jacket water the thermal efficiency of the entire system can be made at least double that of the engine alone. In one plant in the United States the exhaust is to be used to run a high-pressure boiler; in Germany low-pressure boilers and low-pressure turbines are used to some extent. In another plant the equivalent of 100 boiler hp. per 3000 k.w. engine is obtained by a very simple and inexpensive air heater, which is used to heat the buildings and which increases the back pressure on the engine less than two in. of water. However, this last is used only in winter, and could be made more effective, as up to 300 boiler hp. is readily available from the exhaust.

The use of jacket water as boiler feed water is another method of improving the economy of the system, by saving the jacket water loss, and enabling the gas engine to compete with steam-driven equipment in spite of high first cost. This is already being done, and other installations are contemplated, in connection with economizers, utilizing the heat in the exhaust gas. This is an almost ideal source of waste heat, as the jacket water is not contaminated and the exhaust gases are quite clean. The only consideration is not to create too high a back pressure on the engine.

Discussion by Richard H. Rice*

This paper indicates that the economies which I set forth in 1917 as being possible of realization in steel mills are now being obtained. The period since 1917 has been one of intense endeavor in the production of existing types of apparatus. During this period serious difficulties have been experienced with the material

*General manager Lynn works, General Electric Co.

used in steam turbine construction, due no doubt to the demands for intensified production which have been made upon steel mills and other sources of supply of raw materials.

Our endeavors to secure high quality of the materials used in turbine manufacture have led to development of additional means of safeguarding the construction of turbines by a more thorough and accurate examination of these materials. For example, we have developed and put into commercial operation a mechanism for the magnetic examination of turbine wheels, which has been found to point out accurately any hidden defects of magnitude which may exist in such wheels.

We have also been led to investigate more carefully the stresses which occur in the rotating and stationary structures. In particular we have developed and extended the investigation of distribution of stresses by means of photo-elasticity. This is accomplished by testing transparent materials in various ways and passing through such material, when under stress, beams of polarized light.* Much information has been thereby obtained concerning the distribution and character of stresses in the structures involved in turbine design, and improvements have been made in our designs in accordance with these investigations.

New materials have been developed which are suitable for use in buckets and nozzles, which give freedom from corrosion or rusting, and at the same time, considerable increase in the elastic limit. In addition, means have been found to construct buckets of much lighter section, so that the buckets impose much smaller stresses on the turbine wheel rim. Refinements of construction have also been developed in various other parts of the turbine, such as the diaphragms. These result in more accurately formed steam passages, with consequent improvement in economy, while increasing the strength and reliability of the structure.

Measured Progress Along Lines of Efficiency

As regards the progress made since 1917 in the development of the steam turbine we find that (using the steam consumption of the best turbines in the year 1903 as unity) in 1917 the steam consumption had been reduced to 50 per cent and in 1921 it has become 48 per cent, a reduction since 1917 of 4 per cent. A further reduction is confidently expected.

The weight per kilowatt of large steam turbines, which in 1903 was considered as unity, was 28 per cent in 1917, and has now fallen to 25 per cent.

Since 1917 the initial pressure used in large steam turbines has not been increased, but installations are now in contemplation which will raise the pressure from 300 lb. per sq. in., reported in 1917, to 350 lb. now, these pressures being, of course, at the turbine. Boiler pressures will be some 50 lb. higher.

Since 1917 no marked increase has been made in the use of initial temperature of steam due to superheat, but it is expected that instead of 650 deg. in use in 1917 we shall before long be using 750 deg.

The point in which we are chiefly interested, in discussing the improvement of power plants in general, is the heat consumption for the complete electric station. The curve showing this figure shows decrease in the heat consumption, bringing it down from 16,300 B.t.u. per kw.hr. in 1917 to 15,000 B.t.u. in 1921. To show that these figures are not optimistic, the monthly average of an actual plant, of rather small size and not on particularly steady load (since the average is a monthly one), indicates a consumption per kw.hr. of 17,130 B.t.u.

Plea for Larger Use of Electric Drive

Use of steam driven equipment scattered over the plant is not a desirable feature from the standpoint either of economy or of operation. The place to generate power for the plant is in the power station, and electrical transmission and electric utilization of this power is undoubtedly the method which is not only the most economical but also the best from the operating standpoint, having reference both to reliability and ease

of handling. While great progress is being made in steel mills in the direction of substituting electric power for steam, air and other methods of transmission, there is yet a long distance to go before the mills will be in an ideal position in this matter.

Considerable improvement has been made in the efficiency of the turbo blower by the use of a high-class multi-stage turbine as a driver. An installation of this character, which is one of three units now in service on a blast furnace plant, uses 17 per cent less steam than those on which my computations were based in the 1917 paper.

In considering the proposal to utilize the heat in the jacket water and in the exhaust of gas engines, as a means of increasing the thermal efficiency of the gas engine system, the cost of this auxiliary apparatus, installed, and the cost of operating and maintaining it, should be carefully considered and proper charges for interest, depreciation, maintenance and operation set up as an offset against the increase of efficiency.

It is poor economy to submit to low vacuum conditions in condensing systems, as well as to the other disadvantages which often arise from the use of high temperature and impure river waters in the case of steel mills located on rivers where the temperature of the water is high and the quality is poor. Such mills will realize a substantial gain by the use of spray ponds and other means of securing the advantages of a closed system of water circulation. With this system the small quantities of make-up water needed can be treated at moderate expense. A considerable improvement in the vacuum realized in the surface condenser will result.

Recommendations to Promote High Economy

To summarize the requisites for high economy in a steel mill power plant using steam:

- For the turbines:
 - High pressure—300 to 350 lb. per sq. in. initial pressure.
 - High superheat—to total temperature of 650 to 750 deg. Fahr.
 - Lowest possible vacuum, secured by surface condenser and clean circulating water (if necessary by a closed circulating system and even spray ponds).
 - Large turbine units, which have appreciably higher efficiency, both in fuel and in fixed charges.
 - For the boilers:
 - Reasonable ratings for normal load, not over 200 per cent, with high rating for peak load. Steel jacket settings to reduce air leakage into furnace.
 - Large stoker areas and few turns in boiler passes, with resulting small draft losses.
 - Best possible gas burners and dry cleaners for gas.
 - Large boiler units.
 - Automatic control.
 - Steel tube economizers.
 - Air preheaters.
 - For the surface condensers:
 - Save all condensate, treat and de-aerate all make-up water.
 - For the feed water:
 - Heat by extraction from the main turbines or from the house turbines, in series in closed heaters, to secure maximum work from the heating steam.
 - For the auxiliary apparatus, pumps, fans, etc., in the boiler room:
 - Electric motor drive from a house turbine or turbines.
 - For all apparatus about the mill such as hoists, cranes, charging apparatus, etc.:
 - Electric motor drive and control.
 - Finally:
 - Centralized power stations where all power is generated, to be transmitted electrically about the mill.
 - For the blast furnaces:
 - Turbo blowers with accurate governing of air volume, corrected for barometer, temperature and humidity, one blower for each furnace.
- In all cases the determination of value of apparatus and installation should be based on actual costs of operation, including fuel, labor, maintenance, depreciation, and interest charges.

Discussion by Arthur West*

It is the purpose of this discussion to cover briefly the improvements in gas power plants for steel mills. Three principal points worthy of attention are:

1. First cost of plant.
2. Relation of water supply to choice of gas or steam power plant.
3. Possibility of regular operation of gas plant with only one furnace in blast.

First Cost Discussed for a Concrete Case

Regarding first cost it should be noted that the gas engines and generators represent less than two-thirds

*General Electric Review, page 889 and 870, Nov., and page 960, Dec., 1920; page 82, Jan., page 222, March, and page 455, May, 1921.

*Assistant general superintendent Nicetown works, Midvale Steel & Ordnance Co., Philadelphia.

of the total cost of plant. It has been our experience that careful study of the layout of the gas cleaning plant and gas power plant in their relations to each other greatly reduces the total cost of plant by simplifying the building, excavation, piping, etc. The cost of a plant will vary considerably in different localities, according to whether or not it is necessary to drive piles for engine and building. I have prepared below a carefully itemized statement of cost of a complete 21,000-kw. gas power plant as follows:

	Cost per Kw.
1. Six 3500-kw. twin tandem gas engines with six 4000-kva. alternating current generators, all erected complete	\$80.00
2. Power house building of steel, brick and concrete with tiled floors and vitrified tile three feet high around walls. Included in above is a steel and concrete building for gas washing apparatus and all excavation and foundation work for above buildings, but no piling	13.45
3. Excavation and foundation for gas engines and generators	4.12
4. All gas washing apparatus needed to prepare the raw furnace gas for gas engine use	4.40
5. All switchboard and electric apparatus in power house, but not including any sub-stations	5.00
6. All air, gas, water and exhaust piping in power house, including exhaust stacks	2.87
7. Miscellaneous items, crane, railroad tracks in building, etc., oil tanks in building, and all other apparatus in building needed for successful operation	2.88
8. Gas holder of 200,000 cu. ft. capacity	2.98
9. Engineering and drafting	1.20
10. Unforeseen contingencies	\$3.10

Total cost of station ready to run, exclusive of real estate \$125.00

Some of our stations built during the war cost much less than the figure given, notwithstanding the fact that the gas engines were included at current selling price and not at our actual cost to build. All the various items quoted have been carefully modified to represent present day costs. They include all apparatus needed to clean and purify the raw gas as it leaves the furnaces, and also one gas holder of 200,000 cu. ft. capacity, the latter for a special purpose to be later described.

In these days of high capital charges the first cost of the station is of great importance. Since the figures here given include absolutely all auxiliaries, any comparison made with a steam plant should also include absolutely all auxiliaries such as boilers, furnaces for gas firing, economizers, stacks, feed-water apparatus, water softening plant, condensers and circulating pumps, turbines, etc. When this is done it will be found that there is no such discrepancy in the first cost of a steam and gas station as was formerly thought to be the case. The reduction in first cost of the gas station has been brought about in the same manner as in the case of the steam station, viz., by increasing the size of the power units and carefully studying the layout of the whole plant.

Water Supply for Steam and Gas Plants Compared

In many cases around a steel mill the water supply is either deficient in quantity or bad in quality. For such cases the gas station has a great advantage. By the use of cooling ponds or, where space is limited, by employing cooling towers, both the gas cleaning water and the gas engine jacket water may be used over and over again, the gas cleaning water and the engine jacket water being of course separately cooled. The water for gas plant does not require treatment and the only loss of water is that due to evaporation.

In the case of a steam plant, to produce a 28-in. vacuum with cooling ponds or towers requires 5.7 times as much circulating water as is required for the same gas power plant, including water for cleaning and cooling gas as well as engine jacket water. The make-up water required by such a steam plant with surface condensers is 3.5 times that required by the complete gas plant. With surface condensers the condensed steam is just about equal to the evaporation loss in cooling ponds, so that the new water required is practically the amount of the boiler feed. Where water is expensive these gains are important.

It should also be remembered that, to produce 28 in. vacuum, the cooling ponds or towers must cool the water from (say) 110 deg. Fahr. to 85 deg.; while the cooling ponds or towers in the case of the gas plant

must cool it from (say) 155 deg. to 110 deg. The cooling pond is much more efficient at the latter temperature range than at the temperatures needed for vacuum producing. This, together with the fact that the gas cooling ponds or towers are called upon to handle less than 20 per cent of the water per kw. required for the steam plant, renders the cooling water plant and its auxiliaries very much less expensive than in the case of a steam turbine plant.

There are many cases around a steel mill where, even if water be obtainable, the cost of intake and other hydraulic arrangements is greater than cooling ponds or towers. With very muddy streams, or those subject to great seasonal change in flow, this is especially apt to be the case. Such considerations sometimes enormously affect both the first cost and the operating cost of a power plant. In every case we should consider all the elements entering into the production of kilowatts at the switchboard from raw gas at the furnace.

Gas Engine Operation with One Blast Furnace

It used to be thought that gas engines could not be used unless the plant consisted of three or more furnaces. Even with two furnaces in blast there was difficulty in operating gas engines reliably, due to possible changes in gas pressure while one furnace was casting. At our Sparrows Point plant we have for several months had only one furnace in operation. In this plant the demand for power does not, unfortunately, decrease with the requirements for pig iron. The cost of blowing furnaces and generating electric current by gas engines is so very much less than the cost of either doing the work by steam or purchasing power outside that our engineers at this plant had a strong incentive to keep the gas engines going on one furnace, a feat hitherto considered impossible to perform with safety. The difficulty has, however, been surmounted in the following way, which we hope to have more fully described later in a paper especially devoted to the subject.

Briefly, a gas holder of 200,000 cu. ft. capacity is connected to the gas main supplying the gas engines, by a pipe provided with a gate valve controlled by the pressure in the gas main at the engines. When this gas pressure falls below a predetermined minimum (which happens while the furnace is casting) the valve leading to the holder is automatically opened, thus preventing the gas pressure from falling below holder pressure during time of cast. When the furnace cast is over and gas is again going into the mains the valve leading to the gas holder remains open until the pressure reaches a predetermined maximum, this being reached only when the holder is full. When the gas pressure has thus reached the top limit the valve leading to the holder is automatically closed. The full holder is thus constantly in reserve, to keep the gas pressure at engines between the desired limits.

This apparatus is so successful that, for several months past, with only one 500-ton furnace in blast, we have been continuously operating four 3500-kw. gas-electric engines and the two 47 and 84 by 60-in. gas blowers required to blow the furnace. These six gas engines were thus developing about 24,000 brake hp. continuously from one furnace, without the aid of any steam apparatus whatever. Recording charts show that the gas pressure at engines never fell below 5 in. of water.

This arrangement has been in operation about four months and has proved thoroughly safe and practical. With this device it is evident that gas engines can be installed in any blast furnace plant, no matter how few the furnaces. This we feel is a radical step forward in the development of gas power around steel mills. The operation of this device at Sparrows Point has produced a saving over steam or purchased power at the rate of over \$400,000 per year.

"Ready for a Slide" is the caption of a poster sent out by the National Safety Council, Chicago, the photograph representing foundry flasks piled helter skelter. The text reads: "Poorly piled flasks are dangerous. A slight jar is liable to send one or more of the flasks sliding and they may strike you or a fellow workman passing by."

MANY CONCESSIONS

Buying Awaits Lower Prices Based on Lower Costs in the Mahoning Valley

YOUNGSTOWN, OHIO, June 7.—Buying of iron and steel products is being held in abeyance largely until prices based on lower costs are realized. Pipe production of one district interest is devoted at present to small material to be used in construction enterprises. Another Valley maker is turning out an order for heavy sheets, the product to be used by a motor builder for pressed crankcases. Concessions are being granted by producing interests on virtually all finished commodities, though on small orders nominal quotations are generally upheld. Sales departments are combing their respective territories for new business, but few sizeable tonnages are coming out.

One steelworks interest reports that a quotation of \$20 was made for a small lot of off-grade basic pig iron. The nominal asking price for standard basic is, however, from \$21.50 to \$22 in the Mahoning Valley.

In view of the general absence of buying, a veteran steel maker expresses the hope that there will be no deviation from the policy of mutual helpfulness and consideration which has marked the industry in times gone by and that there will be no revival of cut-throat competition such as has prevailed in some other periods of stress. He attributes the present somewhat critical condition of the industry, insofar as buying is concerned, to the sudden expansions during the war beyond the immediate requirements of the country. Normal needs, he states, will soon absorb this enlarged capacity.

In the Youngstown district the more important producing groups are well fortified financially and could weather a depression of prolonged duration. An indication of the attitude of the leading makers with regard to the immediate future is that they are making every effort to keep their operating organizations intact.

SURPLUS STOCKS

Shipyard Steel Has Demoralizing Effect on Seattle Market

SEATTLE, June 1.—The flotation of surplus stocks of steel from the Skinner & Eddy shipyard, dismantled after the close of the war, has dislocated the market on many articles of steel and machinery in this territory. The stock has been parceled out to more than a dozen dealers, who are issuing price lists and endeavoring to dispose of the stock on the small parcel basis. The sale of considerable new stock has therefore been stopped.

The fir lumber mills, expecting a revival of the Eastern demand for lumber in August as representing the fall buying, have built up some good prospects for machinery, especially in large lathes. In many instances jobbers have secured the indorsement of purchasing agents for these mills on spot basis, but when passed on to the heads for approval there has been a halt. There is a brisk demand for cylinder regrinding tools for the automotive trade, the early summer having brightened considerably in the Northwest trade.

Due to agitation of taxpayers on the high cost of the school maintenance and a determined demand for retrenchment, the orders for machinery and tools for vocational and manual training technically placed last winter have been held up. The purchasing departments of the schools have accordingly been making some inquiries for used tools and machinery and have had about \$1,000,000 of stock thrown at them, the bulk of which will come out of the shipyard stocks. Investigation by jobbers shows that there are more machinery and tools in the three shipyards assemblies now in the process of cleaning up than had been surmised, and competition of this sort is feared throughout the summer.

There is a brisk inquiry from the lumber mills for welding tools.

Sales executives state that steel consumers are disappointed by the comparative smallness of the wage reduction for railroad employees. The improbability of any early substantial lowering of freight charges is also acting as a deterrent.

There is no longer any question as to the instability of sheet quotations and concessions from the nominal prices are now generally accepted. Reductions have likewise been made on plates, strip, wire products and semi-finished material ranging from \$2 per ton on plates to as high as \$20 a ton on cold strips.

Certain large producing interests believe the market is tending toward lower levels and there is not the disposition to maintain existing prices which prevailed a month ago.

An interesting fact in connection with the current situation is that jobbers in many instances are handling a relatively larger volume of business than the makers, owing to the large amount of small-lot buying.

In the current market sheets, plates and wire products exhibit the least strength. Quotations on black common sheets as low as 3.50c. are heard. Full-finished sheets are in relatively fair demand, compared with the common grades, all of the inquiry coming from automobile makers. A non-integrated maker of deep drawn stock, for instance, has consistently maintained better operating schedules in this district than the larger, self-contained producers.

Though current tin plate orders are being filled by a district maker from stock material, nevertheless the market shows signs of some betterment, says an official of the company. The opinion prevails that a demand is accumulating which will result in greatly accelerated activity in this branch of the industry before the year ends. The bulk of the current inquiry is from condensed milk interests, the ordinary seasonal requirements from the fruit and vegetable packing industry having failed to show strength. A price as low as \$5.50 has been done on stock tin plate.

A base of \$3 for wire nails generally prevails in this territory.

The Barde Industrial Co. has bought ground in the industrial section of the city on which will be erected warehouses for the housing and handling of steel and machinery carried by the corporation. Contracts for the buildings have been awarded and operations will commence August 1. About 60,000 sq. ft. will be occupied by the grounds and buildings, with an outlay of \$250,000 for buildings alone. It is announced that 10,000 tons of steel, including bars, plates, beams and tool steel, all embraced in a large department are among the stocks to be kept. About 1,000,000 ft. of wire rope will be carried, in sizes from ¼-in. to 2 in. This department is expected to be the largest on the coast. Pipe, electrical tools, and rails will be prominently featured.

The Japanese steamship Moraisan Maru of the Mitsui fleet arrived in port to-day and will load 1000 tons of steel pipe for the Orient.

The Platt Wonder Pump Co., established here a year ago, has moved to large quarters, taking over the building formerly occupied by the Machinery Co. of America. Fifty expert mechanics have been employed. Officials of the company state that the domestic trade outlook is good. Five Northwest cities, King (Seattle) county and the Federal Government have recently purchased Platt pumps for waterworks systems.

Following a conference between purchasing agents of Pittsburgh and Youngstown, it was decided to hold the June meeting of the Purchasing Agents' Association of Pittsburgh in Youngstown on June 21. The members will visit the plants of the General Fireproofing Co. and the Republic Rubber Corporation during the day and will enjoy a banquet in the evening.

The Vacuum Oil Co. says it is not true that it recently purchased 1,000,000 oil barrels, as stated in THE IRON AGE of May 12.

CONTENTS

Fuel Economy of a Drop Forge Plant	1521
Correct Valve Setting and Absence of Leaks—Large Savings Effected by Careful Attention to Details	

Design and Proportions of Hot Blast Stoves	1527
Laws Governing Circulation of Gases While Heating and Cooling—Historical Designs Reviewed	

Piron By-Product Coke Ovens	1531
Italian Vertical Downward Combustion Type Recently Introduced in This Country—Results Obtained	

Sheet Rolling Mills at Baltimore	1535
For Needs of Automobile and Furniture Trades—Top Rolls of Roughing Mills Driven by Independent Motor	

Metal Jobbing Problems Discussed	1545
General Business Situation Considered at Cleveland Meeting of Metal Branch of National Hardware Association	

To Determine Status of Trade Association	1547
National Administration Will Not Tolerate Violation of Law, but Will Encourage Proper Activities	

Steel Corporation's Answer to Pittsburgh Plus Case	1551
Denial of Many Allegations—Plants Itself Upon Decision in Dissolution Case	

Modern Steel Works Power Plants	1555
Centralization and Economy of Units—Attention to Details Urged—Waste Heat Boilers—Preheated Air	

Blast Furnace Output for May	1566
Production About Same Rate as in April—Manganese Alloy Output Lowest in 20 Years	

Engine Building in the United States	1526	No Shortage of Oil Feared	1543
Railroad Wages Reduced	1526	Graduating and Marking Machine	1544
Immigration Under New Law	1526	Eugene Schneider Awarded Fritz Medal	1544
British Empire Steel Rail Order	1530	Changed Design of Economy Lathe	1544
Railroad Troubles	1533	Heat Treatment of Forgings	1546
Foundrymen's Exhibition in 1922	1534	British Steel Exports for April	1548
Steel Treaters' Convention in September	1534	Tariff Legislation	1549
Inverted Chilled Castings	1534	Iron Ore Shipments in May	1549
Coal-Dust Hazards	1538	Power and Portable Saws	1550
Organization of Technical War Service	1538	New Line of Drilling Machines	1550
New Type of Downcomer	1539	Seattle Market Notes	1560
Duplex Planing Tool	1539	Editorials	1562
Automatic Nut Tapping Machine	1540	Freight Rates and Business — Outlook for the Eight-Hour Shift—Steel Production Costs — Checking the Census on Iron	
British Trade in Machine Tools	1540	Iron and Steel Institute in France	1564
Labor Notes	1541	Hoover Reorganization Plans	1565
Crank Planer	1542	Steel Ingot Output for May	1571
Meetings of Machine Tool Builders	1542	Waste in Industry	1579
Ring Coiling Machine	1542	Failure to Agree on Tariff	1580
Market Conditions in Czechoslovakia, Austria, Great Britain, Germany, France, Belgium, Far East	1543, 1548, 1580, 1581, 1584	New Bethlehem Shapes	1581
Air Operated Wire Brush	1543	Industrial Finance	1586
		Short Trade Items	1593

Iron and Steel Markets	1568
-------------------------------------	------

Comparison of Prices	1569
-----------------------------------	------

Prices Finished Iron and Steel, f.o.b. Pittsburgh	1582
--	------

Non-Ferrous Metal Markets	1583
--	------

Personal Notes	1585
-----------------------------	------

Obituary Notes	1585
-----------------------------	------

Machinery Markets and News of the Works	1587
--	------

New York Jobbers' Prices	1594
---------------------------------------	------

ESTABLISHED 1855

THE IRON AGE

EDITORS:

A. I. FINDLEY

WILLIAM W. MACON

GEORGE SMART

CHARLES S. BAUR, *Advertising Manager*

Member of the Audit Bureau of Circulations and of
Associated Business Papers, Inc.

Published every Thursday by the IRON AGE PUBLISHING CO., 239 West 39th Street, New York

F. J. Frank, *President*

George H. Griffiths, *Secretary*

Owned by the United Publishers Corporation, 243 West 39th Street, New York. H. M. Sweetland, *Pres.*, Charles G. Phillips, *Vice-Pres.*, A. C. Pearson, *Treas.*, F. J. Frank, *Secy.*

BRANCH OFFICES—Chicago: Otis Building. Pittsburgh: Park Building. Boston: 410 Unity Building. Philadelphia: 1420-1422 Widener Building. Cleveland: Guardian Building.

Cincinnati: Mercantile Library Building. Washington: 816 Fifteenth Street, N. W. San Francisco: 820 Market Street. London, England: 11 Haymarket, S.W. 1.

Subscription Price: United States and Possessions, Mexico, Cuba, Shanghai, \$6.00; Canada, \$8.50; Foreign, \$12.00 per year. Single copy 50 cents.

Entered as second class matter, June 18, 1879, at the Post Office at New York, New York, under the Act of March 3, 1879

Freight Rates and Business

The unwise proposal has some support in Washington, that there be a horizontal reduction in freight rates. Were such a method of revision adopted the experience of many years before the war would go for naught, for to reduce rates horizontally would be yielding to popular talk that has nothing in it. The remark has been as widespread as it is groundless that business recovery is prevented by freight rates being too high. Surely a lesson should be drawn from the experiences before the war. We had ups and downs in business then, and in times of depression most of the allegations of causes proved unfounded, while most of the remedies proposed were found to be of no value. With particular insistence we heard at times that business would never be good until freight rates were advanced. Now we have been told that trade will not be good until freight rates are reduced. It is a psychological phenomenon, not a business diagnosis.

The idea of a horizontal reduction in freight rates misinterprets much of the talk that has been heard on the railroad problem. A readjustment or harmonizing in wage rates was requisite, as part of the industrial readjustment, and reductions in railroad wages were urged partly as an aid to completing readjustment in certain other lines. In the building trades in particular there has been crying need for wages to come down and working conditions to be modified along the line of efficiency and harder work; and to maintain an unreasonable wage basis on the railroads would retard the readjustment in the building trades and at other points where adjustment was needed.

We are in too serious a situation to let men nurse their grievance against the policy some railroad men used to follow in the old days, of charging "all the traffic will bear." It cannot be helped if it hurts the feelings of some men to adopt this policy, to an extent, in arranging freight rates in the future. It should be sufficient salve that the policy is adopted for the economic good of the country instead of for the financial benefit of individual railroads. According to the policy, a horizontal reduction, or anything approaching a horizontal reduction, would be the

worst way to settle the matter of freight rates.

If the volume of railroad freight traffic were studied it would be seen that it does not show the depression to be as great as is conceived by those who think to increase the volume of business by reducing all freight rates. For instance, the freight ton-mileage last February was at a rate approximately equal to the average rate in the best year before the war, yet February is normally a month of traffic under the year's average. It is quite idle to expect to effect a great increase in freight traffic purely by the method of reducing freight rates in general.

As a remedy along psychological lines, reductions in freight rates are altogether to be commended, but if that is the case the reductions should be made chiefly in the rates that the public has found by concrete example to be plainly burdensome. It cannot be shown that all freight rates are too high for the total volume of business in the country to be what it used to be, but it has been shown plainly that certain rates are altogether too high to permit the lines of business involved to be conducted with facility. Those are the rates that should come down.

The increasing use of giant dirigibles of the R 34 type is brought to notice by the employment of one of them last week as a regulator of traffic for the British derby at Epsom Downs. From a height of some 2000 feet it was possible by wireless to direct automobile and vehicular traffic, which was unusually heavy because of the coal strike and lack of rail transportation. Of more practical interest are the figures for the exports and imports moved by air craft. Already the British Government has issued reports of foreign trade carried on by air transport, and its growth, in the periods compared was very large, imports from France having been the heaviest. That aircraft will play no small part in international trade, particularly among European countries, seems assured. The possibilities in the United States are not so great, but ultimately the commercial airship may be a carrying agent not only between this country and Mexico and Canada, but also to South America. Steel, metallic products and other materials will ultimately find speedy transportation, and exports and imports

by aircraft will become a regular feature of statistical reports here and abroad. The electric furnace and the isolation of aluminum and magnesium are the main factors in this development, the combination of these light metals with themselves or with other metals, made stronger by heat treatment, being responsible for these giants of the air.

Outlook for the Eight-Hour Shift

As Mr. Schwab pointed out at the recent meeting of the American Iron and Steel Institute, if the iron and steel manufacturers profit by their experience during the present period of depression, the result will be highly beneficial to the industry. Certain it is that operating departments are having unusual opportunities for testing new methods. One of these opportunities is found in the adoption of the eight-hour shift in some of the large steel plants. This action has been taken to furnish employment to a larger number of men, and in the case of a large Youngstown company it was stated that as soon as conditions permit the twelve-hour shift will be restored. This announcement undoubtedly was made because the management of the company did not believe it to be the desire of the employees to work permanently upon an eight-hour basis with the accompanying reduction in wages, but it is entirely possible that experience with the eight-hour shift will indicate a method which will be satisfactory to all concerned for putting it into effect permanently.

As stated in these columns last week, the speeding up of the open-hearth process is promised by two methods of throttling the air supply so as to complete a heat in eight hours which ordinarily requires twelve. If this is really accomplished, it will be an important factor in bringing about the eight-hour shift, for a complaint often made by open-hearth workers has been that with the eight-hour shift some of the men would carry the great burden of work connected with the tapping and charging of the furnace, while others would get off lightly. With the charging and tapping recurring more frequently and with the number of workers increased (even though by something less than 50 per cent) the inequalities in work performed would be lessened.

In a recent article in the *Atlantic Monthly*, Philip Cabot tells of the efforts his brother, the founder of the Cabot Fund, made in 1910 to bring about a reduction of hours of workers of the Steel Corporation and urges that this step be taken at the present time, but he frankly admits that a radical change of this kind would be doomed to failure if inaugurated at a period not adapted to it. He admits that conditions preceding the World War were not favorable for the introduction of the eight-hour shift and says that it is fortunate for the cause of progress and reform that changes of fundamental character were not attempted. He adds: "If in 1912 the officials of the United States Steel Corporation had entered upon such a course, they would probably have been forced to abandon it by the exigencies of war, with its huge demand for production and coincident shortage of labor."

It is hardly competent for one, not directly connected with manufacturing problems which would be materially affected by such a change, to say that

the moment has arrived for making it, but the attitude of some leaders of the steel industry is significant. Chairman Gary in his address at the annual meeting of the stockholders of the Steel Corporation, April 18, said the presidents of the subsidiary companies and a majority of others in positions of responsibility, were in favor of abolishing the twelve-hour day, and for this reason and because of public sentiment expected to decrease the working hours in the "comparatively near future." The outlook now is that the experiences of many plants and also the introduction of new methods will hasten the day.

Steel Production Costs

In periods of full employment for the steel mills there has been much reference to the low costs per ton attained. At such a time, when buyers are ordering or specifying for forward deliveries, mills are scheduled far ahead. Roll changes are infrequent, there are long runs on a given size or section and workmen endeavor to make new tonnage records.

Conditions now are absolutely reversed. Aside from the overhead per ton being particularly heavy on account of the light operation, small orders are being handled, nearly every order passing through the mill as a unit, necessitating frequent roll changes and making the amount of workmen's time per ton of output especially large. Apart from the factors of overhead and of high wage rates per hour there is this factor, greatly increasing the cost.

It has been urged often of late that industry has entered a period in which production costs must be governed by the selling prices obtainable, that if a manufacturer cannot sell his goods at cost he must reduce his cost until he reaches the point at which the buyer will place orders. There is something in this, as a general economic principle; but in the steel industry at any rate there are probably no manufacturers who require any further stimulus to the reduction of costs.

In one respect the production cost of finished steel is at the dictation of the buyer rather than at the dictation of the seller. In all business it is commonly recognized that when one purchases goods that are to be made "to order" he is properly asked to pay an extra price, because the cost is higher, and that goods sold at retail are priced higher than goods sold wholesale. While at one time or another a given specification for steel is made to order, there is essentially a great difference between adding the specification of a customer to a batch of specifications already in hand, for the size involved, merely adding the specification to the schedule, and making up a schedule for that one specification. There is also a great difference between selling a carload made up of numerous sizes or sections, all to be shipped within a very few days, and taking a specification for many carloads, when some of the carloads may be made up of a single size or section each and shipped at intervals according to mill convenience.

These things add greatly to the cost of production at this time, and they are things made by the buyer, who is getting goods made to order, and at retail. According to recognized principles of merchandising the producer is entitled to secure, if he can, his extra cost.

It is not good business to make retail sales at wholesale prices simply in expectation that eventually the retail business may grow to wholesale proportions. For the buyers to approach the sellers and say "We will become wholesale buyers if you will name us wholesale prices" is another matter. The steel trade has gone through this experience at various times in the past as, for instance, in the spring of 1909 and in the late weeks of 1911. Both buyers and sellers expect a repetition of the performance at some time in the future, the main question being when buyers will get in the position of being able to offer orders in such form as to reduce mill costs. With full mill activity costs would still be very high as compared with 1913, on account of wages and freight rates being much higher, but they would be materially lower than at present.

Checking the Census on Iron

When the Census Bureau places the 1919 products of blast furnace plants at \$794,467,000, compared with \$317,654,000 in 1914—an increase, "on the face of the returns," of 150 per cent—the thoughtful reader will wonder just how much the 1919 figure should be discounted to take care of the increased unit values placed on the pig iron produced. In a similar way, skepticism is aroused by the announcement of a gain of 206 per cent in the products of steel works and rolling mills—reported to have increased from \$918,665,000 in 1914 to \$2,812,775,000 in 1919.

By using a measuring stick in the shape of an average price of the product in each year under review, one may readily determine a quantitative ratio between the two years. Unfortunately, however, while this method is satisfactory in comparing similar products, it is of less assistance when the materials are essentially dissimilar—as wheat and steel and petroleum—unless we accept, for the time, at least, the theory that prices of 1914 form a basis to which we must return, or, per contra, that they were unduly low, and 1919 prices should be our future guide. But the latter have already been discounted, after first having been far outrun in 1920, and in a market yet without bottom one hesitates to apply even the prices current, knowing that a few months, at most, will probably render them in turn obsolete.

It happens that a composite price of rolled steel products in 1914, based on THE IRON AGE'S quotations, showed an average of \$28.39 per ton, compared with a 1919 average of \$63.24 per ton (2000 lb.). Similarly, a pig iron composite for 1914 was \$13.88, while \$29.37 was the corresponding figure for 1919. If we may assume that all the products reported by the Census Bureau under the two headings quoted varied in price, on the weighted average, in the same ratio as the two composite figures just mentioned, the figures of production as measured in 1914 dollars (or 1914 prices) appear as follow:

	1914	1919	Increase, Per Cent
Blast furnace products	\$317,654,000	\$374,376,000	17.9
Steel works and rolling mills	\$918,665,000	1,262,724,000	37.4

These percentages of increase are quite different from the 150 and 206 per cent, respectively, figured on the reported values. But they appear to

be a fair measure of the absolute advance of the industry in quantity of production, regardless of all theories as to the permanency of any stipulated price level, and as such may be made the basis of similar comparisons when subsequent census figures tell of the progress made between 1919 and 1924.

Though 1914 and 1919 were both poor years in respect to production (1914 gave a rolled steel tonnage 18.5 per cent below the average of 1909 to 1913, inclusive, while 1919 was 17 per cent under the average of 1914 to 1918, inclusive) and hence it is unfortunate that they happened to fit into the Census Bureau's quinquennial schedule of statistics gathered. Nevertheless, they furnish, in their figures of production, definite confirmation of the analysis above given. Thus, the pig iron produced for sale in 1919 (8,690,227 tons) was 18.0 per cent above the 7,362,980 tons of 1914; and the steel rolled in 1919 (25,101,544 tons) was 36.7 per cent greater than the 18,370,196 tons of 1914.

The slump in international iron and steel demand is emphasized by the export statistics for April, those for the United States appearing in THE IRON AGE last week and the British data elsewhere in this issue. For the first time American and British iron and steel exports were practically on a parity in April, at 162,592 and 161,508 gross tons, respectively. With the coal strike on, the British movement in April was larger than was to be expected and exceeded that for March, but it was less than 40 per cent of the pre-war or 1913 record. The extent of the British decline is measured by the fact that the British exports to May 1, this year, were only 177,906 tons per month, which is less than the 1919 average of 188,519 tons per month. A different contrast is presented by the import figures. The British receipts in April were 111,535 tons, making this year's average 117,414 tons per month to May 1, as against imports of 195,200 tons per month in 1913. The interesting point is that while British imports continue high and exports are less than 40 per cent of the pre-war records, American exports are even now 67.5 per cent of the 1913 rate. In both cases, however, capacity, particularly American, has been increased greatly and a heavier export demand is necessary to a healthy and profitable operation of the industry of both countries. •

Bids on Sheet Steel

WASHINGTON, June 7.—Max Solomon, a Pittsburgh scrap dealer, with an average price of \$10.58, submitted the highest bid to the War Department for 20,000 gross tons of shell steel and forgings, located at points in the East and Middle West. The next highest bidder for the entire tonnage was the Hyman-Michaels Co., Chicago, at an average price of \$8.99, while the Jones & Laughlin Steel Co., Pittsburgh, whose figure was \$8.54, came next. The highest bid for any single lot was \$12.15, submitted by Mr. Solomon.

Iron and Steel Institute in France

The autumn meeting of the Iron and Steel Institute will be held, by invitation of the Comité des Forges de France, in Paris on Monday and Tuesday, Sept. 5 and 6, 1921. Following the meeting alternative visits have been arranged to works in Lorraine and in Normandy. A party of the members have been invited also to visit the Creusot works of Schneider & Co.

REORGANIZATION PLANS

Secretary Hoover Making Effective His Ideas as to Co-operating with Industries

WASHINGTON, June 6.—Definite plans for a practical reorganization of the Bureau of Foreign and Domestic Commerce, to meet the existing commercial situation and problems involved in foreign trade, have already been made by Secretary of Commerce Hoover, as the result of the passage by Congress of the second deficiency bill carrying an appropriation of \$250,000 for this work. Mr. Hoover announced yesterday that of the industrial groups that are to be organized, those relating to textiles, chemicals, coal, oil, leather products and food stuffs have been positively settled upon. The setting up of other groups is a question as to what they shall include in the way of their composition and their possibilities. Among these groups will be one relating to machinery, and if a steel group as such is not established, this industry will receive co-operation through one of a number of service committees that have been and are to be named. Another group will deal with specialties such as labor-saving devices, including typewriters.

Industrial Groups

Originally, it was the intention of Secretary Hoover to create 12 industrial groups, but it has not been definitely determined as to the number that will be set up, and no specific provision of this kind is made by Congress.

These groups will carry out the same parallel groupings that apply to the Bureau of Standards and the Bureau of the Census. The Bureau of Standards also was given \$250,000 of the appropriation of \$1,000,000 for the Bureau of the Census, for the continuation of investigation of structural materials for which \$50,000 is allowed; for technical investigations in co-operation with industries upon fundamental problems involved in industrial development following the war, with a view to assisting in permanent establishment of the new industries developed during the war, including personal services of the District of Columbia and elsewhere, for which \$100,000 was allowed, and for co-operation of the Bureau of Standards with Government departments, engineers and manufacturers, with regard to standardization and testing of instruments, equipment, tools, etc., for which \$100,000 was allowed.

Four Groups

Groups under the Bureau of Foreign and Domestic Commerce, which is allowed two additional assistant directors, making four in all, will consist of the heads of divisions and assistants who will co-operate with service committees selected from the various industries. It is proposed to have two expert men for each group. The underlying plan is that with the Bureau of Foreign and Domestic Commerce and the Consular Service of the State Department acting as an agency for recruiting foreign commercial information, there shall be a link to bring the service into direct connection with the industries of the country for the promotion and development of foreign commerce. These divisions are to direct the foreign service so as to secure results needed by the industries themselves. At the same time, the industries are to distribute this preparation among these groups. The experts will make special investigations into particular trade conditions abroad requiring special skill. Detail plans that Mr. Hoover has in mind were set forth in THE IRON AGE of May 26.

Service Committees

Briefly, it is recognized that it is necessary to have experts in the respective trades in co-operation with the service committees on the industries, to assist the bureau in guiding the foreign service to particular results and to give encouragement to the industries to push ahead. Information involving vital facts of value to the industries would be collected, adequately prepared and distributed, and intended to show the direc-

tions in which commerce may be extended to the best advantage. Secretary Hoover has pointed out that the world is facing an entirely new era in foreign trade, and due to the economic conditions abroad, there is a growing tendency to consolidate for militant export purposes in practically every country in Europe. He spoke both of the consolidation of industrial concerns by mergers of capital and of the direct combination of exporters for unity in the exploitation of foreign markets. If these combinations are met, he holds that it is necessary to secure more collective action on the part of the American industries and that it is at least necessary to furnish special information upon which America can act and that such information must be secured under expert direction.

Another factor in foreign commerce requiring a great deal of study is foreign combinations for imports. This results in the whole buying for a nation of a given commodity, so that these combinations may more or less dictate prices within the United States. Consequently, it is maintained that it is necessary to have a general staff of specialists to work out, in co-operation with American industries, policies and methods to meet these forces.

Addressing an informal gathering of business men in Franklin, Pa., on June 3, Charles M. Schwab, chairman Bethlehem Steel Corporation, said he would not want to see an immediate return of prosperity in America. "If we were to recover quickly from our depression," he said, "we should find ourselves back in a period of abnormal times such as we have just passed through." Mr. Schwab's visit to Franklin was in connection with an inspection of the new plant there of the Chicago Pneumatic Tool Co.

The Interstate Iron & Steel Co. turned over its new continuous merchant mill at South Chicago on June 5. The mill contains six stands of 16-in. roughing, two 14-in. finishing stands and four 12-in. finishing stands. Running full the mill will roll 75,000 tons per year.

The Iron Age and Its Readers

In spite of the suddenness with which to many in business came the flood of cancellations and the collapse of buying in the fall of 1920, it remains true that a careful reading—not a mere perusal—of THE IRON AGE market summaries must have brought hints to the wary—hints to which many were not receptive, such was their confidence that the pace was good for another year or two. Some letters from our readers in the first half of the year showed how doubts were being raised that demand could long keep on at the then high rate. Some of the straws showing some movements to the surface trend were the following:

On Jan. 22, 1920, was noted a sharp drop in export buying; on Feb. 19 was emphasized the caution being shown in financial circles and the suspension of some steel shipments; on Feb. 26 was reported the hesitation of one group of buyers; on March 25 was published a hint that some of the leaders in the trade expected an easing of premium prices in the second quarter of the year and that some ship material cancellations had occurred; on April 1, a series of predictions was made of easier conditions, followed by still others in the week of April 8. Then came the railroad strike, which clouded the issue, but on May 6 came the suggestion that mills would shortly be able to take care of the proffered business, particularly with the diminution in shipbuilding and tank construction; and then on June 3 were recorded the first reports of automobile plant cancellations or suspensions at a time when the slowing up of automobile manufacture was generally not believed.

IRON OUTPUT STILL LOW

May Production at About Same Rate as in April

Net Loss of Six Furnaces—Manganese Alloy Output Lowest in 20 Years

The rapid decline which has characterized the country's blast furnace output in recent months appears to have ceased with the May production which, while at a slightly less daily rate than that in April, is a little larger as to total than the previous month. The increase in the May total over April was 28,180 tons, with a decrease in daily rate of 374 tons per day. The production, however, is at a very low rate, the next lowest on record having been in July, 1908, when the total was 1,218,129, as compared with 1,221,221 last month. The net loss in furnaces blown out or banked in May was six or the same as in April, which makes the net loss in the last eight months 229 furnaces.

The production of coke and anthracite furnaces in May, a 31-day month, amounted to 1,221,221 gross tons, or 39,394 tons per day, as compared with 1,193,041 tons, or an average of 39,768 tons per day in April, a 30-day month, and with 1,595,522 tons, or 51,468 tons per day in March, a 31-day month. In May, 1920, the total output was 2,985,682 tons, or 96,312 tons per day. The total furnaces in blast on June 1 was 90, compared with 96 on May 1, with 102 on April 1 and 201 on Jan. 1. The 90 in blast June 1 had a capacity of 38,080 tons per day, as compared with 38,505 tons per day for the 96 in blast on May 1 last. There were 13 furnaces blown out or banked and seven blown in during May.

A feature of the May output was the rapid decline in production of ferromanganese and spiegeleisen, the total of 9232 tons being the lowest since before the war. In January, 1911, the total output of these two alloys was 8360 tons, which marks the lowest previous record. Of the May output, this year, 6853 tons was ferromanganese. This contrasts with an output in April this year of 9466 tons of ferromanganese and with a total for the two alloys of 24,310 tons.

Daily Rate of Production

The daily rate of production of coke and anthracite pig iron by months, from May, 1920, is as follows:

Daily Rate of Pig Iron Production by Months—Gross Tons			
1920	Steel Works	Merchant	Total
May	68,668	27,644	96,312
June	73,659	27,792	101,451
July	71,954	26,983	98,937
August	72,740	28,789	101,529
September	74,908	29,402	104,310
October	77,214	28,998	106,212
November	71,669	26,161	97,830
December	66,037	20,185	86,222
January, 1921	62,327	15,618	77,945
February	58,060	11,127	69,187
March	42,691	8,777	51,468
April	33,854	5,911	39,768
May	33,054	6,340	39,394

The figures for daily average production, beginning with January, 1915, are as follows:

Daily Average Production of Coke and Anthracite Pig Iron in the United States by Months Since Jan. 1, 1915—Gross Tons									
	1915	1916	1917	1918	1919	1920	1921		
Jan.	51,659	102,746	101,643	77,799	106,525	97,264	77,945		
Feb.	59,812	106,456	94,473	82,835	105,006	102,720	69,187		
Mar.	66,575	107,667	104,882	103,648	99,685	108,900	51,468		
Apr.	79,350	107,592	111,165	109,607	82,607	91,327	39,768		
May	79,015	108,422	110,238	111,175	68,002	96,312	39,394		
June	79,361	107,053	109,092	110,793	70,495	101,451			
July	82,691	104,017	107,820	110,354	78,340	98,931			
Aug.	89,686	103,346	104,772	109,341	88,496	101,529			
Sept.	95,085	106,745	104,465	113,942	82,932	104,310			
Oct.	100,822	113,189	106,550	112,482	60,115	106,212			
Nov.	101,244	110,394	106,859	111,802	79,745	97,830			
Dec.	103,333	102,537	92,997	110,762	84,944	87,222			

Production of Steel Companies—Gross Tons

Returns from all furnaces of the United States Steel Corporation and the various independent steel companies, as well as from merchant furnaces producing ferromanganese and spiegeleisen, show the following totals of steel making iron, month by month, together with ferromanganese and spiegeleisen. These last, while stated separately, are also included in the columns of "total production."

Production of Steel Companies—Gross Tons

	Total Production			Spiegeleisen and Ferromanganese		
	1919	1920	1921	1919	1920	1921
Jan.	2,430,022	2,331,117	1,932,159	32,787	23,957	22,228
Feb.	2,209,470	2,137,670	1,625,695	28,105	28,038	29,013
Mar.	2,277,507	2,206,678	1,323,443	26,644	35,275	41,294
Apr.	1,838,677	1,978,322	1,015,621	17,308	27,628	24,310
May	1,586,800	1,128,770	1,024,678	14,604	33,407	9,282
June	1,675,944	2,209,170		14,254	34,751	
July	1,906,604	2,230,671		14,805	36,789	
Aug.	2,108,563	2,119,948		17,419	36,985	
Sept.	1,828,613	2,217,210		20,631	39,546	
Oct.	1,295,690	2,303,644		20,238	34,786	
Nov.	1,727,656	2,150,075		19,964	26,944	
Dec.	1,916,249	2,047,167		15,718	28,023	

Capacities in Blast June 1

The following table shows the number of furnaces in blast June 1 in the different districts and their capacity, also the number and daily capacity in gross tons of furnaces in blast May 1:

Coke and Anthracite Furnaces in Blast					
Location of Furnaces	Total Stacks	June 1		May 1	
		In Blast	Capacity per Day	In Blast	Capacity per Day
<i>New York:</i>					
Buffalo	22	3	1,200	3	1,175
Other New York	4	0	...	0	...
New Jersey	4	2	330	2	330
<i>Pennsylvania:</i>					
Lehigh Valley	18	3	1,125	4	1,510
Spiegel	2	0	...	0	...
Schuylkill Valley	15	2	785	2	680
Lower Susquehanna	10	2	790	2	715
Ferro	0	0	...	0	...
Lebanon Valley	8	0	...	0	...
Ferro	2	1	65	1	70
Pittsburgh District	55	18	8,700	18	9,580
Ferro and spiegel	4	1	110	4	615
Shenango Valley	19	2	900	2	975
Western Penn.	26	6	2,000	7	2,360
Ferro and spiegel	0	0	...	0	...
Maryland	6	1	450	1	400
Wheeling District	15	1	580	1	500
<i>Ohio:</i>					
Mahoning Valley	27	5	2,400	7	3,400
Central and Northern	26	8	4,140	8	3,590
Southern	16	4	1,010	3	635
Illinois and Indiana	42	15	8,100	15	7,075
Mich., Wis. and Minn.	11	3	1,335	2	895
Col., Mo. and Wash.	7	2	760	2	790
<i>The South:</i>					
Virginia	16	2	175	3	355
Kentucky	7	0	...	0	...
Alabama	40	9	3,125	8	2,775
Ferro	1	0	...	1	80
Tenn., Ga. and Texas	16	0	...	0	...
Total	419	90	38,080	96	38,505

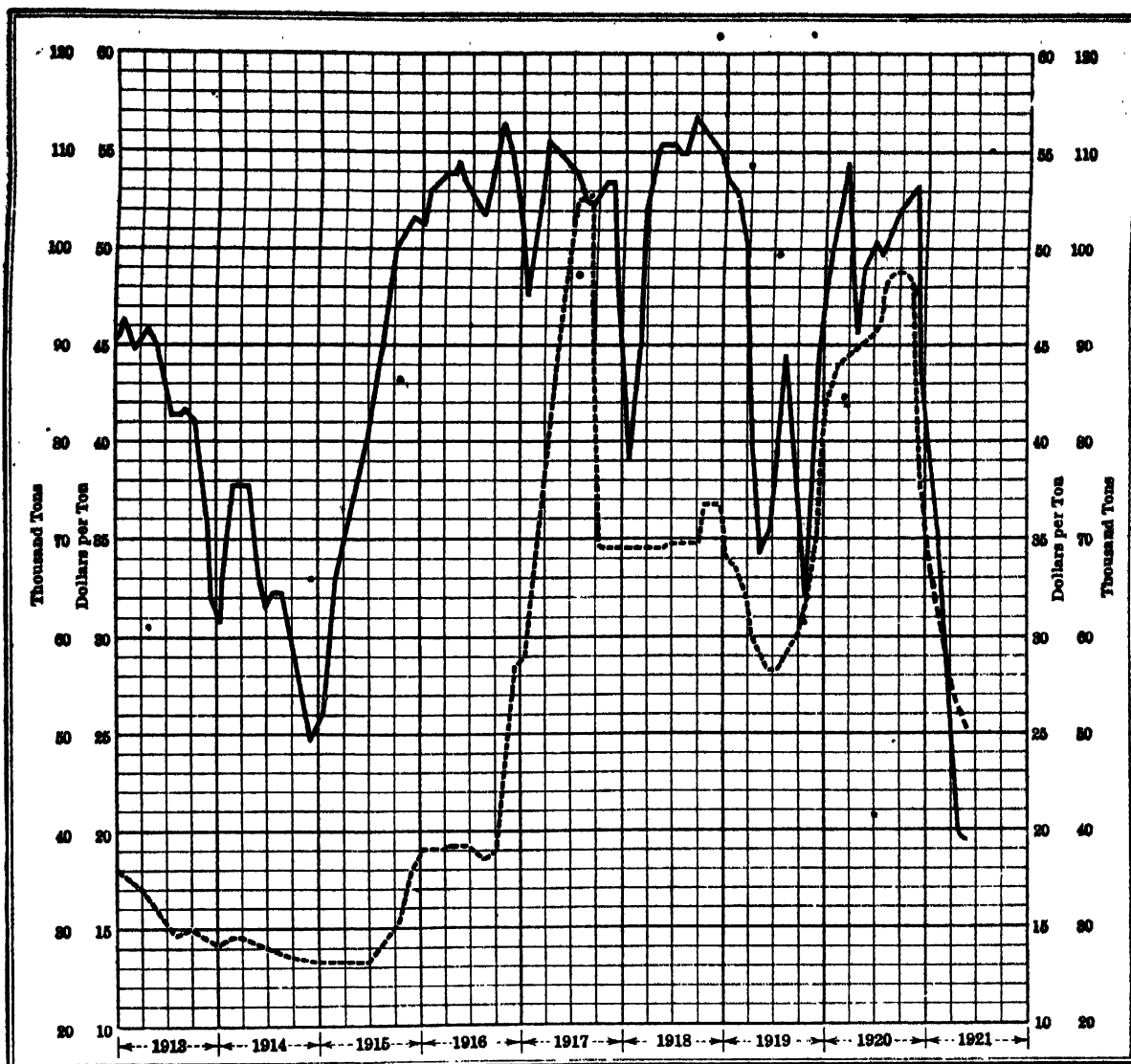
Output by Districts

The accompanying table gives the production of all coke and anthracite furnaces for May, and the three months preceding:

	Pig Iron Production by Districts, Gross Tons			
	May (31 days)	April (30 days)	March (31 days)	Feb. (28 days)
New York	37,202	41,223	82,559	99,019
New Jersey	10,291	9,875	9,307	3,858
Lehigh Valley	42,289	45,329	48,256	45,281
Schuylkill Valley	24,471	21,279	28,631	26,677
Lower Susquehanna and Lebanon Valleys	26,491	24,799	24,521	26,911
Pittsburgh district	281,391	304,308	387,966	486,669
Shenango Valley	27,981	30,763	52,516	83,064
Western Penn.	73,661	70,930	83,350	76,697
Maryland, Virginia and Kentucky	20,781	17,575	22,069	23,165
Wheeling district	17,981	1,991	54,573	98,477
Mahoning Valley	87,090	102,826	132,482	177,411
Central and Northern Ohio	133,801	107,747	137,925	166,571
Southern Ohio	29,108	11,843	4,547	12,200
Illinois and Indiana	249,671	239,585	344,675	406,222
Mich., Minn., Mo., Wis., Colo. and Wash.	65,004	68,058	80,539	81,812
Alabama	94,013	94,910	101,484	124,513
Tennessee	none	none	122	3,710
Total	1,221,221	1,193,041	1,595,522	1,937,257

Diagram of Pig Iron Production and Prices

The fluctuations in pig iron production from 1913 to the present time are shown in the accompanying chart. The figures represented by the heavy line are those of daily average production by months of coke and anthracite iron. The dotted curve on the chart represents monthly average prices of Southern No. 2 foundry pig iron at Cincinnati, local No. 2 foundry iron at furnace at Chicago, and No. 2X at Philadelphia. They are based on the weekly quotations of THE IRON AGE.



The Full Line Represents the Daily Production of Pig Iron and the Dotted Line Is the Average of the Price Per Ton of No. 2 Southern Pig Iron at Cincinnati, Local No. 2 Iron at Chicago and No. 2X Iron at Philadelphia

Production of Coke and Anthracite Pig Iron in the United States by Months, Beginning Jan. 1, 1917—Gross Tons

	1917	1918	1919	1920	1921
Jan.	3,150,938	2,411,768	3,302,260	3,015,181	2,416,292
Feb.	2,645,247	2,319,299	2,940,168	2,978,879	1,937,257
Mar.	3,251,352	3,213,091	3,090,243	3,375,907	1,595,522
Apr.	3,334,960	3,288,211	2,478,218	2,735,797	1,193,041
May	3,417,340	3,446,412	2,108,056	2,985,682	1,221,221
5 mos.	15,799,837	14,678,781	13,918,945	15,095,446	8,363,333
June	3,270,055	3,323,791	2,114,863	3,043,540	.....
July	3,342,438	3,420,988	2,428,541	3,067,043	.....
Aug.	3,247,947	3,389,585	2,743,388	3,147,402	.....
Sept.	3,133,954	3,418,270	2,487,965	3,129,323	.....
Oct.	3,303,038	3,486,941	1,863,558	3,292,597	.....
Nov.	3,205,794	3,354,074	2,392,350	2,934,908	.....
Dec.	2,862,918	3,433,617	2,633,268	2,703,855	.....

Total, yr. 38,185,981 38,506,047 30,582,878 36,414,114

*These totals do not include charcoal pig iron. The 1919 production of this iron was 327,097 tons.

Among the furnaces blown in during May are the following:

The Princess furnace in Virginia; United furnace in central Ohio; Jisco furnace in southern Ohio; No. 1 and No. 4 Joliet furnaces of the Illinois Steel Co. in Illinois; one furnace of the Minnesota Steel Co. in Minnesota and the Alabama City furnace of the Gulf States Steel Co. in Alabama.

Among the furnaces blown out or banked during May were the following:

One Bethlehem furnace in the Lehigh Valley; Nos. 1 and 3 Isabella furnaces of the Carnegie Steel Co. and one Monongahela furnace of the National Tube Co. in the Pitts-

burgh district; Saxton furnace in western Pennsylvania; two furnaces of the Virginia Iron, Coal & Coke Co. in Virginia; Grace furnaces of the Brier Hill Steel Co. and the Cherry Valley furnace in the Mahoning Valley; No. 4 furnace of the National Tube Co. in northern Ohio; Nos. 1 and 2 Gary furnaces of the Indiana Steel Co. in Indiana and one Bessemer furnace of the Tennessee Coal, Iron & Railroad Co. in Alabama.

Bids on Steel Tanks

WASHINGTON, June 7.—The Pittsburgh-Des Moines Steel Co. appears to have been the lowest bidder for supplying the Emergency Fleet Corporation with 14, 55,000-bbl. steel tanks. This company submitted a bid of \$10,985 for each tank when using its own material and \$8,377.90 if it is to do the work of fabricating only and the material supplied by the Fleet Corporation. Each tank is to be 144 ft. 7 in. by 30 ft. 4 in. and involves approximately 200 tons of plates. Prices quoted are on an f.o.b. basis at manufacturers' plants. Among other quotations were the following, the first set of figures calling for the supplying of steel by the fabricators and the second by the Fleet corporation: American Bridge Co., \$11,464.30; \$10,341.42; Ritter-Conley Co., Pittsburgh, \$11,780; \$9,740; Pressed Steel Car Co., Pittsburgh, \$12,567; \$11,569; Petroleum Iron Works Co., Sharon, Pa., \$11,700; \$8,985; Reeves Bros. Co., Alliance, O., \$12,500; \$10,072; Youngstown Boiler & Tank Co., Youngstown, O., \$11,928; \$11,025.

Iron and Steel Markets

DRAGGING BOTTOM

May Iron and Steel Output Close to April Level

Lower Wire, Sheet and Pig Iron Prices—Concessions in Other Lines

The statistics of both pig iron and steel ingot production in May bear out the estimate generally accepted in that month that steel works were averaging a 30 per cent operation. In both cases the figures are so close to those for April as to suggest an industry fairly dragging on the bottom, with little in sight pointing to any appreciable change.

In the 31 days of May pig iron production was 1,221,221 tons, or 39,394 tons per day, against 1,193,041 tons in the 30 days of April, or 39,768 tons per day. For a smaller output in a 31-day month nearly 13 years must be retraced, July, 1908, showing 1,218,129 tons.

Thirteen furnaces were blown out in May and seven were blown in—a net loss of six. The 90 furnaces active as June came in had a daily capacity of 38,080 tons per day against 38,505 tons for 96 furnaces on May 1. Current production is at a yearly rate of 14,000,000 tons, whereas output in 1920 was 36,925,987 tons.

The American Iron and Steel Institute's steel statistics, just issued, show that the May output of ingots was 1,503,206 tons, or about 4 per cent more than April, with 1,441,537 tons. At the May daily rate annual production would be 17,980,465 tons. Output in both 1917 and 1918 exceeded 43,000,000 tons.

The volume of current business has if anything fallen off in the week. Definitely lower prices have been established in wire products, and in black and blue annealed sheets. Concessions are made in other finished steel lines, but owing to paucity of the orders price shading is not general.

Plain wire is now quoted at \$2.75 per 100 lb., wire nails at \$3 per keg and galvanized barbed wire at \$3.85 per 100 lb., all \$5 a ton below prices recently obtaining, and even some shading of the \$3 nail price is reported. Black sheets are down \$3 a ton to 3.85c., Pittsburgh, and blue annealed, \$4 a ton, to 2.90c. On two carloads of plates, less than 2c. a pound, Pittsburgh, was named and in Indianapolis 500 tons of steel bars were sold at 2c. On 400 tons of hard steel bars for the Government at Norfolk, the low price was 1.85c.

The largest transaction of the week in pig iron is the purchase of 25,000 tons of foundry grades by a cast iron pipe company at a price several dollars lower than \$22, Birmingham, which has been the prevailing quotation. Basic, Bessemer and malleable iron have declined \$1 and foundry grades 50c. to \$1 in the Pittsburgh district, and similar reductions in foundry irons are reported in other centers, while nominal advances in eastern Pennsylvania have not been followed by sales. Basic has sold at Chicago at \$20, local furnace.

One reassuring development is that jobbers serving the farmers are buying more freely than those dependent on the manufacturing trade, particularly in the Northwest, where the improved wheat market is having its effect.

General highway bridge and other construction promises still to absorb large quantities of structural steel but especially concrete reinforcing bars. A stadium for Ohio State University will require 4500 tons of steel and a Masonic Temple at Detroit, 7000 tons. The larger fabricated steel awards of the week total 7000 tons.

Business on railroad account includes the purchase of 500 tons of rails for the Cleveland electric railroad system, the awarding of repairs of 500 cars of the Soo Line and the ordering of 500 refrigerator cars for the Great Northern, although most of the steel needed in the last case is already in the possession of the car builder.

Track bolts and spike prices are unsteady. Quotations as low as 3c. and 3.10c., Pittsburgh, are reported on spikes and 3.62c. on bolts.

The ferromanganese and spiegeleisen output in May fell to the lowest in 20 years or 9232 tons as compared with 8360 tons in January, 1911.

For export, inquiries originate principally in the Far East and are chiefly for railroad equipment, among which are nine steel bridges for Japan and cars and locomotives for Chinese roads. About 500 tons of large diameter steel pipe is wanted for Formosa.

Pittsburgh

PITTSBURGH, June 7.

While there is no doubt in the minds of the iron and steel trade here that consumption exceeds production, no very definite idea yet has been formulated as to how long the industry must withstand the present stagnation of business for the reason that there are no reliable statistics as to the stocks in second and third hands and, without this information, it is impossible to accurately forecast when necessity will compel more liberal purchases. A water works engineer can readily estimate how long it will take to empty a reservoir when the inflow and outflow are known and, based on production and consumption, it might be possible to set a time when the iron and steel business would recover. The difficulty now is that iron and steel reserves are an unknown quantity.

Business has not improved in the past week; on the contrary, the more common report is that it has declined further. Buyers hold fast to the belief that lower prices are ahead and are suiting their purchases to this idea. The week has developed definitely lower prices in wire products and in black and blue annealed sheets. The downward movement is neither pronounced nor general, as there are several manufacturers who are disposed to shut down their plants rather than actively compete for a share of the small business that is being offered. The decline in wire products has once more proven the fact that price reductions at this time are not an effective means of stimulating business.

Pig iron prices have suffered further recessions running from 50c. to \$1 a ton and curtailment of steel works operations finds reflection in a similar decline in prices of scrap iron and steel.

Although coke production is at the lowest point

A Comparison of Prices

Advances Over the Previous Week in Heavy Type, Declines in Italics

At date, one week, one month, and one year previous

For Early Delivery

Pig Iron, Per Gross Ton:	June 7, 1921	May 31, 1921	May 10, 1921	June 8, 1920
No. 2X, Philadelphia...	\$25.50	\$25.50	\$25.84	\$47.15
No. 2, Valley furnace...	22.50	23.00	23.50	45.00
No. 2 Southern, Cin'tl...	26.50	26.50	26.50	45.00
No. 2, Birmingham, Ala.†	22.00	22.00	22.00	42.00
No. 2, foundry, Chicago*	21.50	22.00	23.00	43.00
Basic, del'd, eastern Pa.	25.00	25.00	25.00	44.80
Basic, Valley furnace...	21.00	21.75	22.00	43.50
Bessemer, Pittsburgh...	21.96	25.96	25.96	44.40
Malleable, Chicago*	21.50	22.00	23.00	43.50
Malleable, Valley...	24.00	24.00	24.00	44.00
Gray forge, Pittsburgh...	24.46	23.96	23.46	43.40
L. S. charcoal, Chicago...	37.50	37.50	37.50	57.50
Ferromanganese, del'd...	75.00	80.00	85.00	225.00

Rails, Pillets, etc., Per Gross Ton:

Bess. rails, heavy, at mill.	\$15.00	\$15.00	\$45.00	\$55.00
O.-h. rails, heavy, at mill.	17.00	47.00	47.00	37.00
Bess. billets, Pittsburgh...	37.00	37.00	37.00	60.00
O.-h. billets, Pittsburgh...	37.00	37.00	37.00	60.00
O.-h. sheet bars, 1" gh.	39.00	39.00	39.00	80.00
Forging billets, base, 1" gh.	42.00	42.00	42.00	85.00
O.-h. billets, Phila.	42.74	42.74	42.74	63.10
Wire rods, Pittsburgh...	48.00	48.00	48.00	75.00
Skelp, gr. steel, 1" gh., lb.	2.20	2.20	2.20	2.75
Skelp, sh. steel, 1" gh., lb.	2.20	2.20	2.20	3.00

Finished Iron and Steel,

Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Iron bars, Philadelphia...	2.25	2.25	2.35	4.25
Iron bars, Chicago...	2.25	2.25	2.38	3.75
Steel bars, Pittsburgh...	2.10	2.10	2.10	3.50
Steel bars, New York...	2.48	2.48	2.48	4.02
Tank plates, Pittsburgh...	2.00	2.20	2.20	3.50
Tank plates, New York...	2.38	2.58	2.58	3.77
Beams, etc., Pittsburgh...	2.20	2.20	2.20	3.10
Beams, etc., New York...	2.58	2.58	2.58	3.27
Steel hoops, Pittsburgh...	2.75	2.75	2.75	5.00

*The average switching charge for delivery to foundries in the Chicago district is 70c. per ton.
†Silicon, 1.75 to 2.25. ‡Silicon, 2.25 to 2.75.

The prices in the above table are for domestic delivery and do not necessarily apply to export business.

Sheets, Nails and Wire, Per Lb. to Large Buyers:	June 7, 1921	May 31, 1921	May 10, 1921	June 8, 1920
Sheets, black, No. 28, 1" gh.	3.85	4.00	4.00	5.50
Sheets, galv., No. 28, 1" gh.	5.00	5.00	5.00	7.00
Sheets, blue an'd, 9 & 10.	2.90	3.10	3.10	4.50
Wire nails, Pittsburgh...	3.00	3.00	3.00	4.00
Plain wire, 1" gh.	2.75	3.00	3.00	3.50
Barbed wire, galv., 1" gh.	3.85	4.10	4.10	4.45
Tin plate, 100 lb. box, 1" gh.	\$6.25	\$6.25	\$6.25	\$7.00

Old Material, Per Gross Ton:

Car wheels, Chicago...	\$13.50	\$14.00	\$15.00	\$25.50
Car wheels, Philadelphia...	18.00	18.00	16.00	38.00
Heavy steel scrap, 1" gh.	13.00	13.50	13.00	25.00
Heavy steel scrap, Phila.	11.50	12.00	12.00	22.50
Heavy steel scrap, Chgo.	11.50	11.50	11.50	22.00
No. 1 cast, Pittsburgh...	17.00	18.00	18.00	32.00
No. 1 cast, Philadelphia...	17.50	18.00	18.00	37.00
No. 1 cast, Chgo. (net ton)	13.00	13.50	13.50	35.50
No. 1 RR. wrot. Phila.	15.00	15.00	15.00	33.00
No. 1 RR. wrot. Chgo. (net)	10.00	10.50	10.50	25.00

Coke, Connellsville,

Per Net Ton at Oven:				
Furnace coke, prompt...	\$3.00	\$3.25	\$3.25	\$14.00
Furnace coke, future...	3.25	3.40	3.40	14.00
Foundry coke, prompt...	4.50	4.50	4.50	15.00
Foundry coke, future...	5.00	5.00	5.00	15.00

Metals,

Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Lake copper, New York...	13.00	13.25	12.75	19.00
Electrolytic copper, N. Y.	13.00	13.25	12.50	19.00
Zinc, St. Louis...	4.55	4.75	4.95	7.75
Zinc, New York...	5.05	5.25	5.45	8.10
Lead, St. Louis...	4.50	4.75	5.00	8.50
Lead, New York...	4.75	5.00	5.00	8.75
Tin, New York...	20.00	31.50	32.25	49.25
Antimony (Assam), N. Y.	5.20	5.25	5.25	8.75

in years, still lower prices have been reached in the past week. New prices show operators substantial losses, but business is accepted at these prices because even greater losses would be sustained by complete suspension of the mines and ovens.

Pig Iron.—The only important business recently done has been the purchase by an Allegheny Valley sheet maker of approximately 2000 tons of basic iron at delivered prices of \$22.25 to \$22.50. The iron was sold by middlemen and while definite details are withheld, it is the common impression that the iron will not come from any of the Valley furnaces. Deducting the freight from the Valley of \$1.96 per ton would mean about \$20.25 to \$20.50, furnace, if the iron were coming from the Valley. One lot of 500 tons of basic iron recently was sold at \$21, Valley furnace, and this now measures the market on this grade, especially in view of the fact that merchant producers have expressed a willingness to take business at that figure. Bessemer iron has been sold at \$23, Valley furnace, in small lots and that price represents the present maximum possibilities with regard to prices. Malleable iron has been offered at \$23, Valley furnace, and possibly could be bought for less. The market on No. 2 foundry iron is quotable from \$22.50 to \$23, but the latter is more of an asking than a selling price. The American Radiator Co. is reported to have bought considerable foundry iron for its several plants around \$21 from lake furnaces. Average prices of pig iron from Valley furnaces for the month of May as compiled by W. P. Snyder & Co. show that basic brought \$21.87½ or 62.5c. below the April average and Bessemer \$24.25, a decline of 75c. from April average. The Standard Sanitary Mfg. Co. recently bought 200 tons No. 2 foundry for its Louisville plant at \$22,

Birmingham, this price being quoted by all makers in that district.

We quote Valley furnace, the freight rate for delivery to the Cleveland or Pittsburgh district being \$1.96 per gross ton:
Basic... \$21.00
Bessemer... 23.00
Gray forge... \$21.50 to 22.00
No. 2 foundry... 22.50 to 23.00
No. 3 foundry... 22.00 to 22.50
Malleable... 23.00

Billets, Sheet Bars and Slabs.—Few now active in the business can recall a time when demand was at such a low ebb. Prices established April 13 find fairly close observance, but it would be exaggeration to call the market firm in the absence of inquiries which would provide a test. Demand is held on check, not only the slow demand for finished products, but because supplies of billets, sheet bars and slabs are ample and buyers see no reason to expect higher prices.

We quote 4 x 4-in. soft Bessemer and open hearth billets at \$37, 2 x 2-in. billets, \$39; Bessemer and open-hearth sheet bars, \$39; slabs, \$38; forging billets, ordinary carbons, \$42, all f.o.b. Youngstown or Pittsburgh mills.

Ferroalloys.—The market here is dull, unsettled and weak. The largest inquiry now on the market is for 5 tons of spiegeleisen for third quarter delivery from a steel maker outside the Pittsburgh district, and it is probable that the prospective buyer will decide eventually to buy by the month, instead of placing his tonnage at one time. Makers still ask up to \$35, furnace, for average 20 per cent material, but no recent business has been done at higher than \$32 and a firm bid of \$30 hardly would go begging. Domestic ferromanganese now is quotable at \$75 to \$80, delivered, these prices representing a fair appraisal of to-day's possibilities rather than sizable sales. Only carload lots are mov-

ing and even such sales are anything but numerous. English material still is held at \$75 c.i.f. Atlantic seaboard, but this would mean a delivered price in this district above that of domestic material and, consequently, attracts no attention. The market for 50 per cent ferrosilicon is purely a buyers' affair. All makers are anxious for business and would go pretty low to secure an order. Canadian producers are said to have quoted under \$70 delivered, in an effort to uncover a demand.

We quote 76 to 80 per cent ferromanganese at \$75 to \$80 delivered on domestic, English, 76 to 80 per cent, \$75, c.i.f. Atlantic seaboard. We quote average 20 per cent spiegeleisen at \$30 to \$32 furnace quoted by makers on direct business and \$38 to \$30 furnace on resale tonnages. 50 per cent ferrosilicon, \$70 to \$75 furnace, freight allowed, for domestic and foreign material. Bessemer ferrosilicon is quoted f.o.b. Jackson County and New Straitsville, Ohio, furnaces, as follows: 9 per cent, \$41.50; 10 per cent, \$45; 11 per cent, \$48.50; 12 per cent, \$51.60. Silvery iron, 6 per cent, \$32; 7 per cent, \$33.50; 8 per cent, \$35.50; 9 per cent, \$37.50; 10 per cent, \$40; 11 per cent, \$43.20; 12 per cent, \$46.60. The present freight rate from Jackson and New Straitsville, Ohio, into the Pittsburgh district is \$4.06 per gross ton.

Wire Rods.—Decline in prices of wire products has restricted an already small demand for rods, as the failure of the latter to drop with the finished products has encouraged some buyers to hold up shipping instructions against orders in. All makers are holding to \$48, Pittsburgh, for the base size of soft rods, but the market looks top-heavy. Prices are given on page 1582.

Iron and Steel Bars.—Demand for mild steel bars still is entirely for small lots for prompt shipment and because of the character of the buying there have been no important deviations from the regular market price of 2.10c. base. Some makers, rather than go to the expense of starting up idle mills for brief periods, are turning down orders which they cannot supply from stock. Inquiries for reinforcing bars are fairly numerous although generally for small lots. Such bars, rolled from new billets are held at 2.10c. base, but prices as low as 1.80c., presumably against bars rolled from old rails, shell steel or billet crops, are reported. The contract for the Baldwin reservoir in Cleveland, which will take about 1700 tons of reinforcing bars, has been awarded a Cleveland contracting company, which has not yet placed the business. Iron bars still are slow of sale and attractive orders undoubtedly would develop lower prices.

We quote steel bars rolled from billets at 2.10c., reinforcing bars, rolled from billets, 2.10c. base, reinforcing bars rolled from old rails, 1.90c. to 2c., refined iron bars, 2.75c., in carloads, f.o.b. mill, Pittsburgh.

Structural Material.—At least two good sized structural projects have been placed with fabricators in this district in the past week. The Jones & Laughlin Steel Co. has taken 1300 tons for a crusher plant for the Kelley Island Line & Transport Co., Marblehead, Ohio, and the Pittsburgh Des Moines Steel Co. has taken 1200 tons for a Navy Department aviation station, Ford Island, Hawaii. Other awards have been for small tonnages and although fairly numerous, do not reach any very large aggregate. Disputes between the contractors and building trades exist in practically all of the large cities in the country and Pittsburgh is no exception. The men are refusing to accept a cut in wages proposed in the new scale offered by contractors. An effort is being made in some centers to establish the open shop, but in this district the movement has been unsuccessful because of the failure of contractors to stand together. An award is expected soon of the 14 55,000-barrel tanks recently put up by the Shipping Board. Plain material is inactive and prices nominal. Prices given on page 1582.

Plates.—There is no change in the market as regards either the demand or prices. Inquiries run entirely to small tonnages for immediate shipment and on such business makers are not disposed to cut prices. Sizable tonnages, however, will undoubtedly develop lower prices. We quote sheared plates of tank quality, ½-in. and heavier, at 2.20c., base Pittsburgh.

Steel Rails.—Very fair demand still is observed for light rails from the coal operators, but contractors and other users still are buying very sparingly. These rails rolled from new steel are generally held at 2.20c., Pittsburgh, but those rolled from old standard sections

are offered at 2c. and on firm offers could be bought as low as 1.90c.

We quote 25 to 45-lb. sections, rolled from new steel, 2.20c.; rolled from old rails, 1.90c. to 2c.; standard rails, \$45 mill for Bessemer, and \$47 for open-hearth sections.

Hoops and Bands.—Business continues extremely slow, with buyers taking hold entirely in a hand to mouth way. Such business as is coming out is for immediate shipment and is being met largely from manufacturers' stocks. The price remains at 2.75c. base, but strict observance of this quotation is not claimed.

Cotton Ties.—Announcement of opening prices will be much later this year than usual, as makers seem inclined to wait until a demand appears before making a quotation. A good many ties were carried over from last year and early requirements will be supplied from these stocks.

Nuts, Bolts and Rivets.—There is no improvement in business, buyers still showing a tendency to confine purchases strictly to actual needs. Recent prices, however, are fairly well maintained because manufacturers are not trying to stimulate demand at the expense of profits. Rivets still are weak, however. Some makers who want orders have recently quoted as low as \$3.10. Prices and discounts are given on page 1582.

Iron and Steel Pipe.—Purchases steadily are dwindling and while plant operations do not reflect this fact, this is because makers are producing for stock. Manufacturers are finding considerable competition in oil country pipe from offerings by speculators and also because several of the oil companies are offering their surplus stocks in the expectation of being able to replace them when needed at less than to-day's prices. Demand for merchant pipe is better than that for oil country goods but at that the jobbers are ordering cautiously. Open shading of prices is absent, but this must be ascribed chiefly to the belief held by manufacturers that price cuts at this time would not help business. Discounts are given on page 1582.

Steel Skelp.—Inquiries are few and for small lots, and few of such sales as are being made bring the full quotation of 2.20c., Pittsburgh. Makers here who have quoted that price invariably have lost the order.

Wire Products.—The recent reduction of \$5 per ton in quotations by independents, which unofficially is being met by the American Steel & Wire Co., has failed utterly to stimulate the demand, which has been even lighter in the past week than it was previously. Indeed, some makers observe a tendency on the part of buyers to withhold shipping instructions against orders already in. Persistent reports of further reductions are making buyers extremely cautious.

We quote wire nails at \$3 base per keg, Pittsburgh, and bright basic and Bessemer wire at \$2.75 base per 100 lb. Pittsburgh.

Cold-Finished Steel Bars.—It is doubtful whether this branch of the industry ever before experienced a period when demands were so few and small. Consumers still have sizable stocks and are more interested at the moment in reducing, than in adding to, them. Most makers still ask 2.10c., base, but 3c. has been done and difficulty now is being experienced by makers to get more.

Hot-Rolled and Cold-Rolled Strips.—Reports about business vary somewhat, some noting a moderate increase in orders, while others still find interest on the part of consumers extremely small. One Pittsburgh district company has accumulated enough orders to run two mills this week, but it is noted that the company which secured much of the Ford business of a few weeks ago has its strip mills down this week. In general, there is room for considerable improvement in business. Prices are not very well defined. The stabilized bases were 2.75c. for hot-rolled and 5.50c. for cold-rolled, but these prices have been hard to obtain since the Ford Motor Co. was able to buy so much lower.

Spikes.—Fair demand is noted for small spikes in connection with coal mine development work, but sales are neither numerous nor large. Railroad spikes are dull and improvement is not expected until after the railroads have the advantage of lower wage costs and start laying rails. Large makers are quoting 3.40c.,

base, Pittsburgh, on all sizes, but on large spikes this price is being shaded by at least \$3 per ton, and the Colorado Fuel & Iron Co., which is the low bidder against the 13,000 kegs asked for by the Southern Pacific Railroad, is said to have named a price of \$3.50, f.o.b. Pueblo. Prices are given on page 1582.

Chain.—Effective June 1, leading makers revised downward on a number of kinds of chain. The new prices show reductions of 20c. to 40c. per pair on trace chains, with the extras for hooks, T hooks and T bars cut 2c. per pair from the old list, dated April 11, 1921, while the charge for galvanizing and for copper plating has been cut from 2c. to 8c. per pair. Stake chains have been lowered 25c. to 30c. per ft. Discounts have been increased (price lowered) 5 per cent on butt, stage, breast, with the exception of double and tapered, machine and coil chains and cow ties. Repair links and lap links and rings have been reduced in price 15 per cent. No. 25 steel dees now are quoted at list, against list plus 20 per cent in the April list.

Sheets.—It is impossible to chronicle any material betterment in business, although some fair-sized orders recently have been coming in from Japan. The past week has developed some deviation by independent makers from the stabilized prices of April 13. Business in blue annealed sheets has been booked as low as 2.90c., base, and sales of black sheets have been done as low as 3.85c., base, concessions from the regular market quotations of \$4 and \$3 per ton respectively. Prices are given on page 1582.

Tin Plate.—Makers of cans for the condensed milk trade are specifying fairly freely, but demands from other sources still are few and small. Production plate still is quoted at \$6.25 per base box, Pittsburgh, and this is the base of shipments against contracts. New orders carrying that price, however, are few and small, as container manufacturers are meeting extra demands to a large extent from stock items, which are available anywhere from \$5 to \$5.75.

Coke and Coal.—The coke market has developed fresh weakness in the past week and \$3.50 per net ton oven has given place to \$3.25 as the maximum on standard furnace fuel, either for spot or future shipment. As a matter of fact, \$3.25 has not found much basis in recent transactions, as the largest piece of business done was 9000 tons for June shipment to a merchant furnace which has about enough business to keep in blast this month, and the price was \$3.15. At least one producer quoted \$3 against this business, which was placed at a higher price to the producer already supplying this furnace. An Eastern steel company, which is piecing out its contract shipments by spot tonnages has been able lately to pick up choice brands of furnace coke at \$3. The market is quotable from \$3 to \$3.25 per net ton oven. It develops that the Robeson business was taken at around \$3.60 per net ton, ovens, the contract to run to Oct. 1, and calling for 8000 tons a month. The Thomas Iron Co., Hokendauqua, Pa., has inquired for 4000 tons a month for last half shipment, the Colonial Iron Co., Riddlesburg, Pa., for 7000 tons a month and the Empire Steel & Iron Co., Catasauqua, Pa., for 500 tons a month. None of these inquiries has been closed, though as low as \$3.25 has been quoted against them. Foundry coke also is weaker, in that \$5 per net ton, ovens, now is the top quotation, while good brands can be bought at \$4.50 to \$4.75 and as low as \$4 and \$4.25 is heard of on unselected 72-hour fuel. Present furnace coke prices show producers a considerable loss, but coal is not in demand and there are some operators whose loss would be greater if they were to shut down. Lake shipments have not benefited the coal market, which still is in buyers' favor. Spot offerings of mine run steam coal still can be had at \$1.75 to \$2, while not much more is obtainable on by-product coal and while high grade gas coal is fetching as much as \$2.50, the more common range is from \$2 to \$2.25.

Old Material.—Prices have weakened perceptibly since a week ago, due to a further falling away in the demand in keeping with steel works operations. Plants which are in operation appear to be congested and permits for shipments to them are being withheld. Shipping instructions are lacking to those plants which are

down or nearly so. This condition has resulted in price cuts of from 50c. to \$1 per ton in almost all grades. One steel maker here recently was offered 1000 tons of heavy melting steel at \$13 delivered, but being filled up for the present turned down the offer. At that, the offerings of this and other grades are anything but heavy. Users of machine shop turnings have not been flooded with tonnages at the prices they are willing to pay. Steel makers here who made bids of around \$13.50 for the couplers, knuckles and springs in the June list of the Pennsylvania Railroad, Eastern region, failed to secure any of the material offered. Max Solomon, this city, was the successful bidder for the 22,000 tons of shell forgings, bids for which were opened by the Ordnance Salvage Board in Washington yesterday. The price was \$10.58 per gross ton, f.o.b. shipping point, which means from \$16 to \$16.50 delivered Pittsburgh district.

We quote for delivery to consumers' mills in the Pittsburgh and other districts taking the Pittsburgh freight rate, as follows:

Heavy melting steel, Steubenville, Follansbee, Brackenridge, Monessen, Midland and Pittsburgh.....	\$13.00 to \$13.50
No. 1 cast cupola sizes.....	17.00 to 17.50
Revolving rails, Newark and Cambridge, O.; Cumberland, Md.; Huntington, W. Va.; Franklin, Pa. and Pittsburgh.....	14.50 to 15.00
Compressed sheet steel.....	10.50 to 11.00
Bundled sheet sides and ends, f.o.b. consumers' mills, Pittsburgh dist.....	8.50 to 9.00
Railroad knuckles and couplers.....	14.00 to 14.50
Railroad coil and leaf springs.....	14.00 to 14.50
Railroad grate bars.....	11.50 to 12.00
Low phosphorus melting stock, bloom and billet ends, heavy plates, 3/4-in. and heavier.....	17.50 to 18.00
Railroad malleable.....	12.00 to 13.00
Iron car axles.....	21.00 to 22.00
Locomotive axles, steel.....	18.00 to 19.00
Steel car axles.....	15.00 to 15.50
Cast iron car wheels.....	14.50 to 15.00
Rolled steel wheels.....	14.00 to 14.50
Machine shop turnings.....	8.25 to 8.50
Sheet bar crop ends at origin.....	14.00 to 15.00
Heavy steel axle turnings.....	10.50 to 11.00
Short shoveling turnings.....	9.50 to 10.00
Heavy breakable cast.....	14.50 to 15.00
Stove plate.....	12.50 to 13.00
Cast iron borings.....	9.00 to 9.50
No. 1 railroad wrought.....	12.50 to 13.00

May Steel Ingot Output Still Low

The steel ingot statistics of the American Iron and Steel Institute for May show that 30 companies, which in 1920 produced 84.21 per cent of the total, had an output last month of 1,265,850 gross tons, as compared with 1,213,958 tons in April. The increase for May was 51,892 tons, or about 4.10 per cent. Estimating the production of the other companies on the basis of those reporting, the total production of ingots in May was 1,503,206 tons, or 57,815 tons per operating day, counting 26 working days to the month, against an estimated total of 1,441,537 tons or 55,443 tons per operating day in April. This is an increase of 61,669 tons or 2372 tons per day. In the table below the output of Bessemer and open-hearth works is separated and the data for 1920 by months are included:

Monthly Production of Steel Ingots by 30 Companies Which Produced About 84.21 Per Cent of Total in 1920—Gross Tons

	Open Hearth	Bessemer	All Other	Total
January, 1920.....	2,342,758	714,657	10,687	2,968,102
February.....	2,152,106	700,151	12,667	2,865,124
March.....	2,487,245	795,164	16,640	3,299,049
April.....	2,056,336	568,952	13,017	2,638,305
May.....	2,251,544	615,932	15,688	2,883,164
June.....	2,287,273	675,954	17,463	2,980,690
July.....	2,135,633	653,888	13,297	2,802,818
August.....	2,299,645	695,003	5,784	3,000,432
September.....	2,300,417	693,586	5,548	2,999,551
October.....	2,335,863	676,634	3,485	3,015,982
November.....	1,961,861	673,215	3,594	2,638,670
December.....	1,687,162	649,617	3,586	2,340,365
Total, 1920.....	26,197,843	8,112,753	121,656	34,432,252
January, 1921.....	1,591,281	608,276	3,629	2,203,186
February.....	1,295,863	450,818	2,796	1,749,477
March.....	1,175,591	392,983	2,404	1,570,978
April.....	1,000,053	211,755	2,150	1,213,958
May.....	1,047,810	216,497	1,543	1,265,850

The May ingot production was at the yearly rate of 17,980,465 tons, counting 311 operating days to the year. This compares with a rate in April of 17,242,773 tons, and with a rate of 21,258,405 tons in March. The increase of 61,669 tons in the estimated ingot output of all companies in May over that of April compares with an increase of 28,180 tons in the May pig iron output over that of April, as given on other pages of this issue.

Chicago

CHICAGO, June 7.

The dearth of business is forcing a steady reduction in production by both mills and furnaces. The Illinois Steel Co. continues to operate 10 out of 29 blast furnaces in this district and is rolling steel at about 31 per cent of normal while the Inland Steel Co. at Indiana Harbor has two out of three blast furnaces running and is making steel at the rate of 25 per cent of capacity. Its Chicago Heights mill, however, is idle, as is the Calumet Steel Co. plant at the same place. The bar iron mills of the Republic Iron & Steel Co. and the Interstate Iron & Steel Co. at Chicago are also inactive. At South Chicago, however, the latter company is operating its open hearths, its billet mill and its recently completed continuous merchant mill on a 30 per cent basis. The Wisconsin Steel Co. mills are on a 20 per cent basis and one of its three blast furnaces is blowing. With the going out of a Federal stack, the number of merchant blast furnaces operating in this district has been reduced to two, one being at Mayville and the other an Iroquois furnace at South Chicago. The latter of late, has been making Bessemer iron for the Markpipe plant.

The market is weak in practically all departments, but owing to the paucity of orders, price shading cannot be said to be general. Here and there concessions are being made, however, and in some cases on unimportant tonnages.

On two carloads of plates, less than 2c. was named, and in the Kansas City district 1.90c., Pittsburgh, has been done. In Indianapolis 500 tons of steel bars was sold at 2c., Pittsburgh, and in the Northwest bar business has been taken at 1.90c. and 1.875c., Pittsburgh. The general reduction of \$5 a ton on wire and wire nails has not yet had any noticeable effect on business.

Jobbers serving the farmers are buying more freely than those dependent more largely on the manufacturing trade. This is particularly true in the Northwest, where the improved condition of the wheat market is having its effect. In fact, the large exports of wheat of late have aroused general interest. In some quarters hope is springing up for an earlier recovery of the agricultural implement industry than was heretofore thought possible.

Local steel producers are interested in an impending revision of transcontinental freight rates. The present rate on finished and semi-finished steel to the Pacific Coast is \$1.50 and the transcontinental lines have tentatively reduced it to \$1.05, which will apply from both Chicago and Atlantic tidewater points to the coast. This new rate has not yet been accepted by Eastern connecting lines and is not satisfactory to Western shippers, as the scheduled water rate from New York to the Coast is 75c., and considerably lower rates have been made on recent cargoes. Hearings are being held before the Transcontinental Freight Committee in this city this week, and it is possible that a further revision of all rail rates will be made.

Pig Iron.—A local furnace has sold 1000 tons of basic iron to a melter in the St. Louis district at \$20 base, Chicago. This quotation is not regarded as truly representative of the ruling market here, because it was taken in competition with furnaces near the buyer's plant from which the freight on the iron would have been negligible. Current business in Chicago and vicinity has been light and largely confined to carload lots. A Michigan melter bought 500 tons of malleable for June shipment at \$21.50, Chicago furnace, while a consumer in central Illinois purchased 300 tons of foundry for delivery within the next 45 days at \$20 base, Chicago. Locally buying will probably be stimulated somewhat as a result of the settlement of the strike of union molders. The strikers asked for 90c. an hour, while the foundries offered 85c. and a compromise was reached on the basis of 77.5c. an hour or \$7 a day. About 40 foundries are affected. The active Federal stack has been blown out with the result that only one merchant blast furnace, an Iroquois stack, remains in blast out of seven in this city. Local by-product foundry coke has been reduced 50c. a ton to \$11.25 delivered in the Chicago switching district. Connellsville foundry

coke is available at from \$5 to \$5.50 ovens, the freight to Chicago being \$4.62. At least one maker of Southern foundry iron is now quoting \$21 base Birmingham. One thousand tons of Southern resale, however, is being offered locally at considerably less than the delivered price of the furnace material.

The following quotations are for iron delivered at consumers' yards, except those for Northern foundry, malleable and steel-making irons, including low phosphorus, which are f.o.b. furnace and do not include a switching charge averaging 70c. per ton:

Lake Superior charcoal, averaging sil.	
1.50, delivered at Chicago.....	\$37.50
Northern coke, No. 1, sil. 2.25 to 2.75.....	\$22.00 to 22.50
Northern coke foundry, No. 2, sil.	
1.75 to 2.25.....	21.50 to 22.00
Northern high phos.....	21.50 to 22.00
Southern foundry, sil. 1.75 to 2.25.....	27.67
Malleable, not over 2.25 sil.....	21.50 to 22.00
Basic.....	21.00 to 21.50
Low phos. Ohio furnace sil. 1 to 2	
per cent copper free.....	35.00
Low phos. f.o.b. Birmingham, sil. 1 to	
2 per cent, copper free.....	31.00.
Silvery, sil. 8 per cent.....	38.53

Ferroalloys.—Outside of an inquiry for 100 tons of spiegeleisen which has not yet resulted in an order, the market is without features.

We quote 78 to 82 per cent ferromanganese, \$80 delivered; 50 per cent ferrosilicon, \$80 delivered; spiegeleisen, 18 to 22 per cent, \$37 to \$38 delivered.

Plates.—The Great Northern Railroad has ordered 500 refrigerator cars from the General American Car Co. Not more than 1500 tons of steel will be needed in the construction of this equipment and the car builder has most of this material in stock. The Sinclair Refining Co. is asking for prices on the construction of four oil storage tanks of 55,000 barrels capacity each, for Tulsa, Okla. Only the tops of the tanks will be of steel, and they will require about 800 tons of light plates or heavy gage sheets. Demand for plates is unusually light, but such business as has been done has indicated the unsteady condition of the market. Two carloads, for example, were purchased for less than 2c., base Pittsburgh.

The mill quotation is 2c., Pittsburgh, the freight to Chicago being 38c. per 100 lb. Jobbers quote 3 23c. for plates out of stock.

Structural Material.—The situation remains substantially unchanged so far as fabricators are concerned. A fair number of small fabricating contracts have been awarded of late, but tonnage is far from the total necessary to put shops on a satisfactory footing. Locally the building trade lockout is still in effect and architects and contractors state that it is already too late in the year for new building projects to be undertaken even if an early settlement with the unions is reached. The largest fabricating prospect in the West is a Masonic Temple at Detroit which calls for about 7000 tons. Recent fabricating awards include:

Hankar at Pearl Harbor, Hawaiian Islands, 675 tons, to Pittsburgh-Jos Moines Steel Co.
Curtain Theater Building, San Francisco, 600 tons, to Judson Mfg. Co.
Loew Theater Building, San Francisco, 600 tons, to Judson Mfg. Co.
High school and junior college, Sacramento, Cal., 411 tons, to American Bridge Co.
Woodbury Junior High School, Denver, Colo., 323 tons, to Midwest Steel & Iron Works, Denver
Swift & Co. coal pulverizing plant, Fort Worth, Tex., 235 tons, to Gage Structural Steel Co.
Two highway spans, Oroville, Wash., 153 tons, reinforced concrete substituted for fabricated steel.

Pending work includes:

World Theater Building, Omaha, Neb., 350 tons, bids taken last week
Bascule bridge, Green Bay, Wis., 800 tons, plans to go out Aug. 1.

The mill quotation is 2.20c., Pittsburgh, which takes a freight rate of 38c. per 100 lb. for Chicago delivery. Jobbers quote 3 23c. for materials out of warehouse.

Rails and Track Supplies.—There is little demand for track accessories in this district, but it is apparent from purchases made in other sections that track bolts and spike prices are unsteady. Sales of spikes have been made at as low as 3.20c., Pittsburgh, while bolts have been sold at 4.20c., Pittsburgh. On the other hand, tie plates and angle bars appear to be firm. The Gary rail mill continues to operate at about 50 per cent of capacity.

Standard Bessemer rails, \$45; open-hearth rails, \$47; light rails rolled from new steel, 2.20c. f.o.b. makers' mills. Standard railroad spikes, 3.20c. to 3.40c., Pittsburgh; track bolts with square nuts, 4.20c. to 4.35c., Pittsburgh; steel tie plates, 2.50c., and steel angle bars, 2.75c., Pittsburgh and Chicago; tie plates, iron, 2.50c. to 3c. f.o.b. makers' mills.

Bolts and Nuts.—The market is very quiet and while prices are not firm, the paucity of sales makes it difficult to ascertain the ruling level of quotations. Jobbers have practically no stocks, but are afraid to buy because they expect another general reduction in steel prices which they believe would be reflected in bolt and nut discounts. Rivets are weak. A Western railroad bought 20 tons of large structural rivets at less than \$2.90, f.o.b. Pittsburgh, and as low as \$2.75 is also reported to have been done. For mill prices, see finished iron and steel, f.o.b. Pittsburgh, page 1582.

Jobbers quote structural rivets, 4.53c.; boiler rivets, 4.63c.; machine bolts up to $\frac{1}{2}$ x 4 in., 50 per cent off; larger sizes, 45 off; carriage bolts up to $\frac{1}{2}$ x 6 in., 40 off; larger sizes, 40 off; hot pressed nuts, square and hexagon tapped, \$2.10 off; blank nuts, \$2.60 off; coach or lag screws, gimlet points, square heads, 50 and 6 per cent off. Quantity extras are unchanged.

Railroad Rolling Stock.—The Soo Line has awarded a contract to the American Car & Foundry Co. for the repair of 500 box cars. The Chilean State Railways are in the market for 30 Mikado type locomotives. The Mississippi Central has ordered three switch engines from the American Locomotive Co.

Bars.—The Indiana Highway Department will soon advertise for bids on 21 reinforced concrete bridges and 13 culverts and these are said to be forerunners of other projects which are expected to be undertaken during the course of the year. The department's program, if carried out, will result in the purchase of between one and two million dollars worth of steel alone. In this connection it is to be noted, however, that highway programs undertaken in other Western States have thus far resulted in a disappointingly small volume of business. In general, the demand for mild steel bars is exceedingly light, and while price shading continues to be reported, it has not been brought into prominence through the placing of orders involving tonnage of consequence. Lack of business has resulted in practically a suspension of bar iron production and the same can be said of rail carbon steel bars.

Mill prices are: Mild steel bars, 2.10c., Pittsburgh, taking a freight of 38c. per 100 lb.; common bar iron, 2.25c. to 2.38c., Chicago; rail carbon, 2c. to 2.25c., mill or Chicago.

Jobbers quote 3.13c. for steel bars out of warehouse. The warehouse quotation on cold-rolled steel bars is 4.63c. for rounds and 50c. extra for flats, squares and hexagons. Jobbers quote hard and medium deformed steel bars at 2.88c. base.

Cast Iron Pipe.—Akron, Ohio, has rejected all bids on 3.2 miles of 48-in. pipe, despite the fact the figures on both steel and cast-iron pipe are said to have been exceedingly attractive. Although the bids covered the laying of the pipe, it is estimated that the low figure on steel pipe was based on 1.50c. plates. Akron will re-advertise. Other prospective business includes:

Marion, Ill., 600 tons, bids in June 13.

Eric, Ill., 250 tons, June 7.

Bellwood, Ill., amount not yet specified, June 15.

Minneapolis, 300 tons.

We quote per net ton f.o.b. Chicago, ex-warehouse as follows: Water pipe, 4-in., \$57.10; 6-in. and above, \$54.10; class A and gas pipe, \$3 extra.

Wire Products.—General reductions of \$5 a ton in wire and wire nails have brought plain wire down to \$2.75 per 100 lb. and wire nails to \$3 per keg base, Pittsburgh. It is too early to appraise the effect of the cuts on business. While the jobbers are not yet showing an inclination to let in stocks, it is notable that those serving the farm trade are buying more freely than those dependent more largely on the manufacturing trade. Local warehouse prices have also been reduced \$5 a ton.* For mill prices, see finished iron and steel, f.o.b. Pittsburgh, page 1582.

We quote warehouse prices, f.o.b. Chicago: No. 9 and heavier black annealed wire, \$3.63 per hundred pounds; No. 9 and heavier, bright basic wire, \$3.78 per hundred pounds; common wire nails, \$3.73 per hundred pounds; cement coated nails, \$3.15 per keg.

Old Material.—Buying by users is light and the weakness of the market has been reflected in further declines in a number of items. It is probable that more general reductions would be made but for the fact that some classes of scrap are not being bought at all. Among the few sales to consumers we note one of 600 tons of No. 1 busheling at \$9 per net ton and another of 300 tons of No. 1 wrought at \$10.50 a net ton. Dealers who laid in scrap at higher prices than those now quoted are beginning to fear that they may have to liquidate at a decided loss. If freight rates on scrap

should be reduced in the near future, their position would certainly not be strengthened. Railroad offerings include the Grand Trunk Western, 7400 tons; the Santa Fe, 1800 tons; the Missouri, Kansas & Texas, 1500 tons; the Great Northern, 2700 tons; the Michigan Central and the Lake Erie & Western, blank lists.

We quote delivery in consumers' yards, Chicago and vicinity, all freight and transfer charges paid, as follows:

Per Gross Ton	
Iron rails	\$16.50 to \$17.00
Relaying rails	30.00 to 35.00
Car wheels	13.50 to 14.00
Steel rails, rerolling	13.50 to 14.00
Steel rails, less than 3 ft.	13.00 to 13.50
Heavy melting steel	11.50 to 12.00
Frogs, switches and guards, cut apart	11.50 to 12.00
Shoveling steel	11.00 to 11.50
Low phos. heavy melting steel	14.00 to 14.50
Drop forge flashings	7.50 to 8.00
Hydraulic compressed sheet	7.50 to 8.00
Axle turnings	8.00 to 8.50

Per Net Ton	
Iron angles and splice bars	15.00 to 15.50
Steel angle bars	11.00 to 11.50
Iron arch bars and transoms	14.50 to 15.00
Iron car axles	20.00 to 20.50
Steel car axles	14.00 to 14.50
No. 1 busheling	9.00 to 9.50
No. 2 busheling	6.00 to 6.50
Cut forge	10.00 to 10.50
Pipes and flues	7.00 to 7.50
No. 1 railroad wrought	10.00 to 10.50
No. 2 railroad wrought	9.50 to 10.00
Steel knuckles and couplers	12.50 to 13.00
Coil springs	12.50 to 13.00
No. 1 machinery cast	13.00 to 13.50
Low phos. punchings	11.00 to 11.50
Locomotive tires, smooth	11.00 to 11.50
Machine shop turnings	3.50 to 4.00
Cast borings	5.00 to 5.50
Stove plate	12.50 to 13.00
Grate bars	10.50 to 11.00
Brake shoes	11.00 to 11.50
Railroad malleable	12.00 to 12.50
Agricultural malleable	12.00 to 12.50
Country mixed	8.00 to 8.50

New York

NEW YORK, June 7.

Pig Iron.—The pig iron market has descended to new depths of dullness. The New Jersey melter which was mentioned last week as being in the market for 1200 tons has withdrawn the inquiry and will buy from month to month to meet its requirements. This and other companies having on hand, or to be delivered, tonnages bought at much higher prices are buying moderate tonnages at present low prices in order to reduce their average price. The New Jersey inquiry brought out some low quotations, as for example, a Buffalo furnace quoted \$22 furnace for iron analyzing 1.75 to 2.25 silicon. One company sold 500 tons Tuesday for prompt delivery. A few hundred tons of Pennsylvania iron has been sold at \$25.50, furnace, for No. 2X. High phosphorus Luxembourg iron averaging silicon 2.85 and phosphorus 1.90 is being offered for sale at \$28.50 per gross ton c.i.f. Philadelphia.

We quote delivered in the New York district as follows, having added to furnace prices \$2.52 freight from eastern Pennsylvania, \$5.46 from Buffalo and \$6.16 from Virginia:

East. Pa. No. 1 fdy., sil. 2.75 to 3.25	\$28.52 to \$29.52
East. Pa. No. 2X fdy., sil. 2.25 to 2.75	27.52 to 28.52
East. Pa. No. 2 fdy., sil. 1.75 to 2.25	26.52 to 27.52
Buffalo, sil. 1.75 to 2.25	32.46 to 33.46
No. 2 Virginia, sil. 1.75 to 2.25	31.16 to 32.16

Finished Iron and Steel.—The whole list of rolled steel products is decidedly weak and it is chiefly due to lack of attractive business that some prices have not been cut. The tendency to shade prices is more apparent on export inquiries than on domestic business, and the latter is confined to such small orders that the incentive to make concessions is lacking. Plates, shapes, bars and sheets are soft, while wire products have been reduced \$5 a ton by the leading interest and independents. The fact that wire rods have not been reduced proportionately will probably work somewhat of a hardship to those companies which do not make their own steel. New prices on wire products are 3c. for nails, 2.75c. for bright and annealed wire and 3.85c. for barbed wire, all f.o.b. Pittsburgh. In plates 2c., Pittsburgh, is to-day's market on carload lots; 2.20c. on less than carloads, while an attractive specification of 100 tons or more would likely bring out quotations of 1.95c., Pittsburgh, or even lower. Evidence is lacking of shaded prices on structural shapes for domestic use, but on an inquiry for 1800 tons for a bridge in Japan.

put out by Suzuki & Co., New York, bids of 2c., Pittsburgh, have been submitted. It is known that some fabricators who were recently awarded structural jobs are delaying the placing of the plain material, apparently expecting lower prices. An interesting variation in bids on reinforcing bars was noted at the opening by the United States Shipping Board on June 3, the inquiry calling for 410 tons for Norfolk, Va. The lowest bid was \$31, f.o.b. Marietta, Pa., but this was for rusted material. On rail carbon bars a company at Franklin, Pa., put in a bid of \$37 per net ton, f.o.b. mill. A Perth Amboy company quoted \$43.20, mill, and another bid on mild steel was 2c., Rockaway, N. J., mill. Another bid of 2c., mill, was put in by a Columbia, Pa., company, but the material offered was to be re-rolled from soft steel scrap. Other bids were 1.99c., Pittsburgh; 2.54c., delivered Norfolk, and the larger independent mills quoted 2.10c., Pittsburgh. In structural material there is a pronounced tendency to postpone work that has been estimated upon by fabricators. Conspicuous among the projects which have been indefinitely deferred are the Chesapeake & Ohio Railroad bridge, 1500 tons; tanks for the United States Shipping Board; 900 tons for the Pennsylvania Sugar Co., Philadelphia; 1200 tons for the Chamber of Commerce, Newark, N. J.; 300 tons for the National Folding Box Co., New Haven, Conn. Bids close this week on 1500 tons for a bank at Fort Wayne, Ind., and 400 tons for a chemical laboratory at Cornell University. The Bethlehem Fabricators, Inc., was awarded 450 tons for the State of New Jersey Hospital at Morris Plains and 600 tons for the Great Northern Paper Co., Millinocket, Me., is reported to have been placed. The Pittsburgh & West Virginia Railroad is expected to place orders this week for the repair of 500 steel hopper cars, 250 of which are to have new steel bodies. If the deal can be financed the Mexican Government may purchase 100 locomotives. It is expected the business will be equally divided between the American Locomotive Co. and Baldwin Locomotive Works. A Mexican commission is here now trying to arrange the transaction.

We quote for mill shipments, New York, as follows. Soft steel bars, 2.48c., plates, 2.38c. to 2.58c., structural shapes, 2.58c.; bar iron, 2.28c.

Ferrolloys.—There continues to be almost no demand for ferromanganese or spiegeleisen and quotations are nominally unchanged. While it is thought that these could be shaded there has been no test of the market. Demand for spiegeleisen is confined to a few inquiries for carload lots. At last the production of both alloys has fallen to totals which are now in keeping with the present condition of the steel industry. As indicated in the blast furnace reports on other pages the ferromanganese output for May was only 6853 tons as compared with 9566 tons in April, and an average of 19,178 tons per month the first quarter of this year. The spiegeleisen output was only 2379 tons, as compared with 14,744 tons in April and 11,666 tons in the first quarter of this year. The manganese ore market is inactive and nominal. The 50 per cent ferrosilicon market is also inactive with quotations nominal.

Ferromanganese, domestic, delivered, per ton	\$80.00
Ferromanganese, British, seaboard, per ton	\$75.00
Spiegeleisen, 20 per cent, furnace, per ton,	\$30.00 to \$32.00
Ferrosilicon, 50 per cent, delivered, per ton,	\$80.00
Ferrotungsten, per lb. of contained metal, 48c. to 58c.	
Ferrochromium 6 to 8 per cent carbon, 60 to	
70 per cent Cr., per lb. Cr., 16c. to 16.50c.	
Manganese ore, foreign, per unit, seaboard,	22.50c.

Warehouse Business.—Slackness continues with prices largely nominal among dealers heavily stocked. A large mill interest is reported to have unofficially offered wire nails, per keg, at a considerable concession to customers, which is viewed in some quarters as the forerunner of an official reduction on other wire products. Prices show no change and business is unimproved. We quote prices on page 1594.

High Speed Steel.—The market remains sluggish, although some producers report a slight improvement in sales to manufacturers of textile machinery and similar lines. A mill manufacturing corrugated bars and other products recently purchased what is at present a heavy order, about 5000 lb. We quote 18 per cent tungsten high speed steel at 90c. to \$1 per lb.

Cast Iron Pipe.—Reductions of \$5 in price have been made in the base size, 6 in., and of \$10 in the smaller sizes. The largest municipal inquiry is that of the city of Norfolk, Va., for a large tonnage of 30-in. flexible joint pipe, bids to be opened June 9. Pipe manufacturers are probably busier than makers of any other iron and steel commodities. The new prices, f.o.b. New York, for carload lots follow: 6-in. and larger, \$53.30; 4-in. and 5-in., \$58.30; 3-in., \$68.30, with \$4 additional for Class A and gas pipe.

Coke.—Some merchants report more satisfactory sales in foundry coke than in pig iron. The price centers around \$5, Connellsville, for guaranteed coke, though unguaranteed coke is obtainable at \$4.50. One maker of by-product coke in this district still adheres to the \$5.50, Connellsville, price. New England ovens are attempting to secure contract business for future delivery though the response is not active.

Old Material.—Prices are stable for the simple reason that there is little business. An eastern Pennsylvania heavy melting steel consumer which offered \$12.50, delivered, a short time ago, now offers only \$12. There is a slight demand for stove plate and pipe. The fair demand for cast a week ago has subsided. Dealers are watching with interest the agitation for a reduction of freight rates, which would allow them to make more long distance shipments with profit.

Buying prices per gross ton, New York, follow:

Heavy melting steel	\$7.00 to \$7.50
Re-rolling rails	9.50 to 10.00
Relaying rails, nominal	40.00 to 42.50
Steel car axles	10.50 to 11.00
Iron car axles	17.00 to 18.00
No. 1 railroad wrought	10.00 to 11.00
Wrought iron track	7.25 to 7.50
Forge fire	5.00 to 5.50
No. 1 yard wrought, long	8.50 to 9.00
Light iron	2.00 to 3.00
Cast borings (clean)	4.00 to 4.50
Machine-shop turnings	3.00 to 4.00
Mixed borings and turnings	3.00 to 3.50
Iron and steel pipe (1 in. diam. not under 2 ft. long)	8.00 to 8.50
Stove plate	9.00 to 9.50
Locomotive grate bars	8.50 to 9.00
Malleable cast (railroad)	8.00 to 8.50
Old car wheels	13.00 to 13.50

Prices which dealers in New York and Brooklyn are quoting to local foundries, per gross ton, follow:

No. 1 machinery cast	\$16.00 to \$17.00
No. 1 heavy cast (columns, building materials, etc.), cupola size	15.00 to 16.00
No. 1 heavy cast, not cupola size	10.00 to 11.00
No. 2 cast (radiators, cast boilers, etc.)	10.00 to 11.00

Cincinnati

CINCINNATI, June 7.

Pig Iron.—A Kentucky melter is in the market for 500 tons of Southern iron and 250 tons of either Northern or Virginia iron for June shipment. The National Cash Register Co., Dayton, Ohio, has sent out an inquiry for 320 tons half Northern and half Southern and a central Ohio melter inquired for 500 tons of malleable but almost immediately withdrew the inquiry. With these exceptions the market is very quiet, the largest sale reported in this territory being one of 200 tons of Northern iron to an Indiana melter. The American Radiator Co. is reported to have closed for 300 tons of Southern iron for its Birmingham plant. Prices are inclined to weakness and a sale of 100 tons of Southern iron was made during the week at \$21.75, Birmingham. Carload sales of Southern iron, however, are still being made at \$22.50 to \$23, but it is said that on a round tonnage \$21 could be done. Some southern Ohio high silicon iron was sold last week on the basis of \$23, Iron-ton, but sales are still being made at \$24. There is no activity in either silvery or basic.

Based on freight rates of \$4.50 from Birmingham and \$2.52 from Iron-ton, we quote f.o.b. Cincinnati:

Southern coke, sil. 1.75 to 2.25 (base)	\$26.50
Southern coke, sil. 2.25 to 2.75 (No. 2 soft)	27.50
Ohio silvery, 8 per cent sil.	38.02
Southern Ohio coke, sil. 1.75 to 2.25 (No. 2)	25.52
Basic, Northern	25.52
Malleable	26.52

Finished Material.—Rumors of lower prices continue to be heard on all lines of finished products.

This is particularly so in the case of black and galvanized sheets and on an inquiry of five or six carloads for a West Virginia manufacturer it is reported that quotations ranging from \$4 to \$6 a ton below the stabilized prices were made. So far as can be learned, this business has not been placed. A sale of 530 tons of reinforcing bars was made to a local contractor during the week. The price has not been announced, but on the straight bars it is said that 2.32½c. delivered Cincinnati, took the business and on bent bars 2.40c. delivered. Some readjustment in wire prices has been made by one of the leading companies, to meet prices quoted by some of the smaller mills, and it is reported that the Steel Corporation subsidiary is also inclined to meet the present market. Some inquiries are being received for bale ties, wire fence and wire nails. Some plate business was also placed during the week and several carload lots of structural material were booked at the stabilized price. Some interest was also shown in steel pipe, several users placing fair sized orders. In the structural field, no projects of any size are up for bids. It is expected that bids will be asked on June 15 for the construction of the stadium at Ohio State University. This will take approximately 3500 tons of reinforcing bars and about 750 tons of structural steel. Several high school buildings in this section of the State will also shortly be up for bids. Plant operations will not change materially during the week, the mills in this territory running approximately 40 to 50 per cent, which is slightly above the general average of the independents.

Warehouse Business.—Business continues light and small orders for immediate shipment are about the only activity. No price changes are reported and none is anticipated for some time.

Iron and steel bars, 3.35c. base; hoops and bands, 4.05c. base; shapes, 3.45c. base; plates, 3.45c. base; reinforcing bars, 3.42½c. base; cold rolled rounds 1½ in. and larger, 4.85c.; under 1½ in. and flats, squares and hexagons, 5.35c.; No. 10 blue annealed sheets, 4.35c.; No. 28 black sheets, 5.50c.; No. 28 galvanized sheets, 6.50c.; wire nails, \$3.60 per keg base; No. 9 annealed wire, \$3.60 per 100 lb.

Coke.—The coke market is unusually quiet, only an occasional carload sale being reported. Prices are, if anything, a little softer. It is reported that additional ovens in the West Virginia field will go out shortly owing to lack of orders.

Old Material.—There is no activity in the scrap market and some dealers state that the present stagnation is unprecedented. Prices quoted in the absence of transactions can be regarded only as nominal.

We quote dealers' buying prices:

	Per Gross Ton	
Bundled sheets	\$2.50 to \$3.50	
Iron rails	16.50 to 17.50	
Relaying rails, 50 lb. and up	30.50 to 31.50	
Re-rolling steel rails	11.50 to 12.50	
Heavy melting steel	10.00 to 11.00	
Steel rails for melting	10.50 to 11.50	
Car wheels	14.00 to 15.00	
	Per Net Ton	
No. 1 railroad wrought	10.00 to 11.00	
Cast borings	5.00 to 5.50	
Steel turnings	3.50 to 4.00	
Railroad cast	13.50 to 14.50	
No. 1 machinery	13.50 to 14.50	
Burnt scrap	8.00 to 9.00	
Iron axes	20.00 to 20.50	
Locomotive tires (smooth inside)	10.00 to 11.00	
Pipes and flugs	7.50 to 8.00	

Youngstown Companies Reduce Salaries

YOUNGSTOWN, OHIO, June 7.—Incoming business of the Youngstown Sheet & Tube Co. averages between 15 and 20 per cent, the lowest rate in years, state officials. New business with other Valley independents is at the same rate or less. Independents are reducing salaries of officials from 15 to 30 per cent in efforts to lower costs. Effective June 16 the Brier Hill Steel Co. will cut officials' salaries 15 per cent.

"We are losing money on operations and are continuing our efforts to spare operating and overhead costs," states President James A. Campbell of the Sheet & Tube company. "There will be no bonuses for officials and salaries must likewise be reduced."

Cleveland

CLEVELAND, June 7.

Iron Ore.—It is expected that ore prices for the season will be established within a week. The first actual sale for 1921 has been made, this being included in a new long time contract which specifies that whatever shipments may be made this season shall be at the going market price and other inquiries have come out for approximately 100,000 tons of ore, including one lot of 65,000 tons. In addition to these inquiries, another factor that will doubtless lead to the naming of prices without further delay is that some consumers who are taking ore on long time contracts are getting anxious to have prices fixed so that they will know what the ore they are taking is going to cost them. Some buying will follow the establishment of prices, but sales will be very light. Ore shipments during May were only 2,594,027 gross tons, or the smallest movement in May since 1908. During May last year shipments were 6,976,085 tons. Shipments for the season to June 1 were 2,770,238 tons. Shipments are not increasing. However, the June movement will show a gain over May, as very little ore was moved before the middle of May.

We quote delivered lower lake ports: Old range Bessemer, \$7.45; old range non-Bessemer, \$6.70; Mesabi Bessemer, \$7.20; Mesabi non-Bessemer, \$6.55.

Pig Iron.—The market is dull and weak. Foundry iron prices have declined at least 50c. per ton to \$22.50 for No. 2, at which some small lot sales have been made and there are reports of quotations as low as \$22. However, a few furnaces are still asking \$23. Some of the low prices are coming from other than Lake furnaces. A Barberton, Ohio, consumer has placed 500 tons of foundry iron and neither this iron nor 350 tons recently inquired for by the American Radiator Co. for its Springfield, Ohio, plant went to a Cleveland furnace. The radiator company which recently inquired for 200 tons for its Titusville plant has sent out another inquiry for the same amount for that plant. The Standard Sanitary Mfg. Co. has inquired for 500 tons of Southern foundry iron for its Louisville plant for June shipment, and it is expected to come into the market in a day or two for a good sized lot of Northern iron for June shipment. The American Car & Foundry Co. has inquired for 100 tons of foundry iron for its Berwin, Pa., plant. Two or three inquiries have come from the East for 300 to 400 ton lots. One local interest reports sales of only 600 tons during the week. Car lot sales of low phosphorous iron are reported at \$39 and \$40 and a Pittsburgh consumer is inquiring for 500 tons of this iron. Many of the small lot foundry iron sales are being made to consumers that are buying low priced iron to average down prices on their high priced contracts. The falling off in the automobile business has resulted in cutting down shipments of foundry iron. On the other hand, one jobbing foundry which has not taken any iron this year has released over 500 tons for June shipment.

Basic	\$23.46
Northern No. 2 fdy. sil. 1.75 to 2.25	24.50
Southern fdy. sil. 2.25 to 2.75	29.92
Ohio silvery, sil. 8 per cent	38.86
Standard low phos., Valley furnace	\$39.00 to 40.00

Finished Iron and Steel.—The volume of business has fallen off and orders are extremely light. There are further reports of price shading on steel bars, plates and structural material, but most mills are adhering to regular prices. Virtually no business is coming from the automobile industry. Mills and parts manufacturers are awaiting an announcement from the Ford Motor Co. as to its plans for July production. This company has been placing orders early in the month for its requirements for the following month, but has as yet sent out no requirements for July. There has been a curtailment of operations in plants making alloy steels for the automobile trade. The building strike in Cleveland, after lasting five weeks, has been settled by an arbitration agreement and this is expected to result in more activity in the building field. The Jones & Laughlin Steel Co. has taken 1400 tons of structural material for a crusher plant for

the Kelly Island Lime & Transportation Co. at approximately \$85 per ton fabricated and erected, which is regarded as a very low price. As low as \$64 was bid on this building fabricated but not erected. Bids for the Ohio State University stadium will be taken June 15. This will require 2000 tons of reinforcing bars in addition to 2500 tons of structural material. A new low price of 1.85c. on hard steel reinforcing bars has been made on a Government inquiry for 400 tons for work at Norfolk, Va. The usual quotation is 1.90c. Following a reduction to 2.75c. on plain wire, a concession to 2.90c. is reported to have been made on nails by one small mill. The Cleveland Railway Co. has placed 500 tons of standard rails with the Lackawanna Steel Co.

Cleveland warehouses quote steel bars and small shapes at 2.99c.; plates, 3.09c.; structural shapes, 3.09c.; No. 9 galvanized wire, 4.45c.; No. 9 annealed wire, 3.75c.; No. 28 black sheets, 4.80c.; No. 28 galvanized, 5.70c.; No. 10 blue annealed, 3.85c. to 4c.; hoops and bands, 3.69c.; shafting, 4.25c.

Sheets.—The demand for sheets is quieter than it has been. A little price shading is reported on all grades. However, most mills are adhering to regular quotations.

Track Supplies.—Sharp cuts in prices on spikes and track bolts have been made in this territory and are attributed to a Chicago mill. Quotations of around 3c. to 3.10c., Pittsburgh, were reported on spikes and 3.62c. on track bolts.

Coke.—Foundry coke prices have declined about 25c. a ton. Some carlot sales are being made at \$5 to \$5.50 for standard Connellsville brands.

Bolts, Nuts and Rivets.—The demand for bolts and nuts is still very light and a number of manufacturers are operating their plants at only 25 to 30 per cent of capacity. Small orders are being booked at regular prices, but makers admit that a good inquiry would probably bring out concessions. The inquiry for 1,036,000 1½-in., 3½ per cent nickel steel bolts, amounting to several thousand tons, for the New York vehicular tunnel has been held up temporarily. The rivet market is very dull and prices are irregular with a spread of at least \$2 a ton in quotations.

Old Material.—The scrap market is almost at a standstill. The only activity is in a limited amount of trading between dealers, and consumers' prices are to a large extent nominal. One Cleveland mill has shut off shipments of heavy melting steel scrap, but another consumer is still taking borings and turnings. Small lot purchases by dealers are reported at \$7.50 to \$8 for mixed borings and \$11 for heavy melting steel. Quotations are unchanged.

We quote per gross ton delivered consumers' yards in Cleveland and vicinity as follows:

Heavy melting steel	\$11.50 to \$12.00
Steel rails under 3 ft.	13.50 to 14.00
Steel rails, reolling	15.00 to 16.00
Iron rails	13.00 to 14.00
Iron car axles	20.00 to 21.00
Low phosphorus melting scrap	14.00 to 15.00
Cast borings	8.00 to 8.25
Machine shop turnings	6.50 to 7.00
Mixed borings and short turnings	8.00 to 8.25
Compressed steel	10.00 to 10.50
Railroad wrought	12.00 to 13.00
Railroad malleable	13.00 to 14.00
Light bundled sheet stampings	5.00 to 6.00
Steel axle turnings	10.00 to 10.50
No. 1 cast	17.00 to 17.50
No. 1 bushing	7.50 to 8.00
Drop forge flashings, over 10 in.	5.50 to 6.00
Drop forge flashings, under 10 in.	6.00 to 6.50
Railroad grate bars	13.50 to 14.00
Stove plate	13.50 to 14.00
Pipes and flues	7.00 to 8.00

High Cost of Shipping Ore

CLEVELAND, June 7.—Ore consumers have presented to shippers interesting figures showing transportation costs, using these as a reason for holding up shipments of ore contracts this season. The total cost of transporting ore from the mines to a Valley furnace at present is \$3.13 per ton including war tax. They have estimated a possible reduction of 64c. per ton in transportation and handling including a 30c. reduction from the mines to upper lake docks and adding to this 22c. interest on the transportation charge for a year and 10c. for additional State tax on ore carried at Lake Erie docks or furnace yards as compared with the tax if the ore is left in the mines, makes a total of 96c.

a ton higher cost for moving ore this year as compared with their estimates for next year. This figure does not take into consideration increase in inventory, possible lower labor costs next year for unloading and lower royalties next year should the 1922 ore prices be lower than this year's prices. Ore shippers are using the same figures as an argument for the immediate reduction of transportation costs.

Boston

BOSTON, June 7.

Pig Iron.—Little business was transacted the past week. One house reports a sale of 200 tons eastern Pennsylvania No. 1 X at about \$31, delivered to an eastern Massachusetts foundry, which figures out about \$24.50 furnace for silicon 1.75 to 2.25. Another house reports other sales of silicon 2.25 to 2.75 in car lots, totaling 175 tons, at \$26 furnace and 100 tons No. 2 X Virginia at \$27, furnace. Otherwise little has been done. The undertone of the market for Virginia irons appears firmer due to a lack of resale lots offered. An eastern Pennsylvania furnace previously on a basis of \$28, \$29.25 and \$31 for No. 2 plain, No. 2 X and No. 1 X, now quotes \$27, \$28 and \$29, respectively, but it is still out of line with most furnaces. Buffalo iron is an indefinite factor in this territory. What could be done on sizable orders is problematical. It now develops that some sales of eastern Pennsylvania iron reported recently represented readjustments on contracts. Delivered pig iron prices follow:

East Penn., silicon 2.25 to 2.75	\$28.56 t	\$29.56
East Penn., silicon 1.75 to 2.25	27.56 t	28.56
Buffalo, silicon 2.25 to 2.75	30.46 t	32.46
Buffalo, silicon 1.75 to 2.25	29.46 t	31.46
Virginia, silicon 2.25 to 2.75	33.58 t	35.83
Virginia, silicon 1.75 to 2.25	32.58 t	33.58
Alabama, silicon 2.25 to 2.75	33.66 t	34.16
Alabama, silicon 1.75 to 2.25	33.16 t	33.66

Finished Materials.—Slightly more figuring on structural steel tonnages, but no increase in actual tonnages booked is reported. Reinforcing bars market is more active than others, yet aggregate tonnage involved does not exceed 1000 tons. Small mills have quoted as low as 1.75c. f.o.b. Pittsburgh on a 125-ton lot and 1.90c. on similar tonnages, while important interests hold to 2.10c. Mill representatives report the market for finished materials in general was less active the past week than for any similar period this year. Buyers are still dickering on rail and plate tonnages reported last week.

Warehouse Business.—Movement of iron and steel out of stock continues as heretofore and at unchanged prices. Bolts and nuts are perhaps a shade more active, but business is spotty. Wire nails have been cut from 4.35c. to 4.10c. per keg base, and there has been a further readjustment in cut nails from \$6.75 to \$5 per keg base from store. Barbed wire is 25c. per 100 lb. cheaper.

Jobbers now quote: Soft steel bars, \$3.18 per 100 lb. base; flats, \$4.18 to \$4.28; concrete bars, \$3.18 to \$3.45½; tire steel, \$4.25 to \$4.75; spring steel, open hearth, \$5.50; crucible, \$11.50; steel bands, \$3.83 to \$4.48; steel hoops, \$4.38; toe calk steel, \$5.25; cold rolled steel, \$4.65 to \$5.15; structural, \$3.18 to \$3.28; plates, \$3.48 to \$3.50; No. 10 blue annealed sheets, \$4.55; No. 28 black sheets, \$5.85; No. 28 galvanized sheets, \$6.85; refined iron, \$3.18 to \$5; best refined, \$5; Wayne iron, \$8.50; Norway iron, round, ¼-in. to 2½-in., 8c. per lb. net; other sizes, 10c. base.

Coke.—The New England Coal & Coke Co. and the Providence Gas Co. have announced June foundry coke prices. Spot fuel is now \$11.41 delivered where the local freight does not exceed \$3.40, and contract coke \$11.16 delivered. These prices are practically on a \$5.25 and \$5 respectively, f.o.b. Connellsville oven base. Both companies report a considerable increase in releases on contracts with little improvement in new business. Connellsville foundry cokes are offered at \$5 per ton and occasionally at 25c. per ton less. Only scattering car lots have been taken.

Old Material.—Some dealers quote No. 1 machinery cast at slightly higher prices due to car lot sales of selected textile machinery at \$19 delivered and slightly higher. A majority, however, have not been able to secure more than \$18 delivered for what little they have sold since last reports. A Massachusetts railroad equipment manufacturer has purchased about eight

cars stove plate at \$15.50 and \$16 delivered. Quotations on railroad malleable have fallen below those of stove plate in the absence of inquiries. A Maine melter paid \$9 delivered for a car of cotton ties, and a New England horseshoe maker \$16 delivered for 100 tons of strictly No. 1 railroad wrought, while a dealer has taken on a limited tonnage of wrought pipe at \$7.50 on cars shipping point.

The following prices are for gross ton lots delivered consuming points:

No. 1 machinery cast.....	\$18.00 to \$19.00
No. 2 machinery cast.....	16.00 to 17.00
Stove plate.....	15.00 to 15.50
Railroad malleable.....	14.50 to 15.00

The following prices are offered per gross ton lots f.o.b. Boston rate shipping points:

No. 1 heavy melting steel.....	\$7.00 to \$7.50
No. 1 railroad wrought.....	10.00 to 11.00
No. 1 yard wrought.....	9.00 to 9.50
Wrought pipe (1-in. in diam., over 2 ft. long).....	7.00 to 7.50
Machine shop turnings.....	3.00
Cast iron borings, rolling mill.....	3.00 to 4.00
Cast iron borings, chemical.....	3.00 to 4.00
Blast furnace borings and turnings.....	3.00
Forged scrap and bundled skeleton.....	4.00 to 5.00
Street car axles and shafting.....	12.00 to 13.00
Car wheels.....	12.00 to 12.50
Revolving rails.....	9.00 to 9.50

Buffalo

BUFFALO, June 7.

Pig Iron.—Approximately 2000 tons was sold last week by Buffalo furnaces through their several offices at the \$24 and \$25 base prices, but on the whole business is quieter. Improvement hoped for by several furnace interests has failed to materialize. Sales are mostly for carload lots. One furnace has sold practically all its iron in stock and as its furnace has been down for weeks, it is completely withdrawn as a factor in this district. The trend of business is indicated in the inquiry reported by one producer; an aggregate of 4000 tons in 20 separate inquiries.

We quote f.o.b. dealers' asking prices per gross ton Buffalo as follows:

No. 1 foundry, 2.75 to 3.25 sil.....	\$26.00 to \$27.00
No. 2X foundry, 2.25 to 2.75 sil.....	25.00 to 26.00
No. 2 plain, 1.75 to 2.25 sil.....	21.00 to 25.00
Basic (nominal).....	23.00 to 24.00
Malleable nominal.....	21.00 to 25.00
Lake Superior charcoal.....	35.00

Finished Iron and Steel.—Continued dullness marks this market. Business is no better with any company and worse with several. With one producer operation is on the same scale as for the last two months. The only mill which has improved its schedule is now working about 50 per cent of normal in all departments except rails. Sufficient orders are on hand or in sight to continue this capacity for some time. Bars are more in demand than any other material with this mill. A number of reinforcing bar inquiries were received by local mills, but none of the orders was placed here. One mill refused to quote knowing its price was prohibitive. Demand is good for wire cloth and netting with one maker and fabric used in road construction is also active. This mill has sufficient orders on hand to continue its present schedule for the summer. The Kellogg Structural Steel Co. will fabricate 150 tons for St. Peter and Paul's school, Buffalo, and 100 tons for the Alberger Pump Co., Newburgh, N. Y. Small mills are shading pipe prices but no tonnage has been brought out as a result.

We quote warehouse prices f.o.b. Buffalo as follows: Structural shapes, 3.25c.; plates, 3.25c.; plates, No. 8 gage, 4.10c.; soft steel bars and shapes, 3.15c.; hoops, 3.85c.; blue annealed sheets, No. 10 gage, 4.15c.; galvanized steel sheets, No. 28 gage, 6.30c.; black sheets, No. 28 gage, 5.30c.; No. 9 gage annealed wire, 4.35c.; cold rolled strip steel, 8.15c.

Warehouse Business.—Prices on bolts, nuts, wire nails and rivets have been reduced by one warehouse interest and aggregate about 10 per cent all along the line. Better business in structural material to be used in bridge construction is seen as a number of public improvements along the highways are started. No change has been made on the so called major lines such as sheets, bars and plates. The volume of business continues even and has not changed perceptibly in six weeks. Reinforcing bar business has improved slightly with the advent of public improvements.

Old Material.—Dealers say the market is less active than at any time since the depression set in. All sales are for trivial tonnages. The activity in heavy melting steel which occupied a number of dealers has quieted and apparently the entire order placed by a railroad equipment maker has been filled. Prospective business indicates a quiet summer period.

We quote dealers' asking prices per gross ton, f.o.b. Buffalo, as follows:

Heavy melting steel.....	\$12.50 to \$13.00
Hydraulic compressed.....	9.00 to 9.50
Low phos., 0.04 and under.....	17.00 to 18.00
No. 1 railroad wrought.....	13.00 to 14.00
Car wheels.....	16.00 to 17.00
Railroad malleable.....	11.50 to 12.50
Machine shop turnings.....	7.00 to 8.00
Heavy axle turnings.....	10.00 to 11.00
Clean cast borings.....	7.00 to 8.00
Locomotive grate bars.....	11.50 to 12.50
Wrought pipe.....	9.50 to 10.50
No. 1 busheling.....	9.50 to 10.50
Stove plate.....	15.00 to 16.00
Bundled sheet stampings.....	7.00 to 8.00
No. 1 machinery cast.....	18.00 to 18.50

Birmingham

BIRMINGHAM, ALA., June 7.

Pig Iron.—The largest transaction of the week was 25,000 tons to the National Cast Iron Pipe Co. reported to have gone at a very low price. A sale of 800 tons for the Pacific Coast was made. Special shipping arrangements in vessels out of a gulf port are understood to have helped this sale. Several lots of 100 tons were sold for Western delivery and numerous car lots. Many new customers appeared in the market for rush car loads. Inquiry is brisker. Stocks are running low all over the South and Southwest. No large deals are reported. The high price now is \$22.50 with any tonnage around 200 and up selling at \$22. Average silicon differentials are not over \$1.

We quote per gross ton f.o.b. Birmingham district furnace, as follows:

Foundry, sil. 1.75 to 2.25.....	\$22.00
Basic.....	21.00
Charcoal.....	35.00

Plant Operations.—Several iron consumers in the Birmingham district report greater operations. Radiator works are reported at normal and one large maker of sugar refinery castings is also at normal. Shipments have been good. One interest more than moved its one-furnace make. Another has reduced stocks by 8000 tons. This week witnesses the beginning of regular operations of the pressed steel car plant of the Chickasaw Shipbuilding & Car Co. with capacity of 15 to 25 standard freight cars per diem and orders for 1000 cars on hand. Ingot production of the Tennessee company is at 50 per cent with the rail mill on a continuing normal base. Japan is taking 4500 tons of rails. The Gulf States Steel Co. is running in all departments at 50 per cent capacity.

Coal and Coke.—Numerous reductions in wages have been made at coal mines at request of miners who appealed to operators to get business at reduced prices from competitors. Union as well as non-union mines have done this.

Old Material.—The scrap market still fails to show signs of revival, although No. 1 heavy steel is seemingly in better demand. Transactions are light.

We quote per gross ton f.o.b. Birmingham district yard as follows:

Old steel rails.....	\$10.00 to \$11.00
No. 1 steel.....	9.00 to 10.00
No. 1 cast.....	16.00 to 17.00
Car wheels.....	16.00 to 17.00
Tramcar wheels.....	15.00 to 16.00
No. 1 wrought.....	13.00 to 14.00
Stove plate.....	9.00 to 10.00
Cast iron borings.....	6.00 to 7.00
Machine shop turnings.....	6.00 to 7.00

A manufacturers' power conference has been called by the Water Power League to meet at the Waldorf-Astoria, New York, June 21 and 22, to discuss the development of power for manufacturing and other purposes. Featured discussions will consider the Federal power act and the super power zone plan.

Philadelphia

PHILADELPHIA, June 7.

Steel companies admit that prices are soft, though denying that any great amount of cutting has yet been done except on plates, the price of which is now regarded as 2c., Pittsburgh, with the probability that lower quotations would be made on any desirable tonnage. There seems no longer to be any question that the prices uniformly adopted several weeks ago by the Steel Corporation and the independent companies have been abandoned in spirit, at least, and the fact that few low prices have actually been quoted has been due principally to lack of desirable specifications.

The steel trade has done very little business in the past two weeks. Demand is at the lowest point since the present depression set in. This situation also applies to pig iron.

Pig Iron.—Following a sale of 300 tons of No. 2 plain iron to a radiator plant at Trenton, N. J., at \$23, furnace, an Eastern producer of pig iron decided to advance its price to \$24, base, with \$25 for No. 2 X and \$26 for No. 1 X. Other Eastern producers intimate that they also will adhere to these prices, which constitute an advance of \$1 on No. 2 plain from the low point, 50c. to \$1 on No. 2 X and about the same amounts on No. 1 X. These low prices have been made only on the most desirable tonnages, carload lots being quoted about \$1 a ton above the minimum levels. The demand for iron shows no improvement; in fact, in the past week or two there has been a falling off in the demand. No sales are reported as yet on the new price basis, and in view of this we continue our quotations as of last week.

The following quotations are, with the exception of those on low phosphorus iron, for delivery at Philadelphia, and include freight rates varying from 84 cents to \$1.54 per gross ton:

East. Pa. No. 2 plain, 1.75 to 2.25	\$24.75 to \$25.25
East. Pa. No. 2X, 2.25 to 2.75 sil.	25.50 to 26.25
Virginia No. 2 plain, 1.75 to 2.25 sil.	31.74
Virginia No. 2X, 2.25 to 2.75 sil.	32.99
Basic deliv. Eastern Pa.	25.00
Gray forge	25.26
Standard low phos. (f.o.b. furnace)	38.00
Malleable	28.00 to 29.00
Copper bearing low phos. (f.o.b. furnace)	35.00

Semi-Finished Steel.—Reports of sales of German sheet bars in this country are not confirmed. It has been stated that one lot was sold at \$34, delivered New York. The demand for billets is negligible. Price quotations are unchanged, \$37 for rerolling quality and \$42 for forging quality, f.o.b. Pittsburgh.

Coke.—Blast furnace coke is now offered in this district at a shade under \$3.25, Connellsville. Foundry coke remains unchanged, \$5 to \$5.50.

Plates.—Even those companies which are still adhering to 2.20c., Pittsburgh, admit freely that practically all of the business which has been placed in the past week or two has gone at 2c., Pittsburgh, or less. A coal company is reported to have bought 100 tons at 2c. On less than carloads the 2.20c. price is being maintained, but on lots of a carload or more of desirable sizes, even 2c. has been shaded. The cut prices have benefited two or three mills in a small degree, as much of the current business has gone to them, but on the whole the demand for plates has not been increased by the naming of the lower prices.

Structural Material.—Very little business in shapes is offered, but prices are soft. Some of the steel companies are convinced that plain material has been sold at 2c., Pittsburgh, by an Eastern mill, but positive evidence is lacking. Fabricators are making extremely low prices, \$60 to \$62, fabricated and delivered, which leaves a very small margin for fabrication and shipping costs over the price of the plain material. Most of the structural jobs now being placed are under 100 tons, and even these are few in number.

Bars.—The only demand is for reinforcing bars and the rerolling mills, which are quoting about 1.75c., Pittsburgh, on rerolled material, are getting most of this business. Soft steel bars are quoted at 2.10c., Pittsburgh, by the leading producers.

Sheets.—Lower prices on sheets are being named by some mills. Very little business is being done in this district.

Warehouse Business.—Demand for steel out of stock has dropped within the last two weeks to the lowest point of the year. Prices are unchanged, the following being named for Philadelphia delivery with reductions of \$2 or \$3 a ton, depending on the grade, for shipment out of town:

Soft steel bars and small shapes, 3.20c.; iron bars (except bands), 3.20c.; round edge iron, 3.50c.; round edge steel, iron finish, 1½ in. x ½ in., 3.50c.; round edge steel, planished, 4.25c.; tank steel plates, ¼-in. and heavier, 3.30c.; tank steel plates, 3/16-in., 3.52c.; blue annealed steel sheets, No. 10 gage, 4.20c.; light black steel sheets, No. 28 gage, 5c.; galvanized sheets, No. 28 gage, 6c.; square twisted and deformed steel bars, 3.20c.; structural shapes, 3.30c.; diamond pattern plates, ¼-in., 5.05c.; 3/16-in., 5.27c.; ¼-in., 5.37c.; spring steel, 5c.; round cold-rolled steel, 4.60c.; squares and hexagons, cold-rolled steel, 5.10c.; steel hoops, No. 13 gage and lighter, 3.85c.; steel bands, No. 12 gage to 3/16-in. inclusive, 3.85c.; iron bands, 4.50c.; rails, 3.20c.; tool steel, 12c.; Norway iron, 8c.; toe steel, 4.50c.

Old Material.—A slight improvement in the demand for scrap is noted. Several of the Eastern steel mills are buying such quantities as can be obtained, but have reduced their price to \$11.50, delivered, for No. 1 heavy steel. Dealers are paying \$12 for steel scrap for storage. The tendency of prices, where changes have occurred, has been downward. We quote for delivery at consuming points in this district as follows:

No. 1 heavy melting steel	\$11.50 to \$12.00
Scrap rail	11.00 to 11.50
Steel rails, rerolling	15.00 to 15.50
No. 1 low phos., heavy 0.04 and under	17.00 to 18.00
Car wheels	18.00 to 19.00
No. 1 railroad wrought	15.00 to 16.00
No. 1 yard wrought	14.00 to 15.00
No. 1 forge fire	10.00 to 10.50
Bundled sheets (for steel works)	8.00 to 8.50
No. 1 busheling	12.00 to 12.50
No. 2 busheling	10.00 to 11.00
Turnings (short shoveling grade for blast furnace use)	8.00 to 8.50
Mixed borings and turnings (for blast furnace use)	8.00 to 8.50
Machine-shop turnings (for rolling mill and steel works use)	8.50 to 9.00
Heavy axle turnings (or equivalent)	10.00 to 11.00
Cast borings (for rolling mills)	9.50 to 10.00
Cast borings (for chemical plants)	10.50 to 11.50
No. 1 cast	17.50 to 18.00
Railroad grate bars	12.50 to 13.00
Stove plate (for steel plant use)	12.50 to 13.00
Railroad malleable	15.50 to 16.50
Wrought iron and soft steel pipes and tubes (new specifications)	13.00 to 13.50
Iron car axles	No market
Steel car axles	No market

St. Louis

ST. LOUIS, June 7.

Pig Iron.—It seems practically impossible to move the pig iron market out of the doldrums in which it has continued for so long and the transactions are so few, so small and otherwise so uninteresting that the market may be regarded as entirely without feature. The expected activity, as a result of the settlement of the stove molders' scale, has not developed and in one or two instances stove molders have asked that shipments under contracts be deferred on account of the condition of their yards. Southern iron is still unable to compete with Northern iron in price and such few sales as are made of car lots are invariably either of Northern iron or from the local furnace which is operating on the East side. The West side furnace is still shut down. The East side furnace is delivering about half of its output to its allied interests and delivering it hot, while the remainder is going out on sales.

Coke.—There has been no business whatever in coke during the past week either in small immediate lots or on future contracts. This is due to the fact that melters are covered by supplies in the yard and under contract. There has been no change from the prices quoted at the Connellsville base figure.

Finished Iron and Steel.—In finished products both the mill representatives and the warehousemen continue to live chiefly on hope as the sales show no increase.

WASTE IN INDUSTRY

Report of Committee of American Engineering Council—Findings and Recommendations

St. Louis, June 8.—Waste in industrial processes is causing enormous annual losses to the nation, according to the report of the American Engineering Council's committee on the elimination of waste in industry, made public at a meeting of the council's executive board here to-day. A plan of nation-wide co-operation among government, public, trade associations, industry, labor, bankers and engineers is outlined.

The waste inquiry was in charge of a committee of sixteen headed by J. Parke Channing, New York, as chairman, and L. W. Wallace, Washington, executive secretary of the American Engineering Council of the Federated American Engineering Societies, as vice-chairman. The committee was named last January by Herbert Hoover, then president of the council. The inquiry was carried on by a large force of field workers who obtained first hand information of conditions existing in the leading basic industries, particularly in New York, New England and Pennsylvania. The investigation is the beginning of a movement by the country's organized engineers to bring about better industrial conditions and more harmonious relations between capital and labor. This report, it is stated, is the first work undertaken by the Federated American Engineering Societies in rendering public service. It deals exhaustively with housing and building; ready-made men's clothing; shoes; metal trades, and printing.

Intermittent Employment Large Waste

The wastes of interrupted production are summarized as follows: "The margin of unemployment amounts to more than a million men; cyclical industrial depressions are causes of waste through idle men, plant, equipment and materials. Intermittent employment is not merely the cause of one of the largest wastes in industry, it is also the one big problem for which labor demands a satisfactory solution. Waste results from conflicts between management and labor, but the amount is much less than is popularly supposed. Large inventories of raw materials and finished product and unbalanced production are causes of waste resulting from idle materials. Large sums of money are invested in idle equipment, and over-equipment and factory buildings in many instances are larger than necessary."

In attributing waste to faulty management, the report says: "The average method of management is far behind standards which have demonstrated their practical value; billions of dollars are tied up in idle equipment and there is a large additional waste through maintenance and depreciation charges. Manipulations in raw material result in serious losses and present sales policies are a contributing cause of irregular production." High labor turnover is given as a rough index of one of the commonest wastes in industry.

As to restricted production, the report says: "Both employer and employees restrict output, the former usually by limiting the total output of an industry, the latter by limiting the rate of speed of output of individual workmen."

Recommendations Offered

The committee's recommendations for the elimination of waste include the following: "A national industrial information service should be established to furnish more timely, regular and complete information covering current production and consumption and stocks of commodities. A national statistical service should be established covering employment requirements and a national policy regarding public health should be fostered and encouraged. The national program for industrial rehabilitation should be encouraged and should offer opportunities for education and placement to those having physical defects as well as those handicapped because of industrial accidents. A nation-wide program of industrial standardization should be encouraged in conjunction with industrial interests, and the government should recognize the necessity for a revision of such federal laws as interfere with stabili-

zation of industry." It is also recommended that a body of principles should be accepted which could be developed for the adjustment and settlement of labor disputes.

After outlining the support and help to be contributed by the public and by trade associations, the report takes up the responsibility of plant management. It declares that administrative policies should cover improvement of organization, administrative and management control; the stabilization of production; introduction of effective employment methods; creation of individual or collective research departments; industrial education; curtailment of practice of adjustments, cancellations and returns where customary; development of purchasing schedules; correlation of sales policies with production and accident prevention.

Modification of Union Rules Urged

Organized labor, it is urged, should co-operate to develop a policy for increasing output. The attitude of opposition or indifference to proper standards for production should be changed and a frank and aggressive insistence on such standards maintained. There should be a scientific examination of the bases for wages and certain union rules should be modified in regard to machine operation, apprentices and craft distinctions which result in restriction of output. Individual workers should realize their responsibilities for waste resulting from ill health and disregard of safety measures.

As to idle material: "The waste of idle material in large inventories of raw and finished materials is very large. Unbalanced production also results in a very large material idleness." Large waste is said to exist through plant idleness. The printing industry is cited as an example where vast sums of money are tied up in unnecessary stock resulting from great duplication of brands of paper. "The present investment of more than a hundred million of dollars in stocks of paper carried on hand to meet trade requirements of the printing industry," it is said, "could be cut in half through standardization."

The report mentions that the average plant in the metal trades group is from 25 to 30 per cent behind the best plant in output per employee, while the building industry is given as about 60 per cent efficient, and the waste in the shoe industry put at about 35 per cent.

The report states that on the whole over 50 per cent of the responsibility for the waste occurring in industrial processes can be placed at the door of management and less than 25 per cent at the door of labor. It is understood there was opposition in the council to the committee report, it being held that the findings of the committee were not definite and concrete enough for public issuance by a body of engineers. The board finally authorized publication of the report, not as one from the American Engineering Council, however, but purely as the findings of a committee.

Discussion on the Report

William McClellan, Philadelphia, a member of the board, representing the American Institute of Electrical Engineers, and F. J. Miller, Bucks County, Pa., representing the American Society of Mechanical Engineers, criticized the report adversely, while L. W. Wallace defended the accuracy of the report. Mr. Miller said that the report gives conclusions without setting out the facts on which the conclusions were based. It charges, he said, inefficiency to large groups of industries in general, whereas it is more than probable that the facts from which the conclusions are drawn apply only to a few individual members of this group. Mr. McClellan said the report did not define the waste alleged nor cite the committee's authority for the charges made.

It was stipulated that the report be sent back to the committee for revision and members of the board are to receive all the information on which the committee based its conclusions and the board members may suggest any changes they may deem desirable to the committee in writing. As soon as completed and approved by the board, the full report will be given out for publication.

COMPETITION FROM FRANCE

Belgian Steel Market Conditions—Strike at Ougree-Marihay

BRUSSELS, BELGIUM, May 16.—The iron and steel market in Belgium has been improving. Most of the plants have their order books filled until the end of June by reason of the English strike. At present 24 blast furnaces are in operation producing 3019 tons of pig iron per day.

The development of the past week was the general strike at Ougree-Marihay works, for a trivial pretext, throwing out about 6000 workers, and resulting in the shutting down of four coal mines whose workers decided to quit as an "act of solidarity." The trouble dates back several months. It was provoked by the ill will of several coke oven workers who work six hours a day.

They refused to clean the ovens as had always been done before, and declared that from that time on they would operate the ovens themselves for their own account. Other workers joined them and the management called upon the gendarmes who put an end to this project. In the conference that followed the management demanded the dismissal of 45 workers for acts of insubordination; then in a spirit of conciliation it reduced the number to eight, then to seven, and finally proposed to make an example of three or four. But the workers insisted on the re-employment of all the

coke oven workers. This the management refused. A complete shutdown was threatened, but the management got a few volunteers to operate the electrical equipment driven by blast furnace gas. Later these men also quit. The company issued a statement saying that the cessation of work would certainly lead to the cancellation of important orders and that it was to be feared these would be turned over to foreign firms, possibly German. As the strike continued numerous acts of violence were reported.

Coke is becoming very abundant in Belgium in view of the cutting down of pig iron production, caused by foreign competition. In May 25,000 tons was sent from Germany to Belgium, augmenting the stocks at the disposition of Belgian consumers. It is certain that if the price of Belgian coke does not go down appreciably, French and Luxemburg competition for finished products will be very serious for Belgium.

Belgian iron and steel manufacturers have taken note of the reduction from 600 to 550 fr. per ton in the price of beams in France which is expected to be followed by a similar reduction in the price of sheets and flats.

The French comptoirs evidently want by these means to get a foothold in outside markets and Belgian steel men are on their guard. Recent quotations have been, per 100 kilos: Merchant iron, export, f.o.b. Antwerp, 46 fr.; ordinary sheets, 60 fr.; merchant bars, 44 fr., interior; export, f.o.b. Antwerp, 46.50 fr.; scrap iron and steel, 12 fr.; ordinary coke, 117 fr.

British Iron and Steel Market

Cleveland Furnaces All Idle—Labor Threatens Further Trouble—Sterling Lower

(By Cable)

LONDON, ENGLAND, June 7.

Labor is threatening trouble on all sides; the coal strike conferences have been renewed, the cotton trade is at a standstill, the engineering trade and the wool trade are holding conferences with the Government regarding wage reductions.

Cessation of Cleveland pig iron production is now complete with the blowing out of the last two furnaces. Number 3 foundry iron is unobtainable and lower grades are unsalable. Official minimum quotations are unaltered. Hematite is practically idle except for a small improvement in export sales, but buyers are generally anticipating lower values. Tees prices are unchanged.

Pig iron exports for May amounted to 10,877 tons. Midland iron workers' wages have been reduced 35 per cent.

Tin plates are in fair demand, stock plates having been sold up to 27s. (\$5.09) basis f.o.b. Only about 7 per cent of the South Wales tin plate capacity is active, due to the fuel shortage. One Japanese order for 13,700 boxes has been reported, of charcoal plates, which are to be filled from stock.

We quote per gross ton except where otherwise stated, f.o.b. maker's works, with American equivalent figured at \$3.77 per £1 as follows:

Durham coke	£2 2	\$7 92
Cleveland basic	6 0	22 62
Cleveland No. 1 foundry	6 5	23 56
Cleveland No. 3 foundry	6 0	22 62
Cleveland No. 4 foundry	5 19	22 43
Cleveland No. 4 forge	5 17½	22 15
East Coast mixed	8 0 & 17 10*	30.16 & 28.28
Ferromanganese	18 0 & 17 10*	67.86 & 65.98
Ship plates	16 0 to 19 0	60.32 to 71.63
Boiler plates	24 0 to 25 0	90.48 to 94.25
Tees	15 10 to 18 10	58.44 to 69.75
Channels	14 15 to 17 15	55.61 to 66.92
Beams	14 10 to 17 10	54.67 to 65.98
Round bars, ¾ to 3 in.	15 0 to 16 10	56.55 to 62.21
Rails, 60 lb. and up.	13 0 to 15 0	49.01 to 56.55
Billets	11 10 to 12 10	43.36 to 47 13
Sheet and tin plate bars, Welsh	11 0 to 11 10	41.47 to 43.36
Galvanized sheets, 24 g.	22 0 to 22 10	82.84 to 84.83
Black sheets	19 0 to 20 0	71.63 to 75.40
Tin plate base box	1 5 to 1 9	4.71 to 5.47
Steel hoops	17 10 to 20 0	65.98 to 75.40

*Export price.

FAIL TO AGREE

Members of Steering Committees Appeal to Tariff Commission for Assistance

WASHINGTON, June 7.—Unable to agree upon the Longworth resolution making rates in the permanent tariff bill effective from the day of introduction in the House, Republican members of the steering committees of the House and Senate have appealed to the Tariff Commission, which is preparing a stopgap bill which would be along the lines but with modifications of, the Longworth resolution.

The joint conference of House and Senate Republican leaders to-day is accepted as further proof of differences within the Republican party itself over ad interim legislation which is opposed almost solidly by the Democrats and also gives evidence of the accuracy of reports that the Longworth resolution would have to be modified before passage by Congress could be brought about. It is felt by many Republicans in both branches that the Longworth resolution gives too much power to the Ways and Means Committee, which could determine rates that would be made effective from the time the permanent tariff bill is reported to the House. Members of Congress opposing the Longworth resolution but favoring ad interim legislation say both branches should determine rates rather than leaving it to the Ways and Means Committee. The conference reached no agreement but decided to further canvass the tariff situation before committing the Republican party as to ultimate policy.

Cleveland and Kent Companies Will Merge

CLEVELAND, June 7.—The Lamson & Sessions Co., Cleveland, maker of bolts, nuts and other products, and the Falls Rivet Co., Kent, Ohio, maker of bolts, nuts and rivets, will be merged July 1 in a corporation with a capital stock of \$3,000,000, the name of which has not yet been selected. Both of the existing plants will be operated under the new organization. Stockholders of both companies will exchange their holdings for stock in the new company. Roy Smith, president, Falls Rivet Co., will become a vice-president of the new company, and the present officers of the Lamson & Sessions Co. will hold similar positions in the new organization.

INQUIRY FROM FAR EAST

Bridge, Pipe, Plate and Railroad Inquiries—
Demand for Low Price Plate Shearings

NEW YORK, June 7.—While numerous inquiries continue to appear in the market, chiefly from Far Eastern sources, but little business has so far developed, with the exception of some of the larger government inquiries and those from Japanese sources. Export quotations of mills continue weak and generally lower than the domestic schedule. Pipe inquiries from India and the Far East are generally large. One export company through its German connection has received an inquiry on about 20,000 pieces of charcoal-iron locomotive boiler tubes in 17-ft. lengths for shipment to Reval. The order will probably go to German mills. A house dealing with the Far East has been requested to quote on 210,000 ft. of steel gas pipe, ranging in size from $\frac{3}{8}$ in. to 2 in. and evidently being purchased for stock. Another large pipe inquiry being handled by a New York exporter is for a hydroelectric project in the island of Formosa. It specifies six lines of lap weld, steel pipe, 990 ft. long, capable of a 570-lb. pressure per sq. in. and 46, 50 and 54 in. in size.

Japan Inquiries for Bridges

Railroad purchasing continues to hold the lead in Far Eastern markets. In addition to the purchases and inquiries still in the market from Chinese railroads, recently mentioned in THE IRON AGE, the Pekin-Suiyuan Railroad will purchase 5 locomotives and 100 steel cars and the Shanghai-Nanking-Ningpo Railroad will purchase 6 British type locomotives and 100 passenger cars. In pursuance of the recently announced policy in Japan of renewing a large part of the railroad bridges in the vicinity of Tokio, inquiries are now in the market for 9 steel bridges; the two largest involve 1850 tons and 1500 tons of steel and the remainder are of smaller specifications. Quotations as low as 2c. per lb. base are understood to have been received on this material by exporters handling the inquiry.

Black sheets of light gage continue to be purchased in the Japanese market, one exporter during the past two weeks having booked orders for 350 tons. A Chinese inquiry, which is issued through a Chinese bank, calls for about 500 tons of tank plates and representatives in the Far East report a good demand for plate shearings, which are used for the manufacture of knives and small tools. Prospective buyers, however, as a rule refuse to consider present quotations on this material.

An inquiry has been received by the Wonham, Bates & Goode Trading Co., 251 Fourth Avenue, New York, for a continuous rod mill, capable of handling about 500 tons per 44-hr. week of 4 x 4-in., 300-lb. billets and producing Nos. 5 and 6 gage rods to be used in nail making and redrawing for manufacture into wire netting.

New Shanghai Development Company

The Fung Sheng Industrial & Commercial Development Corporation, capitalized at \$2,000,000, of which one-half has been subscribed, is now in operation in Shanghai. The corporation will undertake the development of real estate holdings, industrial plants, mines, storage warehousing and general industrial financing. According to the *North China Herald*, the demand for power plants in China, which was active until the middle of 1920, is showing signs of resumption. German agents have been offering to book orders for electrical and other machinery at low prices for immediate delivery, but experiences with the delivery are reported to have been unsatisfactory.

The German subsidiary of an American export company reports business there generally slack and the few orders, domestic and export, that are being booked are filled without difficulty in Germany. It is reported by the Bureau of Foreign and Domestic Commerce that a German company is considering the establishment of a plant for building railroad cars on the northern coast of Java.

NEW BETHLEHEM SHAPES

Increased Flange and Web Thickness—New
Beam Size and Light H-Columns

Additional mill capacity, recently completed and put in operation for the production of wide flange structural shapes, has led the Bethlehem Steel Co. to add a number of new sections to its present established line of Bethlehem structural shapes.

Three new beam sections are provided, designated as B24b, B22 and B18a. The new 24-in. and 18-in. beams, B24b and B18a, are to supply the need for beams having a greater carrying capacity than the previous line of 24-in. and 18-in. beams afforded. The new 22-in. beams supply sections intermediate in depth between 20 and 24 in., and have been adopted as an economical addition to the range of beam sizes.

The comparison of the new 24-in. and 18-in. Bethlehem beams with standard section beams, is as follows:

	Bethlehem Beams	Section Modulus		Standard Beams	Section Modulus
B24b.	101.5 lb.	246.1	24 in.	112.0 lb.	246.3
	97.5 lb.	234.3		105.9 lb.	234.3
B18a.	71.9 lb.	136.6	18 in.	85.0 lb.	135.6
	69.0 lb.	126.9		76.6 lb.	126.8

The increase in weight of the new beams is obtained by increasing the thickness of the flange as well as that of the web, instead of obtaining the entire addition in weight by increasing the thickness of the web only. This new method, on which patents are pending, permits obtaining an increase in section modulus practically proportional to the added weight. Thus B18a, 74 lb., compared with B18a, 69 lb., has an increase of 9.7 in section modulus, or about $7\frac{1}{2}$ per cent increase in modulus, due to the increase of 5 lb., in weight, which is about $7\frac{1}{2}$ per cent increase in weight also. By the process of manufacture the addition to flange thickness is made to the outside of the flange, thereby slightly increasing the depth of the beam, but the total variation in depth between minimum and maximum is not more than the usual allowable tolerance in depth necessary in any method of rolling beams.

New column sections are provided, supplementing the company's previous list of H columns and affording a line of sections lighter than its regular H columns. These supplementary column sections are to supply lighter columns for many purposes, including shop and mill building construction. A series of 6-in. columns, in various weights, is provided for specially light construction.

The flanges of the new beams have a bevel of 8-13 per cent, or a slope of 1 in 12. Flanges of the column sections have a uniform slope of 2 per cent. All weights include fillets, but areas and all other properties are given exclusive of fillets. Tolerances in weight and section and all other regulations concerning material, lengths, etc., conform to the established rules applying to the regular Bethlehem sections.

To aid in the selection of columns subjected to direct loads and also to bending produced by eccentric loads or by other means, bending factors have been added to tables of the dimensions and properties of the columns, thus to furnish a convenient method of converting the bending moment into an equivalent direct central load.

Railroads Ask Withdrawal of Advance of
July, 1920

CHICAGO, June 7.—A substantial number of railroads which had not filed applications for wage cuts before June 1 have asked the Railroad Labor Board for a complete withdrawal of the 20 per cent wage advance of July, 1920. At the same time, they have asked that extra pay for overtime and uniform wages for the same classes of employees over the entire country be abolished. A referendum ballot has been sent out to 250,000 maintenance of way employees to determine whether they will accept the average 15.6 per cent cut announced by the board last week. Maintenance of way employees suffered a larger reduction than most other classes of railroad employees.

Non-Ferrous Metals

The Week's Prices

June	Cents Per Pound for Early Delivery					
	Copper, New York		Lead		Zinc	
	Lake	Electro-lytic	New York	St. Louis	New York	St. Louis
1	13.25	13.25	31.37½	5.00	4.70	5.20
2	13.25	13.25	31.25	5.00	4.70	5.15
3	13.00	13.00	30.50	4.90	4.60	5.10
4	13.00	13.00	29.50	4.90	4.60	5.10
5	13.00	13.00	29.50	4.90	4.60	5.05
6	13.00	13.00	29.00	4.75	4.50	5.05
7	13.00	13.00				

NEW YORK, June 7.

No change for the better is reported and the markets continue exceedingly inactive. Demand for copper is light and the price tendency is easy. Tin has declined with the fall in exchange but there has been a little better buying. The lead and zinc markets continue flat and prices are lower.

New York

Copper.—There has been almost no business in the past week. The unsettlement in exchange values has affected this market so far as foreign buying is concerned and there has been no incentive for domestic consumers to make purchases, at least on any large scale. An easier tendency is noted in the market but the price of electrolytic copper depends upon the seller. Most of the leading producers will not sell for June delivery at less than 13.50c., delivered, but from some other sources it is conceded that moderate amounts, enough to fill present needs, can be obtained at 13.25c., delivered. We therefore quote the market at 13c., New York, and 13.25c., delivered, for June, with July ¼c. higher and third quarter at 13.75c., delivered. Lake copper is also inactive and quoted largely nominal at 13.25c., delivered. It is stated that the general market is by no means without its favorable feature. A fair amount of metal is going into consumption both here and abroad constantly, and it is stated that it is equal to at least 60 per cent of the pre-war rate. With production at an extremely low ebb the future of the market is not without its encouragement.

Tin.—The principal factor in this market has been the decline in exchange which at present is considerably below the values two weeks ago. This has resulted in lower prices in this market and in London and has been the cause of a moderate amount of buying. Late last Tuesday, May 31, there were a few sales of spot and future tin at 31.50c. and on June 3 there were future shipment sales of June-July at 30.50c. early in the day, with sales at the close of the day at 30.25c. Yesterday there were sales early in the day at 29.75c. and 29.50c. and at the close as low as 29.25c. The total that changed hands amounted to 100 to 150 tons, mostly future shipment and largely taken by dealers. To-day sales of about 200 tons were made down to 29c. The feature in spot tin is that this position is closely held, and therefore hard to secure. The quotation for this position to-day was 29c., New York, for spot Straits. London quotations to-day were from £8 to £12 lower than a week ago with spot standard at £165 15s., future standard at £167 and spot Straits at £166 15s. Deliveries of tin into consumption for the month of May were 1225 tons with the quantity afloat and landing on May 31 at 2571 tons. Total imports for the five months of this year were 7353 tons, as compared with 23,013 tons to June 1, 1920. Arrivals thus far this month have been 505 tons with 2150 tons reported afloat.

Lead.—The only feature of interest in this market was the reduction late Monday of the quotation of the leading interest from 5c. to 4.75c., both New York and St. Louis. Very little business is reported by either the leading interest or the outside market. The market for some time has experienced the pressing of speculative lots at St. Louis until the outside market has reached 4.60c., St. Louis, which was probably the cause

of the step taken by the leading interest. We quote the market largely nominal at 4.50c., St. Louis, or 4.75c., New York.

Zinc.—The market is absolutely flat with business confined to carload lots for early shipment and very few of these changing hands. Prime Western for early shipment is quoted at 4.55c., St. Louis, or 5.05c., New York, at which level a few lots have changed hands. It is possible that this could be shaded to 4.50c., St. Louis, on a fairly desirable tonnage for prompt shipment.

Antimony.—Wholesale lots for early delivery are quoted at 5.20c., New York, duty paid.

Aluminum.—Virgin metal, 98 to 99 per cent pure, in wholesale lots for early delivery is quoted by the leading producer at 2½c. f.o.b. plant, with the foreign metal of the same grade available from other sellers at 23c. to 23.50c., New York.

Old Metals.—The market is quiet and business is hard to put through. Dealers' selling prices are nominally as follows:

	Cents Per lb
Copper, heavy and crucible.....	12.50
Copper, heavy and wire.....	11.75
Copper, light and bottoms.....	9.75
Heavy machine composition.....	12.00
Brass, heavy.....	8.00
Brass, light.....	6.00
No. 1 red brass or composition turnings.....	9.50
No. 1 yellow red brass turnings.....	6.00
Lead, heavy.....	4.50
Lead, tea.....	3.50
Zinc.....	3.50

Chicago

June 7.—Lack of consuming demand has resulted in further weakness in tin, lead and zinc. Producers and dealers find that they must cut prices to secure any business at all. Old metal prices are unchanged except for reductions in tinfoil and block tin. We quote Lake copper at 13.50c. in carload lots; tin, 31c.; lead, 4.70c.; spelter, 4.70c.; antimony, 7.50c. On old metals we quote copper wires, crucible shapes, 8.25c.; copper cl.ps, 8c.; copper bottoms, 7c.; red brass, 7c.; yellow brass, 5c.; lead pipe, 2.75c.; zinc, 2c.; pewter, No. 1, 17c.; tinfoil, 18c.; block tin, 21c., all these being buying prices for less than carload lots.

St. Louis

June 7.—The non-ferrous markets continue dull and with very little change in quotations. On car lots the prices asked are: Lead, 4.65c.; spelter, 4.75c. On less than car lots the prices asked are: Lead, 5.25c.; spelter, 5.50c.; tin, 34c.; copper, 14c.; antimony, 7.50c. In the Joplin district ore prices show no accretion of strength and lead, basis 80 per cent, sold at \$55 per ton, while zinc blende sold at \$22.50 per ton, basis 60 per cent. There is still no offering of calamine as the prices available do not warrant working the deposits. On miscellaneous scrap metals we quote dealers' buying prices as follows: Light brass, 4.50c.; heavy yellow brass, 7.50c.; heavy red brass, heavy copper and copper wire, 9c.; light copper, 8c.; pewter, 15c.; tinfoil, 18c.; zinc, 3c.; lead, 3.50c.; tea lead, 2c.; aluminum, 9c.

Standard Underground Cable Co. Will Build Plant in St. Louis

The Standard Underground Cable Co. of Pittsburgh, has purchased 600,000 square feet of ground in the north-western industrial district of St. Louis, and will begin the erection of a manufacturing plant there before the end of this year, according to an announcement of the St. Louis Chamber of Commerce. The property is bounded by Kingshighway and Slevin, Geraldine and Brown avenues. It is stated that the expenditure for the St. Louis plant will be between \$2,000,000 and \$3,000,000.

Jordan W. Marsh, president of the company, said that the St. Louis plant will include departments for the drawing of copper wire and manufacture of weather-proof wire, magnet wire and lead covered cable.

GERMAN TREND DOWNWARD

Heavy Stocks Carried by Mills—Sheets Active in Southern Markets

(Special Correspondence)

BERLIN, GERMANY, May 17.—There is scarcely any change in the tone of the market. A slight rally took place when it was doubtful whether Germany would sign the ultimatum presented by the Entente. Prices stiffened for a few days, but gave way again as soon as any existing doubts were removed and the downward trend continues. The pig iron market was dull but for the business done in Luxemburg foundry iron No. 3 which was at first offered at 1050 m. per ton, and has been quoted in francs only during the last days of the past week. Prices ranged between 220 fr. and 240 fr., f.o.b. maker's works.

The rolled material market was also rather quiet except for some activity in warehouse stocks for immediate delivery. For these, comparatively fair prices were obtained. Angles fetched 2200 m. (\$34.32) per ton, flats 2450 to 2550 m. (\$38.22 to \$39.78). Prices for bar iron showed a tendency to fluctuate. The highest quotation heard was 2100 m. (\$32.76), but on the average prices were in the neighborhood of 1850 m. (\$28.86). Spot stocks were obtainable at 2300 m. (\$35.88), while Rhenish-Westphalian mills have already cut the 1800 marks level and are now quoting 1750 to 1700 m. (\$27.30 to \$26.52) per ton.

Luxemburg mills are following suit and are now quoting 290 to 300 fr. (\$23.78 to \$24.60) per ton. Practically the same prices hold true for section iron.

Hoop iron started with 2700 m. (\$42.12), but soon dropped to 2250 m. (\$35.10) per ton. Structural material met with light demand, only the heavier shapes coming in for some inquiries. We quote channels at 2150 m. (\$33.54), tees at 2500 m. (\$39.00). A light business in rounds, bright, was done with prices for $\frac{3}{8}$ -in. to 9/16-in. bars averaging 3200 m. (\$49.92) per ton. The wire market remained unchanged; we quote rolled material at 1600 m. (\$24.96) for domestic delivery, while export stocks are offered at 1800 m. (\$28.08) f.o.b. German port. For open hearth stocks, 60 m. more per ton is charged. Judging by the reports on hand, considerable stocks are still being carried both by mills and warehouses. We quote the following for railroad material: Heavy rails 2300 m. (\$35.88), inclusive, fish plates 2350 m. (\$36.66), heavy ties 1700 m. (\$26.52), light ties 1600 m. (\$24.96), stay plates 1750 m. (\$27.30). Blooms, open hearth, are quoted at 1300 m. (\$20.28) per ton f.o.b. maker's mill.

A slightly increased activity in sheets has been noticeable, especially in the South German markets. Heavy sheets are quoted at 2350 to 2450 m. (\$36.66 to \$38.22), medium sheets at 2550 to 2650 m. (\$39.78 to \$41.34), and thin plates at 2750 m. (\$42.90). Quotations by Rhenish-Westphalian mills ranged within 2200 and 2100 m. (\$34.32 to \$32.76), one inquiry even limiting the price for light sheets to 1900 m. (\$29.54), which met, however, with a refusal. Tin plate was quoted in the Southern markets at 4100 m. per ton, 205 m. per 100-lb. box (\$3.20).

Business in the pipe and tube market was unsatisfactory. We quote cast iron flanged pipes at 300 m. per 100 kg. (2.12c. per lb.) and seamless boiler tubes $2\frac{1}{2}$ in. x $2\frac{1}{4}$ in. at 6.50 m. per metre (3.08c. per ft.).

FRENCH OUTLOOK IMPROVES

Prospect of German Indemnity Payment Brightens Market—Coke Declines—Wage Cutting Continues

(Special Correspondence)

LONGWY, FRANCE, May 14.—The position in Meurthe et Moselle and in Lorraine looks brighter as a result of the prospect of German payment of the indemnity. The Germans have placed in Amsterdam large sums in dollars and sterling, to be converted into French and Belgian francs. This is considered as a proof that Germany is resolved to pay.

There is a scarcity in orders for heavy bars and squares and rounds $2\frac{1}{2}$ in. and larger. Various rolling mills are quoting widely diverse prices. The base price seems to be 44.50 to 45.50 fr. per 100 kg.

Further changes are expected in the near future, as the price of coke will probably be about 95 to 97 fr. per 1000 kilos during the next few months, and the new terms on fuel will doubtless influence the tone of the market in France.

No. 3 pig iron (rough skin) is quoted at 255 fr. per ton and evidently a price of 248 to 250 fr. per ton will be reached this summer in sympathy with a further decline in the prices of fuel. Stocks of pig iron are still considerable and but for the strike in England the depression in Belgium would have reached its climax.

The stock of domestic machine tools is still enormous. A pool has been formed by the French Government to provide the devastated sections with machinery equipment. The warehouses of this official pool are filled with German machine tools and difficulty is being experienced in disposing of the machinery, as with the rise of the franc the preference here is for American machinery.

Dullness prevails among the foundries. American methods and machinery are being adopted with a view to saving labor costs, which are high. Castings for engineering purposes may be had at 125 to 155 fr. per 100 kg., depending upon specifications. Railroad castings range from 100 to 120 fr. per 100 kilos, f.o.b. trucks.

French steel works contemplate the manufacture of thin sheets on a large scale. Three-sixteenth-inch sheets

are being offered at 68 to 72 fr. per 100 kg., f.o.b. mill. Heavy plates are weaker.

Several works in Lorraine have been forced to curtail output and stop pig-iron production. In other districts, however, furnaces have been blown in.

Wage cutting continues. The decline in wages is from 1.25 to 3 fr. per day. Idle men are not numerous, as many are settling down to domestic work, agriculture etc. Official statistics, however, show thousands of idle men.

Suit Against American Can Co. Is Abandoned

WASHINGTON, June 7.—The Government's case against the American Can Co., which was charged with being a monopoly in violation of the Sherman law, has been abandoned. "On motion of Solicitor General Friereson, of the Department of Justice, the Supreme Court yesterday dismissed the Government's appeal from decrees of lower courts, which held the American Can Co. is not a monopoly.

The Supreme Court, before adjourning until Oct. 3, assigned several important cases for reargument, including the one against the United Shoe Machinery Co., charged with violation of the anti-trust law.

Fire at Plant of McKeesport Tin Plate Co.

Fire at the plant of the McKeesport Tin Plate Co., McKeesport, Pa., the night of June 6, destroyed the storehouse, stock house and shipping room. With the exception, however, of a few of the tin pots which the company had not used this year, the producing plant was not touched and officials of the company are advising customers that a resumption of operations will be possible in a few days after the debris is cleared away. As a matter of fact, several mills remained in operation during the early part of the fire and it would be possible to start up at once if it were not for the fact that there is no place to put the product. No reliable estimate yet is available as to damage sustained, but it is chiefly in finished material and in the building which housed the storage, stock and shipping departments.

PERSONAL

Charles V. Haynes, Philadelphia, gave an address on vapor heating systems before the Massachusetts chapter, American Society of Heating & Ventilating Engineers at the Engineers Club, Boston, June 2. The address included an historical sketch as well as the present application and future possibilities of the system.

Hjalmar E. Skougor, consulting industrial engineer, 150 Nassau Street, New York, has returned to New York from Europe after an absence of three months.

William J. Grose, for a number of years in the purchasing department of the Carnegie Steel Co., Pittsburgh, resigned recently to accept a position of bond salesman with Wells, Singer & Dean, Union Arcade, Pittsburgh.

W. H. Bleecker, Jr., formerly district sales manager at the Chicago office of the Page Steel & Wire Co., will be transferred to the New York office in the same capacity. E. J. Flood has been appointed district sales manager for all Page products at the Chicago office, 208 South La Salle Street, succeeding W. H. Bleecker, Jr.

L. A. Lambing has been appointed superintendent of the open-hearth department, Pittsburgh Crucible Steel Co., Midland, Pa. Mr. Lambing, who succeeded Edward F. McGeehan, formerly was assistant superintendent of No. 4 open-hearth department of the Homestead works, Carnegie Steel Co. He is a graduate of the University of Pittsburgh.

Prof. Warren J. Mead of the department of geology, University of Wisconsin, Madison, departed May 30 for Manchuria as one of a party of six experts commissioned to make a geological and engineering survey of iron ore and coal deposits along the South Manchuria Railway. The experts will return about Sept. 15. Professor Mead has been assigned to work particularly on iron ore exploration. The deposits found in the section which the railroad is having surveyed by the American commission are said to be very similar to the iron ore found in the Lake Superior region of Minnesota, Wisconsin and Michigan, in which district Professor Mead has had wide experience in exploration. Accompanying him are: Prof. W. R. Appleby, dean School of Mines, University of Minnesota; W. R. Emmons, state geologist of Minnesota; L. D. Davenport, Boston; W. H. Craig and Frank Hutchinson, Duluth, Minn.

Oskar Kylin was recently appointed general sales manager of the Foster Machine Co., Elkhart, Ind. Mr. Kylin, who for the last five years has been chief engineer and a member of the executive board of the company, still retains his former position in addition to his new duties.

Charles D. Terry, assistant to the general superintendent of the National Tube Co., sailed on the Olympic, June 4, for a tour in Europe, including France, Switzerland, England and Scotland. He is accompanied by Mrs. Terry. As a member of the committee of the American Society of Mechanical Engineers on threading practices Mr. Terry went abroad in 1919 to confer with French and English representatives on an international threading standard for pipe fittings, valves, etc.

Charles Piez, president Link-Belt Co., Chicago, and nationally known as director-general of the United States Shipping Board, Emergency Fleet Corporation, addressed the Engineering Advertisers' Association of Chicago on June 7 at the Great Northern Hotel, Chicago, on "Advertising and Selling from an Executive's Viewpoint."

Several important changes in the sales department of the Midvale Steel & Ordnance Co., Philadelphia, were put into effect Monday, June 6. About two years ago, the general sales department was split into five divisions, each having its own manager, with John C. Neale, vice-president, in charge as general manager of sales. These five divisions are now consolidated into

three divisions. Alfred C. Howell, who was in charge of the structural division, which took in plates, shapes and charcoal iron boiler tubes, becomes district sales agent in Philadelphia, succeeding Frank J. Krouse, who has been appointed assistant manager of the bar and billet division. Ward A. Miller, who was in charge of the distributors' division, which took in wire products and tool steel, has been appointed district sales agent in Chicago, succeeding the late Clifford J. Ellis. J. C. C. Holding becomes manager of the structural division, with L. S. Thomson as his assistant. L. R. Steuer remains as manager of the bar and billet division, with Frank J. Krouse as his assistant, and Stuart Hazlewood continues as manager of the forging division, with P. S. Rattle as his assistant. The structural division will handle sales of plates, shapes, tubes, cars, standard rails, splice bars and tie plates. The bar and billet division will handle sales of bars, wire products, billets, sheet bars and light rails, and will also handle all jobbing and export trade. The forging division will include, in addition to forgings, tires, gear blanks, wheels, axles and tool steel.

Stephen Badlam has severed his connection as sales engineer with the Philadelphia Roll & Machine Co., Philadelphia, and has engaged in business as an engineer, specializing in rolling mill equipment, with offices at 1019-1021 North American Building, Philadelphia. Prior to his connection with the Philadelphia Roll & Machine Co., Mr. Badlam was 12 years with the Pennsylvania Steel Co. in the operating department, and assistant chief engineer of the Pittsburgh Crucible Steel Co. during the building of its Midland plant, and also chief engineer of the Pittsburgh Seamless Tube Co. In the World War he was major of infantry on the General Staff, First Army, and was overseas for two years.

OBITUARY

W. A. JONES, president W. A. Jones Foundry & Machine Co., Chicago, died May 30, at his home in Laporte, Ind., of heart disease after having been in ill health for several years. He was 71 years of age. Before becoming established in Chicago, Mr. Jones was for several years in business at Marseilles, Ill. In Chicago he was connected with the Link-Belt Co. until 1890, when he founded the W. A. Jones Foundry & Machine Co. He specialized in the manufacture of pulleys and transmission machinery, doing general jobbing work also. He was president of the American Foundrymen's Association in 1901 when the first Chicago convention of that organization was held. His only son, Warren G. Jones, vice-president of the company, has conducted the business since his retirement several years ago.

ALEXANDER H. HANDLAN, president Handlan-Buck Mfg. Co., St. Louis, manufacturer of railroad supplies, died May 28 at his summer home in Oconomowoc, Wis., from heart disease after an illness of more than a year. He was 77 years old, and retired from active participation in the company's affairs about 20 years ago. Mr. Handlan began his career 52 years ago as a bookkeeper for M. M. Buck, a small dealer in railroad lanterns. He bought an interest in the business shortly afterwards, and finally bought out Mr. Buck. In 1901 he changed the name of the concern to its present form.

MICHAEL E. CONRAN, president M. E. Conran Co., Brooklyn, pipe and fittings, died May 25.

WILLIAM ARCHIE KYTE, sales manager and member of the board of governors of the Foster Machine Co., Elkhart, Ind., died May 24 at his home in that city. He was born at Middlebury, Ind., on March 1, 1878, and his association with the Foster Machine Co. started in 1905. Death was caused by nervous exhaustion and heart trouble after an illness dating from last January.

FRANK L. FERNALD, naval constructor, U. S. N., retired, died at his home at Elliot, Me., May 29, in his eighty-fifth year. He was the designer of the battleship Maine, which was destroyed in Havana Harbor.

IRON AND INDUSTRIAL STOCKS

General Trend of Security Values Has Continued Downward

Although assurances were given the country has passed through the worst of a financial strain, little industrially transpired the past week to inspire investment confidence. The general tendency of security values has continued downward. Although plans for Federal Reserve System banks to reduce rates during the summer were recently made public, money rates are high. In fact, it is difficult for many concerns to earn the interest, after fixed charges, on borrowed capital at present rate of production. This fact, coupled with heavy shrinkages in inventories, possibly explains the recent passing of dividends in many instances. Throwing over of non-dividend paying stocks has accelerated the general downward tendency of securities.

The reduction of 12 per cent in railroad labor wages, effective July 1, may be followed by a cut in transportation charges, consequently some investors figure the ultimate net gain for the carriers will be unimportant unless tonnages hauled increase to a greater extent than currently reported. No immediate supply and equipment purchases by the railroads appear likely and lower prices for railroad and equipment stocks have resulted. The demand for steel products, pig iron and coke likewise has encouraged comparatively little investment in producing company stocks. On the other hand, the lack of selling pressure is noteworthy. Automobile stocks have been sold the past week on further cuts in prices for machines. At the moment the textile industries are our brightest spots, although grain and cotton markets are responding to better statistical reports.

The range of prices on active iron and industrial stocks from Saturday of last week to Monday of this week was as follows:

Allis-Chalm. com.	31 1/4 - 34 1/4	Lackawanna Steel.	45 1/2 - 48 1/4
Allis-Chalm. pf.	73 1/4 - 74	Midvale Steel.	26 - 28
Am. Can. com.	29 - 30 1/4	Nat. Acme	— - 20
Am. Can. pf.	83 1/4 - 83 3/4	Nat. F. & S. com.	49 - 51
Am. C. & P. com.	122 1/2 - 125	N. Y. Air Brake.	65 - 65 1/4
Am. C. & P. pf.	108 1/4 - 109 1/2	Nova Scotia Steel.	29 - 30
Am. Loco. com.	82 1/2 - 85	Press. Steel com.	81 - 82 1/4
Am. Loco. pf.	— - 101	Ity. Stl. Spg. com.	83 1/4 - 84
Am. Radiator com.	— - 70	Ity. Stl. Spg. pf.	100 1/2 - 100 3/4
Am. Steel F. com.	28 1/2 - 30	Replodge Steel.	23 1/2 - 25 1/4
Am. Steel F. pf.	84 - 85	Republic com.	54 1/4 - 56 1/4
Bald. Loco. com.	76 1/2 - 83 1/4	Republic pf.	— - 89 1/4
Bald. Loco. pf.	— - 99	Sloss com.	38 - 38 1/2
Beth. Stl. C. P. H.	64 1/4 - 57	Sloss pf.	— - 73
Beth. Stl. 8% pf.	99 1/4 - 100	Superior Steel.	— - 39 1/4
Chic. Pneu. Tool.	— - 60	Tranque-Williams.	37 1/2 - 38
Colorado Fuel.	29 1/2 - 30	Un. Alloy Steel.	26 - 28
Cruc. Steel com.	63 1/4 - 69 1/4	U. S. Steel com.	78 1/4 - 81 1/4
Gen. Electric.	133 - 135	U. S. Steel pf.	107 1/4 - 108 1/2
Gr. No. Ore Cert.	27 1/2 - 28 1/2	Vanadium Steel.	29 1/4 - 31 1/4
Gulf States Steel.	34 - 35	Va. I. C. & Coke.	— - 83
Int. Har. com.	84 1/4 - 89	Westingh'ose Elec.	45 1/2 - 46

Selling Industrial Stocks

YOUNGSTOWN, OHIO, June 7—Owing to the financial needs of certain holders, selling is developing in preferred stocks of industrial interests. Omission or reduction of common dividend rates has or will materially affect many incomes with the result that cash is being realized in the sale of holdings. This situation, as well as the general slump which has overtaken the industry, has resulted in weakening some of the standard issues.

Commons have naturally declined in sympathy with the general business situation. On about 400 shares, common stock of the Brier Hill Steel Co. sold down to \$17, which is equivalent to \$102 for the old stock before the financial reorganization last year. This price represents a decline of \$133 from the peak of this issue.

Youngstown Sheet & Tube Co. common is selling at \$58, equivalent to \$252 for the original common before the July, 1920, stock dividend, a decline of \$125 per share.

Trumbull Steel Co. common has sold down to \$19.75, which is equivalent to \$98.75, or down about \$75 from the high price.

United Engineering & Foundry common is sought at \$177, the last sale price, and is offered at \$183.

The St. Louis Coke & Chemical Co. has completed arrangements for financing of approximately \$2,000,000 to take care of current liabilities. The National Enameling & Stamping Co. has a substantial interest in this concern.

The G. A. Ball Bearing Mfg. Co., 3051 West Lake Street, Chicago, has increased its capital stock from \$75,000 to \$200,000.

Sale of the property of The Immel Co., Columbus Ohio, automobile body manufacturers, has been ordered by the common pleas court on the application of R. H. Schryver, receiver for the company. The property is held at approximately \$250,000.

Industrial Finances

The Wisconsin Gear & Axle Co., Milwaukee, has increased its capital stock from \$100,000 to \$250,000, consisting of \$50,000 of preferred and \$200,000 of common shares. The concern manufactures axles and gears for the automotive industries. The plant and offices are situated at State Street and Hawley Road.

The Zenith Furnace Co., Duluth, Minn., has filed an amendment to its corporate articles in Wisconsin providing for an increase in capital stock from \$1,500,000 to \$3,000,000. W. B. Castle, Duluth, is president.

The Milwaukee Rolling Mill Co., Milwaukee, which recently placed in operation a new sheet mill representing an investment of about \$1,750,000 at Forty-third Avenue and Grant Street, in West Milwaukee, has increased its capital stock by a new issue of \$1,500,000 of preferred shares, making the total \$3,000,000, in addition to 15,000 shares of common stock having no par value. The new preferred shares will not be issued immediately, according to officers of the company, but will be available when future expansion makes it necessary. The company operates the only sheet mill in the Milwaukee district and is producing blue, black galvanized and annealed sheets. The capacity is 60,000 tons annually. B. B. Jack is general superintendent.

The A. L. Smith Iron Works, Chelsea, Mass., has increased its capitalization \$150,000 by an issue of 1500 shares of first preferred stock, par \$100. Arthur L. Smith is president and treasurer.

The Millers Falls Co., Millers Falls, Mass., tools, has increased its capitalization \$165,200 by an issue of 1652 shares of preferred stock, par \$100, against stock and securities. Philip Rogers is president and George W. Nims, treasurer.

A public offering of \$4,000,000 Interstate Iron & Steel Co., Chicago, 8 per cent first mortgage 20-year sinking fund, series A, bonds, dated May 1, has been made. They are a part of an authorized issue of \$10,000,000 bonds, and are a direct first mortgage in all fixed property of the company.

Penn Seaboard Steel Corporation voting trust certificate holders are offered the opportunity to extend until June 26, 1926, the voting trust agreement which expires June 26, 1926.

The combined profit and loss account of constituent companies of the British Empire Steel Corporation, Ltd., for the year ended Dec. 31, as filed with the New York Stock Exchange, showed a profit, after Government war taxes, interest, depreciation and all other expenses, of \$6,235,127. Sales and other revenues amounted to \$69,681,342 and cost of sales, etc., \$58,865,096. Cash showed \$1,261,884, notes receivable \$429,171, accounts receivable \$12,160,127, and inventories \$18,480,185.

Bankrupt Company Busy

The John Obenberger Forge Co., Milwaukee, which is passing through bankruptcy proceedings, is increasing its operating schedule under permission granted recently to the trustee, John F. Gordis to re-open the works. To finance production, the United States District Court has authorized the trustees to borrow \$60,000 from the First Wisconsin National Bank of Milwaukee, which is the largest creditor. The loan was approved by trustee John F. Harper. It bears 7 1/2 per cent interest and is secured by certificates issued by the trustee. The Obenberger company has orders from the Nash, Packard, Dodge and other automobile manufacturing companies which require prompt delivery. Much of the business on the books represents reinstatement in part of large orders which were cancelled about eight months ago, as the direct result of which the Obenberger company was forced into the bankruptcy court.

Office Changes

General offices of the Eastern Fuel Co. and the Georges Creek Coal Mining Co. have been removed to rooms 404 to 410 Frick Building, Pittsburgh.

Laughlin & Barney, machinery and machine tools, Pittsburgh, have removed from the Wabash Building to the Union Arcade.

The U. T. Hungerford Brass & Copper Co., 180 Lafayette Street, New York, has organized a metal specialties department, which will handle all turned, spun, cast and drawn work, for which the company has manufacturing facilities. The new department will act in an advisory capacity to the branch offices in Boston, Baltimore, Philadelphia and San Francisco.

The John C. Brill Co., sales representative for iron and steel products, New Orleans, has been appointed district sales representative for Oklahoma, Arkansas, Texas and the balance of this Southwestern territory for the LaSalle Steel Co., Chicago, manufacturer of shafting.

Machinery Markets and News of the Works

MAY BUSINESS SLOW

First Week of June Brings No Improvement in Machine Tools

Aside from Probable Railroad Purchases in Chicago the Markets Are Lacking in Prospects

May was a poor month for machine tool builders and their selling representatives. In some instances the volume of sales for May showed a decline from April, nor has the first week of June brought anything encouraging, although in a few quarters inquiries are reported slightly better. The difficulty in closing orders, however, is one of the outstanding features in all sections of the country.

New York

NEW YORK, June 7.

The past week brought no change in the machine-tool situation. Domestic demand for tools is confined to single machines, as has been the case for some months. No important business has developed from recent export inquiries. It is estimated that local dealers are doing about 20 or 25 per cent of what may be considered a normal business.

The crane market is extremely flat, practically no new inquiries having appeared in this district and few sales being reported. The Commissioner of Docks, New York, has issued an inquiry for four 2-ton electric winches for the East Fifth Street Pier. This is part of the 72 winches which will be purchased later. The Shepard Electric Crane & Hoist Co. has sold a 10-ton, 65-ft. span overhead traveling crane to the Pidgeon-Thomas Iron Co., Memphis, Tenn.; Woonham, Bates & Goode Trading Co. has sold the United Electric Light & Power Co. a 12-ton, 50-ft. boom crawl tread Orton & Steinbrenner locomotive crane, and the American Gas & Electric Co., 30 Church Street, New York, has purchased a used 25-ton Orton & Steinbrenner locomotive crane from the Simmons Machine Co., Albany, N. Y.

The Burns Brothers Coal Co., 50 Church Street, New York, has filed plans for a one-story, brick machine shop, 100 x 120 ft., at 442-48 107th Street, to cost about \$22,000.

The Autoflong Corporation, New York, has been incorporated with a capital of \$50,000 by W. W. Brown, J. T. Wilson and E. A. Kittel, to manufacture brake mechanisms for automobiles and other automotive equipment. It is represented by Leubuscher & Suling, 258 Broadway.

The Never Fall Products Corporation, New York, has been incorporated with a capital of \$110,000 by W. O. Rogers, Jr., J. H. Ballantine and G. R. Prudon, to manufacture electric, gas and water measuring and controlling devices. George A. Gregg, Bridge Plaza North, Long Island City, represents the company.

The Rockland Light & Power Co., Nyack, N. Y., is planning the erection of an addition to its power plant, estimated to cost about \$435,000, including new steam and electric equipment. Application has been made to the Public Service Commission for permission to issue bonds for \$500,000 to defray the cost.

The Halperg-Wein Co., 110 West Fortieth Street, New York, will purchase a quantity of equipment, including machine tools, for use at railroad and car shops in Sweden.

The Greene Avenue Garage, Inc., Greene Avenue, near Classon Avenue, Brooklyn, is having plans prepared for the erection of a one-story service and repair works addition, 60 x 200 ft., estimated to cost about \$20,000, exclusive of equipment. John J. Carroll, 225 Greene Avenue, is architect.

The Essential Automotive Products Co., New York, has been incorporated with a capital of \$120,000 by L. Liebling, H. S. Benedict and R. R. Hill, to manufacture automobile devices and equipment. It is represented by L. Backner, Maiden Lane.

Aside from probable purchases by the Illinois Central and Rock Island railroads at Chicago, there is nothing in the way of immediate prospects of importance in any of the markets.

A sizable order for power hammers received by a Cincinnati dealer from a West Virginia company stands out in that market as a leading transaction.

Another slump in the automobile industry has set in, and there is no hope entertained for business from that source during the summer, at least.

In the railroad field the announcement of a wage reduction effective July 1 has brought no hint of probable railroad buying with the exception of a few inquiries for car repairs, principally from the Illinois Central, Missouri Pacific and Wabash.

The Luckenbach Steamship Co., 44 Whitehall Street, New York, will take bids up to June 15 for the construction of the first unit of its new freight terminal at Bull's Ferry, Edgewater, N. J., to cost \$10,000,000 with equipment.

The New York State Gas & Electric Corporation, Ithaca, N. Y., H. C. Hopson, 61 Broadway, New York, representative, has made application to the Public Service Commission for permission to build a new power plant at Plymouth, Chenango County.

The Samaroon Sheet Metal Works, Inc., New York, has been incorporated with a capital of \$30,000 by A. Sommerfeld, P. Rosenberg and I. S. Mathew, to manufacture metal goods. It is represented by M. C. Levine, 119 Nassau Street.

The Wire Grip Sanitary Brush Corporation, New York, has been incorporated with a capital of \$50,000 by A. A. Meyerhoff, W. and M. Hertzberg, to manufacture wire brushes. L. Applehome, 302 Broadway, represents the company.

The Stanton Plating & Polishing Co., New York, has been organized by A. O. Jacobson and N. Elkin, 27 Graham Avenue, Brooklyn, to manufacture metal goods.

The Pierce Oil Corporation, 25 Broad Street, New York, is planning for a bond issue of \$12,000,000 for extensions in refineries, operations, etc.

The Master Piston Ring Corporation, New York, has been incorporated with a capital of \$50,000 by B. Hursch, J. I. Polstein and S. S. Budlong, to manufacture piston rings for automobile engines, and kindred automotive products. It is represented by Sanders, Zelenko & Polstein, 217 Broadway.

The Kortum Buff Co., New York, has been organized by K. A. Kortum and C. Brandt, Jr., 99 Nassau Street, to manufacture electro-plating equipment.

The Millville Pulp & Pine Products Co., Millville, N. J., is completing plans for its new one and two-story plant at Millville and Cumberland roads, estimated to cost in excess of \$75,000 with machinery. J. W. Arthur, Old Opera House Building, Millville, is architect. E. H. Hults, 218-20 Walnut Street, Philadelphia, Pa., is president.

A new one-story power house will be erected at the plant of the Rogers-Pyatt Shellac Co., 39 Essex Street, Jersey City, N. J.

The South Jersey Iron Foundry, Inc., Pleasantville, N. J., has been organized to manufacture iron and steel castings. A local plant will be established. Wray C. Arnold, Commonwealth Building, Philadelphia, represents the company.

The Standard Underground Cable Co., Washington Street, Perth Amboy, N. J., has plans under way for extensions and improvements in its plant to cost in excess of \$200,000. The work will include the erection of several floor additions to present buildings and will aggregate about 100,000 sq. ft. of space for manufacturing operations. Upon completion it is proposed to increase the working force about 25 per cent, making a total of about 1800 operatives. C. C. Baldwin is vice-president and general manager.

The Board of Water Commissioners, Perth Amboy, N. J., has awarded a contract to Grelsen & Thompson, Perth

Amboy, for a one-story machine and repair shop on King Street, for department service, at a cost of \$22,460.

The Board of Chosen Freeholders, Passaic, N. J., has awarded contract to Giordano & McGinnis, 415 Highland Avenue, Lodi, N. J., for a two-story automobile service and repair building, 50 x 100 ft., on Marshall Street, to cost about \$50,000.

The New Jersey Blower & Mfg. Co., East Orange, N. J., has been incorporated with a capital of \$50,000 to manufacture mechanical fans, blowers, etc. Charles O. Geyer, 525 Main Street, represents the company.

L. A. Myers, Jr., Inc., 139-45 Ogden Street, Newark, N. J., manufacturer of metal products, has acquired property adjoining its plant at 138-44 Mount Pleasant Avenue, 100 x 100 ft., for extensions.

The Lauder & Shean Device Mfg. Co., Newark, has been incorporated with a capital of \$500,000 by Frederick E. Lauder, Peter A. Shean and Otto Schunck, 810 Broad Street, to manufacture metal specialties.

The American Welding Co., 24 West Kinney Street, Newark, has filed notice of organization to operate a welding, brazing and metal cutting plant. Maurice Rehrlich heads the company.

The New Jersey Commercial Body Co., Burlington, N. J., manufacturer of automobile bodies, has acquired the one-story and basement building at 237-49 Elizabeth Avenue, Newark, on a site 140 x 150 ft., for the establishment of a new plant. Possession will be taken about June 15. The company is headed by S. A. Neidich, Burlington.

The Climax Rubber Co. of New Jersey, 1207 Firemen's Building, Newark, has been incorporated with a capital of \$1,000,000 by J. Phillips Tarr, William J. Gilberts and Warner S. Rexford, to manufacture rubber products.

Edward D. Holly, Newark, and associates have organized a company to manufacture pipe, fittings and other plumbers' supplies and have acquired the factory at Dawson and South streets, 100 x 100 ft. The different buildings on the site will be remodeled and improved and machinery installed for manufacture. Possession will be taken at once. Others interested in the company include Joseph A. Thomson and A. W. Mayer.

The Sanitary Safety Caster Co., Newark, has been incorporated with a capital of \$100,000 by Emil Chalupa, Fred Bien and George A. Schulte, 24 Scott Street, to manufacture casters and kindred metal products.

The Newark Die Co., Newark, has been incorporated with a capital of \$50,000 by Leonard G. Alesbrook, John Hold and H. H. Kunzelman, to manufacture dies, molds and similar products. It is represented by Peck, Davis & Gray, 810 Broad Street.

The Diamond Bracket Co., 457 Eighteenth Avenue, Newark, has filed notice of organization to manufacture metal shade and curtain brackets and kindred products. Elmer J. Poorman, 327 South Sixth Street, heads the company.

The Bock Machine & Garage Co., 160-66 Main Street, East Orange, N. J., has filed plans for an addition to its works, to provide an aggregate floor space of about 25,000 sq. ft. J. L. Bock is head.

and Milwaukee it is reported that every siding is full of bad order cars.

There is very little industrial plant construction in this territory and in Chicago the lockout of the building trades has brought all building to a halt. During May permits were issued in this city for 428 buildings, involving a cost of \$2,967,750, which is by far the lowest amount represented by permits issued in that month in 10 years.

The H. McFarlane Co., manufacturer of automobile bodies, 532 South Canal Street, Chicago, has purchased a tract, 115 x 116 ft., in Green Street, north of Van Buren Street, where it proposes to erect a six story plant to cost \$400,000.

The Atlas Copper & Brass Mfg. Co., 2734 High Street, Chicago, plans to construct a one-story addition, 50x125 ft., to cost \$20,000. L. Ehle, 3810 Broadway, is the architect and engineer.

L. Engel, 3058 Armitage Avenue, Chicago, will soon let a contract for a one-story garage, 60 x 150 ft., at 3515 Armitage Avenue, to cost \$40,000.

The Klose Weld Engineering Corporation, 219 East Twenty-fourth Street, Chicago, has been incorporated to take over the business of the Klose Welding Co. of the same address, which was not an incorporated company. The incorporators include Julius F. and T. M. Klose and A. Bartoli.

The Acme X-Ray Co., 223 West Madison Street, Chicago, has been incorporated with \$150,000 capital stock by George M. McFedries, Julius J. Grobe, John Lawrie and Frederick Kull to manufacture X-Ray apparatus, surgical machinery, tools and instruments.

The U. S. Meat & Bone Cutter Corporation has been incorporated with \$100,000 capital stock to manufacture bone cutters and meat machinery. The incorporators include Dunlop Smith, Edward R. Tiedebohl and John W. Clark. Manufacturing will not begin for a number of months and for the present temporary offices are in room 810, 209 South La Salle Street, Chicago.

J. A. Johnson, 5949 Ohio Street, Chicago, will build an automobile repair shop at 5615 West Division Street, to cost \$4,000.

The Standard Steel Works, Kansas City, Mo., has commenced the construction of a one and two-story plant, 118 x 305 ft., on Holmes Street northeast of the Long-Bell Lumber Co. millwork warehouse, North Kansas City. The present plant is at Nineteenth Street and Tracy Avenue.

W. A. Masters, clerk school district, Chisholm, Minn., has called for bids on machine shop equipment for the local high school.

J. F. Richter, who for several years has conducted a machine shop at Big Sandy, Mont., has moved his equipment to Hardin and is now open for business at the corner of Second Street and Custer Avenue.

The C. & K. Tool & Die Works, 1637 West Lake Street, Chicago, is having revised plans prepared for its new one-story machine shop, 100 x 185 ft., instead of 100 x 125 ft., at Iowa Street and Forty-seventh Avenue.

Arthur A. Patterson, Inc., 332 South Michigan Avenue, Chicago, has been incorporated with a capital of \$50,000 by R. W. Vanier, Fred W. Reinhardt and M. E. Corcoran, to manufacture mechanical equipment and electrical devices.

The Interstate Iron & Steel Co., 104 South Michigan Avenue, Chicago, has arranged for a bond issue of \$4,000,000, for general operations, expansion, etc. Silas J. Llewellyn is president.

The Artificial Ice Co., 140 North Dearborn Street, Chicago, is considering the erection of a new ice manufacturing and refrigerating plant at Halsted and Ninety-fourth streets, to cost about \$275,000, with machinery.

The Old Ben Coal Co., 332 South Michigan Avenue, Chicago, is planning for the construction of a new power house at its No. 16 Mine, 50 x 85 ft., to cost about \$50,000.

The Christopher Motor Co., 3308 Sheffield Avenue, Chicago, is planning for the erection of a new two-story service and repair building, 125 x 125 ft., to cost about \$85,000. J. A. Taggart, 19 South La Salle Street, is architect.

The Graham-Wittenborn Corporation, 35 South Dearborn Street, Chicago, has been incorporated with a capital of \$40,000 by Leslie B. Graham, C. W. Taylor and W. W. Wittenborn, to manufacture speed accelerating and reducing devices and kindred mechanical equipment.

The Baker Ice Machine Co., Nineteenth and Nicholas streets, Omaha, Neb., manufacturer of ice-making and refrigerating machinery, has awarded contract to A. C. Bush, Omaha, for a one-story addition, 280 x 280 ft., to cost about \$150,000 with equipment.

The City Council, Pawnee City, Neb., is having plans prepared for a new municipal electric power plant, to cost about \$85,000 with equipment. E. T. Archer & Co., New England Building, Kansas City, Mo., are engineers.

Chicago

CHICAGO, June 6.

Outside of probable purchases by the Illinois Central and the Rock Island railroads, there is little prospective machine-tool business. Not only the larger industrial companies, but even the small shops which have been responsible for most of the buying of late, are no longer showing any interest in new equipment. Sales totals for May indicate a decline from the April figures, and leaders report that the first week in June brought in practically no new business. Although railroad lists have been issued repeatedly without resulting in orders of consequence, the trade is looking with hope in that direction. The Illinois Central is expected to take action on its extensive inquiry within the next fortnight, while the Rock Island will probably buy during the current week against the small list published in this column on May 26. While it is true that the railroads have been reducing their shop forces and in some cases have closed their shops entirely, it is felt that this is a temporary expedient dictated by a desire to postpone work until the reduced wages go into effect. That the carriers are again taking steps to rehabilitate their rolling stock is indicated by the fact that the Illinois Central, the Missouri Pacific and the Wabash have sent out inquiries for figures on the repair of several thousand freight cars. Notwithstanding the fact that railroad traffic is light and there are sufficient serviceable cars to handle current business, sidetracks are so crowded with bad order equipment that they interfere with the operation of trains. On one line between Chicago

Buffalo

BUFFALO, June 6.

The Meldrum-Gabrielson Corporation, Industrial Building, Syracuse, N. Y., manufacturer of milling machines, attachments, etc., is planning the erection of a new two-story machine shop on West Fayette Street, 70 x 150 ft., to cost in excess of \$200,000 with machinery.

The Genesee Light & Power Co., Batavia, N. Y., is contemplating the construction of a new electric plant near Attica to furnish service in this section. Application for permission to build the works has been made to the Public Service Commission.

The Binghamton Street Railway Co., Binghamton, N. Y., is planning the construction of a new electric power house at Endicott, N. Y.

The American Safety Signal Sales Corporation, Rochester, N. Y., has been incorporated with a capital of \$35,000 by C. R. Steim, H. R. Smith and A. F. Hancock, to manufacture signal devices for automobile service. John J. McInerney, Insurance Building, represents the company.

New England

BOSTON, June 6.

With one exception the few sales the past week concern single machines and were about equally divided between new and used equipment. The exception was four lathes with 60-in. swing and 40-ft. bed purchased by a shipping interest at a price close to \$100,000. Manufacturers' quotations remain unchanged, but concessions were made to move some machines sold the past week. A fairly large press order is under negotiation and may be closed within a day or two.

More inquiries are in the market than a month ago and several are good prospects. One large electrical appliance manufacturer is asking prices on production equipment for experimental work in connection with a large Government contract. Sentiment among other users of metal working equipment appears better, yet future business is not sufficiently assured to justify immediate purchases of equipment. At the moment a majority of inquiries originate from smaller concerns developing new lines and with them the price is of primary importance. The Boston & Albany Railroad Co. has bought a 14-in. lathe. Bids are asked on an assortment of Government machine tools held at the Boston Navy Yard.

Several cranes are under consideration, yet prospective buyers appear in no hurry to cover.

The Springfield Bronze Co., Springfield, Mass., contemplates the erection of a one-story factory, 40 x 64 ft.

Plans are practically complete for a one-story machine shop, 300 x 400 ft., to be erected by the Meisel Press Mfg. Co., 944 Dorchester Avenue, Boston.

The Rockwood Sprinkler Co., Worcester, Mass., is building two one-story additions, 33 x 99 ft. and 35 x 80 ft., respectively.

The Turner Construction Co. has been awarded contract for a two-story power plant, 80 x 120 ft., for the American Woolen Co., Lawrence, Mass.

Plans will be soon completed for a two-story, U shaped factory, 60 x 200 ft., to be erected by the Ansonia Electric Co., 55 Main Street, Ansonia, Conn.

The Instant Freezer Co., Springfield, capitalized for \$25,000, has been granted a Massachusetts charter. Paul Werder, 61 Pearl Street, Springfield, is president, and Harold D. Kittinger, 151 Maple Street, treasurer.

The Hood Turbine Co., Boston, with Robert J. Hurley, 83 Endicott Avenue, Revere, president, and Curtis D. Chase, Wellesley Park, Natick, treasurer, has taken a Massachusetts charter, with a capital of \$100,000.

Christian E. A. Gronbeck, 49 Prospect Street, Keene, N. H., is president, and Harry F. Stahler, 20 Hilda Street, East Milton, Mass., treasurer of the New England Production Co., recently given a Massachusetts charter to manufacture a patented razor holder and other metal specialties.

The foundry department of the Albert Russell & Sons Co., Newburyport, Mass., marine capstans, etc., was damaged by fire last week with an estimated loss of \$40,000. Plans are in progress for rebuilding.

Work is progressing rapidly on the new factory building of the George Baker & Sons Co., Brockton, Mass. The main plant will be 100 x 240 ft., with a floor space of 30,000 ft., and will be used for manufacturing tacks, nails, rivets, staples, washers, cotter pins, screws, etc. The annual capacity of the plant will be 3000 tons.

Charles H. Harris, Inc., 136 West Twenty-fourth Street, New York, has awarded a contract to Levering & Garrigues,

552 West Twenty-third Street, for its new one-story plant, 100 x 200 ft., on Main Street, Norwalk, Conn., for the manufacture of automobile windshields. It is estimated to cost about \$75,000. Charles H. Harris is president.

The Plainville Casting Co., Plainville, Conn., recently incorporated with a capital of \$50,000, has tentative plans under way for a new plant for the manufacture of castings and other metal products. It is headed by William Stewart and Charles F. Conlon, Plainville.

The Stoy's Machine Developing Co., Boston, has been incorporated with a capital of \$25,000 to manufacture machinery. Samuel Stoy is president, and Samuel Goldstein, 19 Mildred Street, Dorchester, Mass., treasurer.

The Norwalk Washing Machine Co., Norwalk, Conn., has been incorporated with a capital of \$50,000 by F. A. Giorchino and W. F. Tammany, 20 Fairfield Avenue, to manufacture electrically operated washing machines.

The Federal Wharf Machine Shop, Boston, has filed notice of organization to operate a machine and repair works at 118 Border Street, East Boston. Edmond J. Leveille, Jr., heads the company.

The Morris Automobile Radiator Mfg. Co., Worcester, Mass., has acquired property at 12 Harding Street for the establishment of a new plant for the manufacture of automobile radiators and other metal products. Morris Sepinuck heads the company.

The Lundin Electric & Machine Co., Inc., Boston, has been incorporated with a capital of \$100,000 to manufacture electrically operated machinery and parts. Emil O. Lundin is president, and M. J. Savage, 10 Thatcher Street, treasurer.

A Freedman, 27 Church Street, Springfield, Mass., has plans under way for a new one-story machine shop on Seventh Street, to cost about \$17,000.

The Worcester Electric Tool Corporation, Worcester, Mass., is arranging for expansion and will concentrate production to a large extent on a new aluminum combination electric drill and valve grinder for automobile service. It is proposed to develop an output of about 100 of these machines a week. The company recently changed its name, having previously operated as the Stenman Electric Valve Grinder Co.

The Scovill Mfg. Co., Waterbury, Conn., manufacturer of brass goods, has filed plans for a one-story addition on East Main Street, 50 x 96 ft.

Philadelphia

PHILADELPHIA, June 6.

The Atlas Machine Tool & Welding Co., Philadelphia, has acquired the two-story building at Germantown and Stenton avenues, 101 x 115 ft., formerly held by the Weder Mfg. Co., manufacturer of surgical instruments, etc., for the establishment of a new plant.

The Philadelphia Rapid Transit Co., Land Title Building, Philadelphia, has filed plans for extensions and improvements in its car repair works at Kensington and Cumberland streets, to cost about \$10,000.

The J. A. Harris Rim & Wheel Co., Philadelphia, is being organized by J. A. Harris and associates to manufacture metal rims, wheels and other equipment for automobile service. Application for a State charter will be made on June 20. The company is represented by Taylor, Robey & Hoar, Stephen Girard Building.

The National Umbrella Frame Co., Thirtieth and Thompson streets, Philadelphia, has filed plans for a one-story addition to its plant on Belfield Avenue, 60 x 120 ft.

The Hittenhouse Motor Car Co., 219 West Hittenhouse Street, Philadelphia, has awarded contract to Ketcham & McQuade, 1029 Brown Street, for a new two-story service and repair building at Germantown and Greene avenues, 40 x 80 ft.

The Paul E. Motron Co., Philadelphia, is being organized by Paul E. Motron, Harry W. Wolfe and Joseph Mundet, to manufacture ice-making and refrigerating machinery. Application for a State charter will be made on June 20. The company is represented by Hazleton Mirkil, Lafayette Building.

The Hurley Motor Co., Broad and Race streets, Philadelphia, has awarded contract to the William Steele & Son Co., Sixteenth and Arch streets, for the erection of a new building at 25 North Broad Street, 80 x 100 ft., to cost in excess of \$500,000.

The Pioneer Auto Safety-Steering Device Corporation, Camden, N. J., has been incorporated with a capital of \$100,000 by J. Lukens Anderson, Philip A. Weigel and Joseph Hoffman, 1225 Broadway, Camden, to manufacture steering equipment and other automobile devices.

The Behrens Crane Co., Merchantville, N. J., has been incorporated with a capital of \$125,000 by Albert Burling,

Merchantville; Albert G. Behrens and J. Newlins Wilkins, Camden, N. J., to manufacture cranes and parts.

The Trenton Chilled Die & Casting Co., Trenton, N. J., has been incorporated with a capital of \$100,000 by Richard B. Newton, B. N. Rich and John H. Conover, Houghton and Cortland streets, Trenton, to manufacture castings and other iron and steel products.

The Keeley Stove Co., Second and Linden streets, Columbia, Pa., has completed plans and will soon award contract for a new one and two-story building, 30 x 50 ft., to cost about \$20,000.

The Pennsylvania Power & Light Co., Allentown, Pa., has taken title to property on Roaring Creek, near Danville, Pa., for the erection of its proposed new hydroelectric generating plant, estimated to cost about \$3,000,000 with equipment. The company is operated by the Electric Bond & Share Co., 71 Broadway, New York.

The Standard Foundry & Machine Co., Pottsville, Pa., has been incorporated with a capital of \$30,000 to manufacture machine parts, castings, etc. B. H. Thompson, Pottsville, is treasurer.

Pittsburgh

PITTSBURGH, June 6.

Closing of contracts for the mills and hammers for the new plant of the International Nickel Co., Huntington, W. Va., constitutes the most important business of the past week in the machinery and equipment market. The seven merchant mills for this plant will be furnished by the United Engineering & Foundry Co., Pittsburgh, while the Standard Engineering Works, Ellwood City, Pa., was the successful bidder for the 30-in. sheet mill and the 26-in. cold mill. Award of the four hammers was split between the Chambersburg Engineering works, Chambersburg, Pa., which secured the two smaller tools and the Massillon Foundry & Machine Co., Massillon, Ohio, which was awarded the two larger hammers. Motors and drivers, it is expected, will be placed this week. In general, business remains exceedingly slack, with some in the trade stating it is worse than it has been. There is basis for this assertion in that a number of inquiries which had been regarded as promising have been deferred, either because it is considered wise to await some definite signs of betterment or because the prospective cut in freight rates is expected to bring further price modifications. The Reilling Mfg. Co., Pittsburgh, which put out an inquiry some time ago for a combination punch and shear, has decided to defer purchase until business is better. We note a sale of a Union hob grinder and a Universal cutter and reamer grinder, both to go to Erie, Pa. Sales still run to individual machines and are supplied out of stock. The new boiler house for the Oliver & Snyder Steel Co., Oliver, Pa., is a duplicate of one at another plant of the company and the equipment list does not call for a crane. The United Engineering & Foundry Co., Pittsburgh, which had an inquiry out for a 15-ton overhead crane, with 5-ton auxiliary, has decided to do nothing until fall. Crane builders who have been figuring on the requirements for the new shops of the Atchison, Topeka & Santa Fe Railroad have been advised that while work on the shops will be pushed, purchase of equipment will go over until the fall. It is not expected that any business will develop until late in the year in connection with plant betterments and extensions of the LaBelle Iron Works, Steubenville, Ohio. The Wheeling Steel Corporation recently closed for a 10-ton hand-power Reading crane for one of its Wheeling plants. The Alliance Machine Co., Alliance, Ohio, was the successful bidder for the 10-ton overhead crane recently placed by the J. E. Moss Iron Works, Wheeling, W. Va. The Koppers Co., Pittsburgh, is reported to have closed for a champion 6-ton bucket trolley for installation at the plant of the Public Service Gas Co., Camden, N. J.

The Crane Co., 636 South Michigan Avenue, Chicago, manufacturer of pipe, fittings, steam specialties, etc., has taken bids for the erection of its new plant at Thirty-fourth Street and the Allegheny Valley Railroad, Pittsburgh. It will include a six-story and basement pipe and pipe bending shop, 192 x 292 ft., and is estimated to cost about \$800,000 with equipment.

The Troop Mfg. Co., Pittsburgh, manufacturer of water heaters, tank heaters, etc., has removed its plant to 2516-26 Jane Street, Southside, recently acquired, comprising a two-story building 80 x 120 ft. It is proposed to triple the output and with available adjoining land, additions will be erected at a future date. Robert A. Troop is president.

The Titan Metal Co., Bellefonte, Pa., has tentative plans under way for the rebuilding of its two-story plant, recently destroyed by fire.

The Schuster-Sterrett Motors, Inc., Pittsburgh, is being organized by Howard H. Schuster, Walter Bieling and James

R. Sterrett, Jr., 1927 Oliver Building, to manufacture automobile and truck parts, and operate a general repair works. Application for a State charter will be made on June 20.

The National Tube Co., Pittsburgh, has acquired the two brick buildings, 48 x 120 ft., at Washington and Second streets, Dravosburg, for \$22,500, and will use the property in connection with its works.

The Feigley Accessories Corporation, Pittsburgh, is being organized by David A. Feigley, Walter C. Anderson and Samuel M. Hazlett, 708 Park Building, to manufacture automobile accessories and equipment. Application for a State charter will be made on June 20.

Fire, May 28, destroyed a portion of the plant of the Valvoline Oil Co., Butler, Pa., with loss estimated at about \$400,000, including equipment and stock.

The North Pole Ice Co., West Carson Street, Pittsburgh, has completed plans for a new seven-story cold storage and ice-manufacturing plant, 100 x 200 ft., to cost about \$400,000, including machinery.

The Forest Coal Co., Fairmont, W. Va., is planning to expend about \$150,000 for the installation of new machinery at its properties, including considerable electrical equipment. The company recently increased its capital from \$100,000 to \$300,000. H. W. Showalter is president.

The Charleston Bolt & Forging Co., Charleston, W. Va., recently organized with a capital of \$300,000, has acquired a building at Nitro, W. Va., for the manufacture of bolts, nuts, spikes, rivets and kindred products. It will defer the erection of a new plant, as previously announced. C. M. Dunnivant is president, and J. Peyton Warren, vice-president.

Fire on May 27 destroyed the plant of the Fairmount Carriage Works at Fairmount, W. Va., causing a loss of approximately \$30,000. Part of the building had been used as a service station and garage by Fred Dietrich, the owner. It is understood that it will be rebuilt.

Baltimore

BALTIMORE, June 6.

The Baltimore Car & Foundry Co., Curtis Avenue, Baltimore, will build a one-story power house. Plans have been completed.

Joseph Thomas & Son, Inc., 818-36 Leadenhall Street, Baltimore, has filed plans for four two-story brick buildings on Leadenhall Street to replace its wood-working plant, recently destroyed by fire. The new works will cost about \$300,000, including equipment.

The Holdtite Mfg. Co., 919 East Baltimore Street, Baltimore, has awarded contract to R. B. Mason, 308 West Madison Street, for its proposed plant, 50 x 142 ft., for the manufacture of rubber goods, estimated to cost about \$28,000, exclusive of equipment. The machinery installation, including presses, etc., will cost approximately \$30,000. Albert A. Esterson is secretary and treasurer.

Freight-handling equipment will be installed in the steel sheds to be erected by the Board of Harbor Commissioners, Wilmington, Del., in connection with harbor improvements, a first bond issue of \$600,000 for which has been voted. Bids for the buildings will be received up to June 20.

The Common Council, Silex City, N. C., is planning for the construction of a hydroelectric power plant on the Deep River for municipal service.

A. L. Flint, general purchasing officer, the Panama Canal, Washington, will receive bids until 10.30 a. m., June 23, for equipment for canal zone service, including grab bucket, steel cable, magnet wire, locomotive shoes, vacuum pump, valves, brass tubing, micrometers, electrical equipment, etc., as set forth in Circular No. 1451. The assistant purchasing agent is located at 24 State Street, New York.

Fire, May 25, destroyed the plant of the Bahan Textile Machinery Co., Union, S. C.

The Bristol Stove & Foundry Co., Bristol, Va., has been incorporated with a capital of \$50,000 to manufacture stoves, stove castings, and other iron and steel products. H. E. Wilkinson is president, and J. C. Rucker, secretary.

The Thompson Spring Co., Wilmington, Del., has been incorporated with a capital of \$300,000 by Clarence W. Thompson, Walter K. Jeffers and Franklin L. Mettler, 832 Market Street, to manufacture springs for vehicles and automobiles.

The Standard Oil Co., Baltimore, has completed plans for a new one-story power house, 93 x 143 ft., on Third Avenue, to cost about \$50,000.

The Faultless Piston Ring Co., Rome, Ga., has been incorporated with a capital of \$200,000 by O. M. Lanham and George Garrison, Rome, to manufacture piston rings for automobile engines, and kindred products.

Detroit

DETROIT, June 6.

The Purity Stamping Co., Battle Creek, Mich., manufacturer of milk strainers, is contemplating the erection of a two-story factory. W. T. Hulcher is president.

The Metal Office Furniture Co., Grand Rapids, Mich., has awarded contract for an addition to the Owen-Ames-Kimball Co. It will be two stories, 150 x 150 ft., and cost \$50,000.

The American Seating Co., Grand Rapids, Mich., has taken out a permit for an addition to cost \$10,000.

The Angle Steel Stool Co., Otsego, Mich., it is reported, will soon be in the market for equipment to take care of its growing business.

The Wildman Rubber Co., Bay City, Mich., has awarded contract to the Bay City Stone Co. for the erection of the first unit of its tire manufacturing plant to cost \$1,000,000. The structure will be of reinforced concrete, 161 x 365 ft., three stories and basement. W. W. Wildman is president.

The R-J Generator Co., Lowell, Mich., has been incorporated with a capital of \$500,000 by John E. and O'Neill Best, and Nicholas J. Pollis, 532 Ottawa Street, Grand Rapids, Mich., to manufacture steam and gas generators, pumps and similar machinery.

The Reliance Engineering Co., Lansing, Mich., has been incorporated with a capital of \$25,000 by E. C. Shields, L. A. Wilford and Henry Fisher, Lansing, to manufacture gasoline engines and parts.

Fire, May 23, destroyed a portion of the plant of the Sturgis Electric Plating Works, Sturgis, Mich., with loss estimated at about \$25,000, including equipment.

The Woodland Piston Co., Muskegon, Mich., has been incorporated with a capital of \$75,000 by Herbert L. Woodland, Herbert H. Huntley and Percy G. Wilson, Muskegon, to manufacture pistons, piston rings and kindred equipment for automobile service.

The Jig Rushing Co., Pontiac, Mich., has been incorporated with a capital of \$25,000 by Otis R. Briney, Lawrence M. Richards and Emmanuel B. Hummins, Pontiac, to manufacture jig bushings and similar equipment.

The Osgard File Works, Inc., Detroit, has been incorporated with a capital of \$25,000 by E. L. and H. K. Deacon, and E. M. Osgard, 226 Orleans Street, to manufacture files, rasps, etc.

Ohio

CLEVELAND, June 6.

Some local dealers report a slight improvement in inquiries for single tools, but others find no change in conditions. The inquiries coming out from week to week that are not resulting in orders indicate that a fair volume of business is backing up, which is expected to be placed when business revives. Owing to the slump in the automobile trade there is virtually no business coming from that source at present. Before this there was a little activity on the part of automobile parts manufacturers. Dealers report a fair demand for machine tool repair parts and accessories.

In Cincinnati machine tool inquiries show a little improvement, but great difficulty is still being experienced in closing orders. Most of the inquirers need the tools, but either buy used equipment or decide to hold off purchasing for the present. A local dealer reports the receipt of a sizable order for power hammers from a West Virginia company, and a local manufacturer took an order for six machines from a company in the South. Part of the purchase by the Virginian Railroad will come to manufacturers in this city, and in addition to the tools recently bought by this road, a local builder has secured an order for two more machines. The Big Four has not yet purchased against its recent inquiry, but may do so this week, and action is expected to be taken by the Illinois Central in the near future. Lathe manufacturers report the receipt of several orders from the oil fields in the Southwest, the first from this source for some time.

The Marion Coaster Co., Marion, Ohio, has been incorporated with a capital stock of \$20,000 to manufacture children's vehicles. Fred Haverman, Jr., James Lingo, N. B. Rule and others are interested.

The Lea Handle Co., Bucyrus, Ohio, has been incorporated with a capital stock of \$20,000 and will manufacture baseball bats, bowling pins and other sporting goods. The company will take over the business that has been conducted by N. H. Lea, and is building a factory addition.

The Board of Trade, Ulrichsville, Ohio, has authorized the purchase of 12 acres as a site for a proposed factory of the Lucius Steel & Welding Products Co.

The Ohio Metal Stamping & Mfg. Co., Akron, Ohio, has been incorporated with a capital stock of \$50,000 by R. B. Spake, C. L. Johnson and others to manufacture metal stampings.

The Aircraft Engineering Co., Dayton, Ohio, was recently incorporated with a capitalization of \$50,000 to manufacture aeroplane parts. W. A. Penrod, B. W. Dawson, John Connolly, E. L. Haas and Ralph Maple are named the incorporators.

Indiana

INDIANAPOLIS, June 6.

A 4-acre tract has been obtained at Mars Hill, a suburb of Indianapolis, as a site for a plant for the American Valve & Tank Co., a Delaware corporation with \$200,000 capital stock. The first unit will be 50 x 150 ft. and will contain the machine shop, nickel plating and porcelain enameling departments. Iron and brass foundries will be built later. Charles B. Wedding, Chicago, formerly of Indianapolis, is president; Samuel Springer, vice-president, and Charles A. Wulf, secretary-treasurer. Mr. Wulf is the inventor of the American line of plumbing supplies and the company will have exclusive manufacturing rights, though they have been made by other companies for several years.

The Graver Corporation, East Chicago, Ind., has secured the contract for a refinery for the Indiana Oil Refining Co., Columbus, Ind., at a cost of approximately \$20,000.

The first unit of the plant of the Duesenberg Motor Co., Harding and West Washington streets, Indianapolis, has been completed at a cost of \$300,000. A second unit is under construction and a third will be added. The company is dismantling its former plant at Elizabeth, N. J., and is moving much of the machinery to Indianapolis. B. A. Worthington is president.

The Martin Howe Coal Co., Bicknell, Ind., is planning to rebuild its tippie and mechanical plant at No. 1 mine, destroyed by fire, May 24, with loss estimated at about \$100,000, including equipment.

The Western Airline Co., 408 Broadway, Cincinnati, is planning the erection of two one-story buildings at Seymour, Ind., for the manufacture of airplanes and parts. C. E. Lay is president.

The Lavelle Foundry Co., Indianapolis, has filed plans for extensions in its plant on West Michigan Avenue.

The Upton-Dussell Co., Bristol, Ind., has been incorporated with a capital of \$50,000 by Henry Dussell, Linford Upton and Arthur Semple, Bristol, to manufacture gasoline engines, parts and other kindred equipment.

The New York Blower Co., 608 South Dearborn Street, Chicago, manufacturer of mechanical fans, blowers, etc., is considering the erection of a one and two-story addition to its plant at Laporte, Ind. Henry Mathews is acting president.

The Burns-Pollock Electric Mfg. Co., Indiana Harbor, Ind., has been incorporated with a capital of \$1,000,000 by A. J. Burns, Thomas Pollock and J. G. R. O'Hara, Indiana Harbor, to manufacture electrical machinery and appliances.

The Central South

ST. LOUIS, June 6.

Cosden & Co., Tulsa, Okla., will make extensions and improvements in the power house at their local oil works to cost about \$100,000. New equipment will be installed.

Fire, May 31, destroyed a portion of the plant of the Oliver Gas Oil Burner & Machine Co., 2030-32 Pine Street, St. Louis, manufacturer of gas and oil burning equipment and devices.

The Massey Refining Co., Scottsville, Ky., has plans under way for the erection of a new oil refinery, with initial daily capacity of about 500 bbl. S. H. Massey is head.

The Illinois Central Railroad, 135 East Eleventh Place, Chicago, is considering the erection of additions to its repair shops and locomotive house at Paducah, Ky.

The Louisville & Nashville Railroad, Louisville, is building a new one-story boiler plant at Paris, Tenn., 100 x 125 ft., and estimated to cost about \$100,000. The G. H. Rimmel Co., 958 Logan Street, Louisville, is contractor.

The Signal Mountain Cement Co., Chattanooga, Tenn., is taking bids for the erection of a new plant, estimated to cost about \$200,000, with equipment.

E. L. George, Bartlesville, Okla., secretary of the local Chamber of Commerce, is developing plans for the formation of a company to establish a new plant for the manufacture of automobile tires and tubes.

The Cameron Refining Co., Ardmore, Okla., has completed plans for additions to its refinery, to increase the daily capacity from 3000 to 4000 bbl.

The Collapsible Rim Mfg. Co., Asheville, N. C., has acquired the plant of the Buzz Engineering Co., Louisville, for new works for the manufacture of metal rims for automobile service. An addition will be erected for rolling mill operations. L. Culberth is president.

The Southerland Coal Co., Henderson, Ky., is planning to rebuild the coal tipples at its properties, and power house, destroyed by fire, May 25, with loss estimated at about \$75,000.

The Duplex Tire & Rubber Co., New Gates Hotel, Joplin, Mo., is arranging for the erection of a new three-story plant on Seventh Street, 100 x 340 ft., for the manufacture of automobile tires and tubes, estimated to cost about \$100,000.

The Mendenhall Torpedo Co., Duncan, Okla., has been incorporated with a capital of \$20,000 by G. L. Wilson, Duncan; W. H. Hamilton and T. W. Mendenhall, Wichita Falls, Tex., to manufacture torpedoes and other explosives.

Fire, May 24, destroyed a portion of the works of the Gordon Metal & Iron Co., Bunker and James streets, Kansas City, Mo., with loss estimated at about \$50,000.

The State Board of Education, Topeka, Kan., J. A. Kimball, business manager, will take bids up to 2 p. m., June 21, for a new two-story power plant at the University of Kansas, Lawrence, to cost about \$100,000.

Milwaukee

MILWAUKEE, June 6

Only a small volume of machine-tool business is passing, orders usually being for a single tool for immediate shipment. There is a fair amount of inquiry but these usually indicate that transactions will be closed only at liberal concessions, which sellers are not inclined to grant. While the used tool market is not so active as before, this class of machines is giving perhaps keener competition. Hope is expressed that the automotive industries will be able to pick up output following the general reductions of prices on passenger cars to the public, which is counted upon to stimulate a demand that flattened perceptibly in the last four to six weeks.

Steel foundries have been compelled to reduce operations still further, especially those specializing in heavy work. Gray and malleable shops are able to maintain forces at the high point reached recently following a period of sharp curtailment.

The E. & W. Co., 325 Oregon Street, Milwaukee, manufacturer of trailers, trucks, convertible truck attachments, shock absorbers, etc., has increased its capital stock from \$200,000 to \$225,000 of preferred stock and 4000 shares of common stock without par value. The concern is building a new shop, 60 x 120 ft., at Cedarburg, Wis., to be ready about Aug. 1.

The Sphinx Machine Co., Milwaukee, has been organized with a capital stock of \$25,000 preferred, plus 500 shares of common stock without par value, to manufacture ice and refrigerating machinery. Walter F. Teschan, president Milwaukee Concrete Mixer Co., 955 Thirtieth Street, and Henry L. Krueger, Frank C. Schroeder and H. W. Rottel are incorporators.

Henry Powers & Co., Chippewa Falls, Wis., will build a public garage and service building, 66 x 82 ft., two stories and part basement, estimated to cost \$25,000. The architects are Schopp, Dorch & Camastile, local.

The Board of Industrial Education, Fond du Lac, Wis., awarded the contract to the Dunel Construction Co., local, for the erection of a \$75,000 addition to the central continuation school and manual arts institute. Purchases of additional equipment will be made soon. J. E. Hennon is architect.

The Lazear Products Co., Racine, Wis., has been incorporated with an authorized capital stock of \$100,000 to manufacture automotive accessories, parts and metal products generally. The incorporators are Chester Dahl, Charles F. Wratten and M. E. Walker, attorney.

The Zwebell Brothers Co., 482 Milwaukee Street, Milwaukee, has awarded the general contract to Walter Tuckwell, 575 National Avenue, for a brick, steel and concrete machine shop, 60 x 100 ft., part two stories and basement, for manufacturing vulcanizing, tire repair and other automotive machinery, tire molds, etc. The investment will be about \$45,000.

The Modern Pouring Device Co., Port Washington, Wis., has been granted a charter to manufacture pouring and lifting devices, cranes, hoists and similar equipment. The capital stock is \$50,000. The incorporators are Max Goldberg, M. J. Knappe and Norman E. Henze, all of Port Washington.

The Algoma Foundry & Machine Co., Algoma, Wis., is erecting a small addition for testing, assembling and finishing gas engines, feed cutters and other farm specialties.

The Board of Education, Barron, Wis., will close bids June 10 for the construction of a \$50,000 addition to the Barron high school, to be equipped for vocational training. The architect is Carl Volkman, Eau Claire, Wis.

The Giant Grip Co., Oshkosh, Wis., has increased its authorized capital stock from \$125,000 to \$250,000 to finance development of the business and future extensions. It was originally established as the Challoner Co. The principal products are portable sawmill and wood-working outfits, anti-skid chains for motor trucks and light forgings.

The Hartford Tool & Machine Works, Hartford, Wis., Fred F. Jordan, proprietor, is making repairs and replacements of buildings and equipment, which were badly damaged by fire on May 15. Later it is the intention to build a brick and concrete shop, 50 x 90 ft.

The More Power Spark Plug Co., Milwaukee, has been chartered with a capital stock of \$200,000 to manufacture spark plugs and other ignition devices for gas engines. The incorporators are Roy G. Hale, Edwin Krenzel and August Haberer, 889 Thirty-ninth Street.

The South Side Garage, Inc., 1133 Indiana Avenue, Sheboygan, Wis., will build a two-story brick addition, 32 x 45 ft., to its garage. It will be used largely for repairs, service and machine work.

The Moloch Co., Kaukauna, Wis., manufacturer of automatic stoking equipment, power hammers and special machinery, expects to take occupancy of its new plant costing \$150,000 about July 1. The machine shop is receiving equipment and the installation of electric cranes is being made in the foundry. It is a consolidation of the Kaukauna Foundry & Machine Works and the Moloch Automatic Stoker Co., formerly of Chicago.

The Oshkosh Tractor Co., Oshkosh, Wis., has been incorporated with a capital stock of \$150,000 of preferred stock to manufacture tractors, engines, implements, etc. The organization is effected for the purpose of transferring the LaCrosse Tractor Co., from LaCrosse, Wis., to Oshkosh, and it is intended to erect a group of buildings during the summer. Harvey P. Phynner, Milo J. Gilbert and Bart W. Heiss, all of Oshkosh, are the incorporators.

The Radiolite Mfg. Co., Milwaukee, is being organized with a capital stock of \$150,000 to manufacture kerosene vapor lamps. The device has been in production on a small scale for three years. A factory will be leased and some new equipment will be purchased. The incorporators are Dr. Robert G. Kohlsdorf, E. Cassidy and Adolph Kanneberg, attorney, 82 Wisconsin Street, Milwaukee.

The J. P. Davis & Son, Co., Chicago, manufacturer of boilers, tanks, smokestacks and other plate work, has acquired the property of the Del'ere Mfg. Co., Del'ere, Wis., also manufacturing similar lines. The new owner plans to resume operations about June 15 and is overhauling the plant and retooling portions of the works. The Del'ere company was organized about five years ago and took over the plant and equipment of the former Lyons Roller Works Co. The Davis company has headquarters in the Harris Trust Building, Chicago, and operates works at Boston, Hopewell, Va., and Carney's Point, N. J. It is capitalized at \$500,000. J. P. Davis is president and general manager.

The Jenkins Machine Co., Sheboygan, Wis., manufacturer of wood-working tools and machinery, has purchased the patent rights to a new routing and carving machine of the multiple type designed by Julius Hamacheck, Two Rivers, Wis., and will place it in production immediately. The machine is practically automatic and is operated by an electric motor and has a maximum speed of 20,000 r. p. m.

The Racine Engineering Co., Racine, Wis., manufacturer of tractors, has decided to relocate in Sheboygan, Wis., and will be reincorporated at once as the Dodge-Sheboygan Co., with a capital stock of \$100,000. The product is known as the Dodge Universal Truc-Trac, being a combination machine designed for the work of a motor truck, farm tractor, field hauler and cultivator. It is intended to erect a one-story brick and steel shop building, 60 x 150 ft., as the first unit of the new work, to be ready about September 1. A. Y. Dodge is president and chief engineer.

The Biggam Trailer Co., 802 First Wisconsin National Bank Building, Milwaukee, organized several months ago with a capital stock of \$200,000, is considering tentative plans for a factory. Since organization its production has been handled under contract with existing shops. Details of the new construction and equipment project have not been divulged. H. F. Biggam is president and general manager.

The Common Council, Kaukauna, Wis., has engaged W. E. Reynolds, architect, to design a two-story brick, steel and concrete municipal building, 100 x 145 ft., to contain a vocational training school. The estimated cost is \$200,000, including manual arts equipment. The Scharrow Iron Products Co., Racine, Wis., has been organized with a

capital stock of \$25,000 by F. E. Scharlow, Andrew Matson and William Christensen, to manufacture hardware specialties, automotive accessories and equipment. Mr. Scharlow, several months ago, retired from the Scharlow Mfg. Co., South Milwaukee, Wis., which he founded in 1912. A machine shop has been established in Racine but enlargement is planned.

The Village Board, Goodman, Wis., has awarded the general contract to the Foster Construction Co., 114 Grand Avenue, Milwaukee, for a two-story high school, with manual arts department, 88 x 175 ft., estimated to cost \$100,000. The architect is Edward Tough, Madison, Wis.

The Illumine Products Co., Milwaukee, has been incorporated with a capital stock of \$10,000 to manufacture automobile and other accessories and specialties. The incorporators are Clifford L. Laduenasse, Chris Trinkl and John F. Wulf, 90 Mason Street, Milwaukee.

California

LOS ANGELES, May 31

The Southern California Edison Co., Los Angeles, has acquired property at Harvard and Walnut streets, Fullerton, Cal., for the erection of a new power house to cost about \$50,000.

The Clark-Turner Piston Co., Los Angeles, manufacturer of pistons for automobile engines, will install considerable new machinery at its plant for increased production.

The United States Electric Steel Products Co., Inc., San Francisco, has acquired about 200 acres at Sacramento, Cal., for the erection of a new plant to manufacture steel products. A power plant will also be constructed. The Electric Furnace Construction Co., 908 Chestnut Street, Philadelphia, is interested in the project, and will handle all the electric furnace installation. It is said that the new works will cost in excess of \$5,000,000.

The Atchison, Topeka & Santa Fe Railroad Co., Los Angeles, has filed plans for a new one-story repair shop at San Bernardino, Cal., estimated to cost about \$50,000.

The Gulf States

BIRMINGHAM, June 6

The Cadenhead Auto Rim Co., Tarrant, Ala., is completing the first unit of its new works for the manufacture of metal automobile rims, and plans to occupy the structure at an early date. It comprises two buildings, 60 x 160 ft. and 60 x 120 ft., and it is proposed to develop an initial daily output of about 3000 rims. Later other additions will be erected. J. T. Cadenhead is president.

The Vulcan Radiator Co., Birmingham, Ala., recently organized, has leased a building for the establishment of a plant to manufacture automobile radiators and other metal specialties. A machine and repair works will be installed, as well as automobile body department. Robert H. Alexander is president, and R. G. Alexander, secretary and treasurer.

The Chickasaw Shipbuilding & Car Co., Fairfield, Ala., is planning for the early occupancy of its new plant for the manufacture of pressed steel cars. With orders on hand for about 1000 cars it is proposed to develop an output of 25 cars per day.

Charles Colvin, Sheffield, Ala., and associates, are planning the establishment of new works for the manufacture of fire hydrants and kindred products. A site is being selected.

The Birmingham Canning Machinery Co., Birmingham, Ala., is planning for the erection of a new factory for the manufacture of canning machinery to be operated by steam pressure.

The F. H. Koretke Brass & Mfg. Co., 922-26 Magazine Street, New Orleans, La., is considering the erection of a one-story addition to its brass foundry. W. E. Gossett is vice-president and general manager.

Fire, May 23, destroyed a portion of the plant of the Parkersburg Rig & Reel Co., Ranger, Tex., manufacturer of oil-well machinery, with loss estimated at about \$50,000.

The Lucey Co., Houston, Tex., recently organized to manufacture oil-well equipment, has filed plans for a new factory, 50 x 75 ft., estimated to cost about \$25,000. Neal Lucey, box 1072, is president, treasurer and general manager.

The Florida Oil & Refining Association, Tampa, Fla., has acquired about 1000 acres at Piney Point, near Ross, Fla., for the erection of a new refinery. It will be constructed in two units, with initial capacity of about 2000 bbl per day, and is estimated to cost about \$250,000, including machinery. R. H. Webster is president.

The Common Council, Georgetown, Tex., is planning for the installation of considerable equipment in the addition

to be erected at the municipal electric power plant, comprising engine, generating apparatus, and auxiliary operating machinery. Work will commence at once.

J. P. Sutton, New Orleans, La., is in the market for equipment for his foundry recently destroyed. A new building, 110 x 150 ft., will be erected.

The city of Meridian, Miss., has voted \$600,000 for the equipment of an electric light and power plant.

Canada

TORONTO, June 6.

The demand for machine tools has again fallen off. Buyers are only entering the market for single tools and these are less active than a week ago. Small tools are showing more activity and some users are entering the market with larger lists. There is still a tendency on the part of some dealers to shade prices, but even this is not having a stimulating effect. Used equipment is still moving in a fairly active way, but little buying is being done. A new price is announced on taps which amounts to a reduction of about 10 per cent.

W. H. Mortimer, Walkerton, Ont., is in the market for a drilling machine.

Edgar B. Rolstop, Kerrobert, Sask., is in the market for a small sawmill outfit and planer, also water-wheel equipment.

The town of Antigonish, N. S., will build a pumping station at a cost of \$15,000 and will install other equipment.

Bids are being received by the chairman and members of No. 2 Committee, London, Ont., E. S. Little, mayor, for four horizontal centrifugal sewage pumps of 1350 Imperial gal. per min. capacity each, against a head of 50 ft.

London Motors, Ltd., East London, Ont., W. Stansell, manager, will have plans prepared at once for the erection of a factory.

The Iron foundry owned by Fleming Brothers, Cabot Street, Halifax, N. S., was destroyed by fire with loss of \$15,000. It will be rebuilt.

The Canadian Johns-Manville Co., Ltd., with sales office at Montreal and Toronto, and which for several years has been operating asbestos properties at Asbestos, Que., has awarded contracts for the erection of a plant in that town, where it will manufacture all classes of asbestos products formerly imported from the United States.

The general contract for an addition to the power house to cost \$80,000 for the Montreal Light, Heat & Power Co., 83 Craig Street West, Montreal at Cedar Que., has been awarded to Anglin-Norcross, Ltd., 65 Victoria Street, Montreal.

SHORT TRADE ITEMS

The Edgeworth Steel Co., 92 Washington Street, North Boston, has succeeded Fitz, Dana & Co., heavy hardware established in 1866 and until recently located at 110 North Street. The new firm consists of D. W. Stressenger, W. W. Hanson and L. B. Hutchings. It has taken over the Fitz Dana & Co. warehouse at Edgeworth, Mass.

The firm name of Churchill, Morgan, Crittlinger, Inc., Worcester, Mass., grinding machines, has been changed to the Morgan Grinder Co.

Reed, Fears & Miller, Inc., Boston, New York and Philadelphia, pig iron and fuel, announce the establishment of a coal department at 514 Stock Exchange building, Philadelphia, which will be under the direction of Jervis W. Burdick.

The Equipment Corporation of America, having offices and plants in Chicago, Pittsburgh and Philadelphia, has just purchased another plant at Primos, Delaware County, Pa. This new acquisition makes five plants which the company operates, for the rebuilding of all classes of contractor's equipment, such as hoisting engines, concrete mixers, steam shovels, locomotive cranes and excavators. The new plant at Primos comprises about eight and one-half acres, approximately one-half of which is now under cover. It is situated on the West Chester division of the Pennsylvania Railroad, about eight miles from the heart of Philadelphia. The organization which the company now maintains at its Philadelphia plant, Thirty-first and Walnut Streets, will move to its new home as soon as work on the buildings is completed.

The Illinois Pipe & Mfg. Co., 2111-2129 South Jefferson Street, Chicago, has moved to 3465 South Lawndale Avenue.

Current Metal Prices

On Small Lots, Delivered from Merchants' Stocks, New York City

The quotations given below are for small lots, as sold from stores in New York City by merchants carrying stocks.

As there are many consumers whose requirements are not sufficiently heavy to warrant their placing orders with manufacturers for shipment in carload lots from mills, these prices are given for their convenience.

Iron and Soft Steel Bars and Shapes

Bars:	Per Lb.
Refined bars, base price	3.23c.
Swedish bars, base price	12.00c.
Soft steel bars, base price	3.23c.
Hoops, base price	4.15c. to 4.28c.
Bands, base price	3.88c.
Beams and channels, angles and tees	
3 in. x ¼ in. and larger, base	3.23c. to 3.33c.
Channels, angles and tees under 3 in. x ¼ in., base	3.23c.

Merchant Steel

	Per Lb.
Tire, 1½ x ½ in. and larger	3.23c.
(Smooth finish, 1 to 2½ x ½ in. and larger)	3.43c.
Toe culk, ½ x ¾ in. and larger	3.75c.
Cold-rolled strip, soft and quarter hard	10.00c. to 10.50c.
Open-hearth spring steel	4.50c. to 8.00c.
Shafting and Screw Stock:	
Rounds	4.73c.
Squares, flats and hex.	5.23c.
Standard cast steel, base price	14.00c.
Extra cast steel	17.00c.
Special cast steel	22.00c.

Tank Plates—Steel

¾ in. and heavier	3.23c. to 3.33c.
-------------------	------------------

Sheets

Blue Annealed	Per Lb.
No. 10	4.23c. to 4.25c.
No. 12	4.28c. to 4.30c.
No. 14	4.33c. to 4.35c.
No. 16	4.44c. to 4.45c.

Box Annealed—Black

	Soft Steel C R. One Pass Per Lb.	Blued Steel Pipe Sheet Per Lb.
Nos. 18 to 20	4.95c. to 5.18c.	
Nos. 22 and 24	5.00c. to 5.23c.	5.60c.
No. 26	5.05c. to 5.28c.	5.65c.
No. 28	5.15c. to 5.38c.	5.75c.
No. 30	5.40c. to 5.63c.	

No. 28, 36 in. wide, 10c. higher.

Galvanized

	Per Lb.
No. 14	4.75c. to 5.38c.
No. 16	5.00c. to 5.63c.
Nos. 18 and 20	5.15c. to 5.78c.
Nos. 22 and 24	5.30c. to 5.93c.
No. 26	5.45c. to 6.08c.
No. 27	5.60c. to 6.23c.
No. 28	5.75c. to 6.38c.
No. 30	6.25c. to 6.88c.

No. 28, 36 in. wide, 20c. higher.

Welded Pipe

Standard Steel		Wrought Iron	
Bk.	Galv.	Bk.	Galv.
½ in. Butt...	—46 —30	¾ in. Butt...	—18 List
¾ in. Butt...	—52 —37	1-1½ in. Butt.	—20 —2
1-3 in. Butt...	—54 —40	2 in. Lap	—14 +3
3½-6 in. Lap.	—49 —35	2½-6 in. Lap.	—18 —2
7-12 in. Lap.	—40 —24	7-12 in. Lap.	—7 +10

Steel Wire

	Per Lb.
BASED PRICE* ON NO. 9 GAGE AND COARSER	
Bright basic	4.50c.
Annealed soft	4.50c.
Galvanized annealed	5.25c.
Coppered basic	5.00c.
Tinned soft Bessemer	6.50c.

*Regular extras for lighter gages.

On a number of articles the base price only is given, it being impossible to name every size.

The wholesale prices at which large lots are sold by manufacturers for direct shipment from mills are given in the market reports appearing in a preceding part of THE IRON AGE under the general heading of "Iron and Steel Markets" and "Metal Markets."

Brass Sheet, Rod, Tube and Wire

BASE PRICE

High brass sheet	17 c. to 19½ c.
High brass wire	18½ c. to 21½ c.
Brass rod	16 c. to 20½ c.
Brass tube, brazed	30½ c. to 31½ c.
Brass tube, seamless	20½ c. to 21½ c.
Copper tube, seamless	22½ c. to 23½ c.

Copper Sheets

Sheet copper, hot rolled, 24 oz., 22c. to 24c. per lb. base.	
Cold rolled, 14 oz. and heavier, 2c. per lb. advance over hot rolled.	

Tin Plates

Bright Tin	Grade	Grade	Coke—14x20	Plates	Wasters
	"AAA"	"A"		80 lb.	\$7.30 \$7.05
	Charcoal	Charcoal		90 lb.	7.40 7.15
	14x20	14x20		100 lb.	7.50 7.25
IC	\$11.10	\$10.00		IC	7.70 7.45
IX	12.30	11.25		IX	8.60 8.35
IXX	14.10	12.75		IXX	9.60 9.35
IXXX	16.10	14.75		IXXX	11.00 10.75
IXXXX	17.70	16.50		IXXXX	12.00 11.75

Terne Plates

8-lb. Coating 14 x 20	
100 lb.	\$8.00
IC	8.25
IX	8.50
Fire door stock	11.50

Tin

Straits pig	35c.
Bar	40c. to 42c.

Copper

Lake ingot	16c.
Electrolytic	16c.
Casting	16c.

Spelter and Sheet Zinc

Western spelter	6½ c. to 6¾ c.
Sheet zinc, No. 9 base, casks	11½ c. open 12c.

Lead and Solder*

American pig lead	6c.
Bar lead	6½ c. to 7c.
Solder, ½ and ½ guaranteed	24½ c.
No. 1 solder	21½ c.
Refined solder	18½ c.

*Prices of solder indicated by private brand vary according to composition.

Rabbit Metal

Best grade, per lb.	80c.
Commercial grade, per lb.	40c.
Grade D, per lb.	35c.

Antimony

Asiatic	6½ c. to 7c.
---------	--------------

Aluminum

No. 1 aluminum (guaranteed over 99 per cent pure), in ingots for remelting, per lb.	30c. to 33c.
---	--------------

Old Metals

Although an easier tone prevails, the market is very sluggish. Dealers' buying prices are nominally as follows:

	Cents Per Lb.
Copper, heavy and crucible	10.50
Copper, heavy and wire	9.75
Copper, light and bottoms	8.00
Brass, heavy	5.75
Brass, light	4.00
Heavy machine composition	9.50
No. 1 yellow brass turnings	5.00
No. 1 red brass or composition turnings	7.50
Lead, heavy	4.00
Lead, tea	3.00
Zinc	3.00

THE IRON AGE

ESTABLISHED 1853

New York, December 29, 1921

VOL. 108: No. 26

Casting Small Parts in Production Foundry

Short Side Movements Supplement Continuous Forward Progress in New Gilbert & Barker Mfg. Co. Plant—Ample Distance from Bed to Charging Door

BY GERRARD FRAZAR

IN designing the new foundry of the Gilbert & Barker Mfg. Co., Springfield, Mass., the engineers, not only arranged the various working departments with a view to quantity production at a minimum operating cost, but embodied ventilating and lighting features that insure maximum comfort and health of employees. The plant is equipped for con-

flooring expedites the movement of electric trucks, eliminates to a great degree wet working areas, and has other well known advantages. Wherever possible, large wall windows are installed. In addition, practically every department is provided with generous overhead natural light and ventilation through monitors and doors leading outside each department, as well as



Light Is Provided for the Foundry Proper Not Only by Windows in Side and End Walls and Monitors but Also by the White Paint on the Inner Wall

tinuous pouring and when run at capacity will give employment to approximately 300.

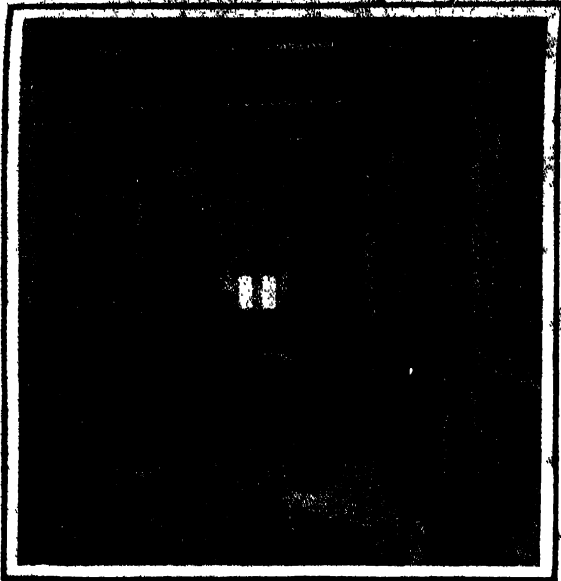
Briefly, it is composed of a 60 x 450 ft main foundry, with executive offices on one end, and cleaning room and pattern storage, galvanizing department, sand storage, cupolas, core rooms and brass melting department—arranged in sequence adjoining one side of the foundry proper. In the arrangement of these subsidiary units, the continuous forward movement of products in the process of manufacture was kept in mind, as has been common practice in foundry design recently. In this instance, however, the forward movement is accompanied by a series of short side movements related to core baking, so timed, by location of working positions, as to minimize lost motion in the general forward movement of products. The plant is strikingly compact for one of its proportions.

In the main foundry and in many of the subsidiary units the flooring is laid with approximately 300,000 creosoted wooden blocks, costing about \$25,000. This

to the foundry proper. The plant is heated by steam throughout. The foundry walls are 37 ft., 6 in. high, being 32 ft. to the bottom of the trusses. All windows in the top of the main foundry are mechanically operated and can be tipped to an angle of 90 deg.

The main foundry is served by one 10-ton and one 5-ton Shepard electric traveling crane. In addition, there are six one-ton Curtis pneumatic wall cranes at convenient points. With such crane equipment and with electric trucks the handling of sand, flasks and castings ranging from ½ lb. up is speeded. No wooden flasks are used, the foundry being equipped with Sterling steel and Adams snap flasks especially adapted for Gilbert & Barker Mfg. Co. products, which are principally gasoline and oil measuring pumps. Castings for these products do not run much above 300 lb. The crane equipment is adapted for much larger castings in anticipation of changed requirements.

All mold-making is mechanical, 21 shockless and 31 jar and squeeze type—a total of 52 Tabor machines—



Steam Heat Keeps the Sand from Freezing in Winter. The track for the sand cars is set in a concrete floor in the sand storage department.

constituting the equipment. The molding machines are, as is usual, arranged along both sides of the long walls of the main foundry and are air-operated. Air, steam, water and oil are delivered to the plant through an underground conduit from the power house, some distance away. All delivery piping inside the plant is contained in metal-covered, cement trenches extending along inside walls, easily accessible in case repairs are necessary. At one end a spur from the general yard switching trackage enters the main foundry, which provides for one car at a time to be loaded and unloaded under cover.

The core room, 60 x 100 ft., is located in the lower end of the plant. Here the arrangement of the equipment provides liberal space for the movement of cars. The oven equipment design is of the latest of the W. W. Sly Mfg. Co., Cleveland. There are 14 ovens in all, seven draw and the balance two-car type. The small or draw ovens are 6 ft., 5 in. x 3 ft., 10½ in., and the others 5 ft., 8 in. x 14 ft., 6 in. each. All are oil-heated and are provided with Gilbert & Barker burners. Two Spencer turbo blowers serve these ovens as well as two brass melting furnaces in an adjoining unit. The two-

car ovens are the double-end style, the cars being pushed into the ovens from one end and subsequently out the other end, where the cores are trimmed, inspected, etc., on the main foundry molding floor.

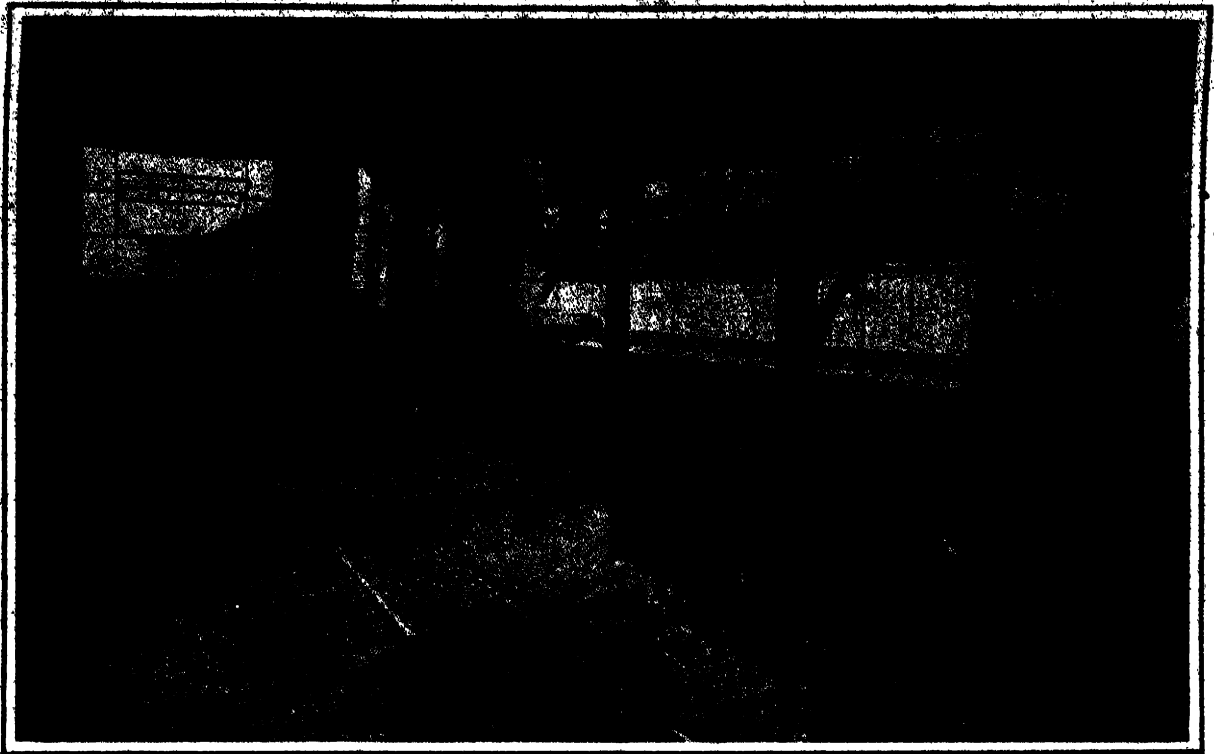
The Gilbert & Barker products involve light brass parts. To provide for these, two oil-burning, brass-melting furnaces equipped with the company's burners, each with a capacity of 1800 lb. per eight-hour running time, are installed in a separate unit, 19 x 40 ft., at the right of the extreme lower end of the main molding floor and in close proximity to the core oven room. Cement, instead of wooden blocks, constitutes the flooring in this, as well as the core oven unit. Though molding of brass castings is distinctly apart from other molding, the arrangement of the units allows the two classes of work to dovetail.

Mixing of sands is done by two direct motor-driven Beystone Mfg. Co., Cambridge Springs, Pa., mixing machines in a separate unit within the sand storage department. In this mixing room is located also the electric control, not only for the mixing machines, but for two 5 hp. a.c. skip hoists, as well. These skip hoists operate above 14 sand storage bins in the department proper, each of which have a capacity of 60 tons, or a total of 840 tons. The storage department being steam heated, an adequate supply of workable sand can be maintained in the coldest weather. The sand is unloaded from cars on a railroad siding outside this department. Skips operate through swinging doors, over inclined wooden trestles to the cars where they are loaded, and returned to the bins. By the electric control the skips can be stopped at any predetermined point or bin, and automatically unloaded, thereby reducing handling charges. The flooring in the sand storage is of cement in which tracks and turntables are inserted for transporting sand in push cars, an auxiliary system for use only when electric trucks become incapacitated or overloaded. Each bin has its individual card on which is a record of the grade of sand, the car number and from whom the sand is purchased, dates of storage and usage.

An extremely satisfactory distance between the bed and the charging door, which gives maximum efficiency, is the outstanding feature of the cupola installation. This installation consists of a No. 9½ and a No. 8 Whiting cupola, the former having a shell diameter of 90 in. and an inside diameter of 70 in., while the shell diameter of the No. 8 is 78 in. and the inside 60 in. Combined, these two cupolas have a capacity of 30 to 35 tons per hour. Their total height is 51 ft., and



There Are 14 Core Ovens, Seven Draw and the Remainder Two-Car Type. The latter are of the double-end style.



The Distance from the Bed to the Charging Doors of the Cupolas Is 21½ Ft.

from the bed to the charging door is 21 ft., 6 in. It is therefore possible to charge each of the cupolas heavily before turning on the air.

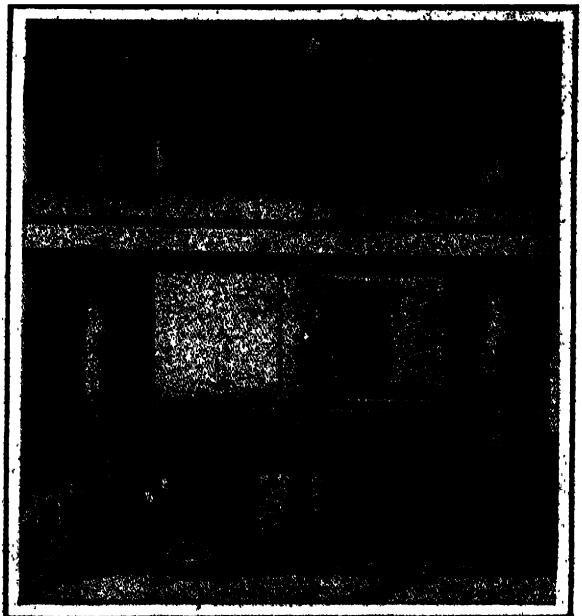
Air for the No. 9½ cupola is furnished by a No. 7A Wilbraham-Green rotary positive pressure blower, direct-connected to motor, having a displacement of 55 cu. ft. per revolution. The No. 8 cupola is served by a No. 6A blower, of the same make and similarly connected, having a capacity of 35 cu. ft. per revolution. These blowers are stationed in an intermediate brick room below the charging floor, together with a system for heating water used in washrooms. Adjoining this room is the laboratory, which is comparatively small, but excellently equipped for all requirements. The proximity of this laboratory to the cupolas is a favorable feature.

The cupola charging equipment is mechanical and also is furnished by the Whiting Corporation. It consists of 3-ton iron charging cars, and combination coke and scrap charging cars, each having a capacity of 600 lb. of coke and 3000 lb. of scrap. The iron, scrap and coke are delivered to the charging floor by a 3-ton electric elevator with scales mounted on the floor of the elevator car. A cinder mill for reclaiming purposes is installed on the lower floor of the cupola house, from which a recovery of 500 lb. to 2000 lb. per day is possible. The present pouring equipment consists of Whiting ladle trucks of 1500-lb. capacity each, from which hand ladles are supplied.

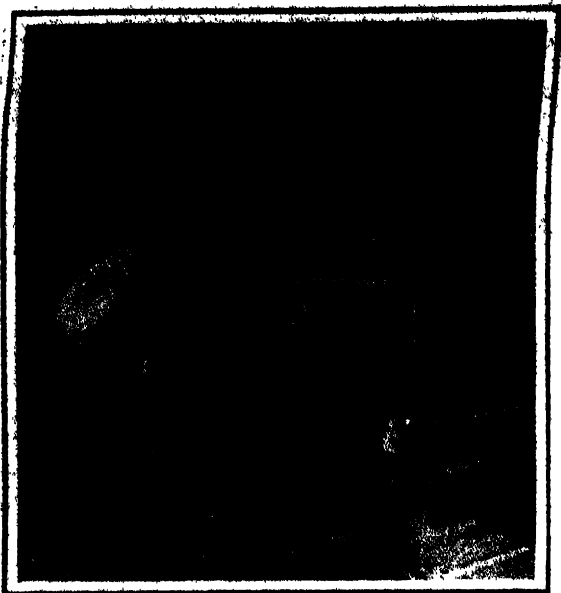
The cleaning room, 40 x 100 ft., is built parallel and adjacent to the spur track leading into the upper or office end of the foundry proper. It is thus possible to care economically for dust delivered through pipes on the outside of the unit leading from a dust arresting system inside, by inserting these dust converters in flat cars used for yard refuse purposes. Along one of the 100-ft. walls of the cleaning room are arranged two Sly sand blasts and three Sly tumbling barrels. Eight double-end United States Electric Tool Co. grinders are positioned across the lower end of this room, while finishing and inspecting benches extend along the other long wall. The flooring in the cleaning room is of wooden blocks, but each piece of equipment rests on a concrete foundation.

From the cleaning room a large elevator runs to the pattern storage above. The elevator doors are fireproof and mechanically-operated by the elevator alone, consequently are fool-proof, as well. Patterns are stored on fireproof racks made of steel tubing with diamond plate shelving. These racks are arranged with ample space between them to permit free movement of trucks and employees. The foundry layout does not include a new pattern making shop, which, in this instance, comes under the direct supervision of the foundry superintendent. For the present, patterns will continue to be made in the company's old shop, located some distance from the new plant.

When necessary, castings are transferred by electric trucks from the cleaning room to the galvanizing department adjacent, the wooden block flooring in both units facilitating such work. This galvanizing depart-



Both Cupolas Are 51 Ft. in Height. Their shell diameters are 90 in. and 70 in., respectively



Two Oil-Burning Brass Melting Furnaces Are Installed in a Separate Unit. Each has a capacity of 1800 lb. in 8 hr.

ment is 40 x 100 ft. There are two galvanizing tanks at the lower end, one each side of the unit, set on concrete foundations, of 15-ton capacity each, and seven wooden pickling vats. The latter and the tanks are served by an elaborate overhead track system with generous headroom, on which six one-ton Curtis electric hoists and two hand hoists operate.

Two large washrooms are provided for employees, with accommodations for 150. Both hot and cold water are available, together with shower baths and individual lockers. These rooms are so constructed as to be easily and effectively flushed out.

Inasmuch as the Gilbert & Barker Mfg. Co. property covers 18½ acres, ample storage space for the foundry's raw materials is available.

Drawing as a part of engineering education and the layout and equipment of drafting rooms are to be discussed on Jan. 10 by Prof. Walter H. James, department of mechanical engineering, Massachusetts Institute of Technology, at a meeting of the Providence Engineering Society, Providence, R. I.

Proper Recognition of Employee a Factor in Success of Suggestion System

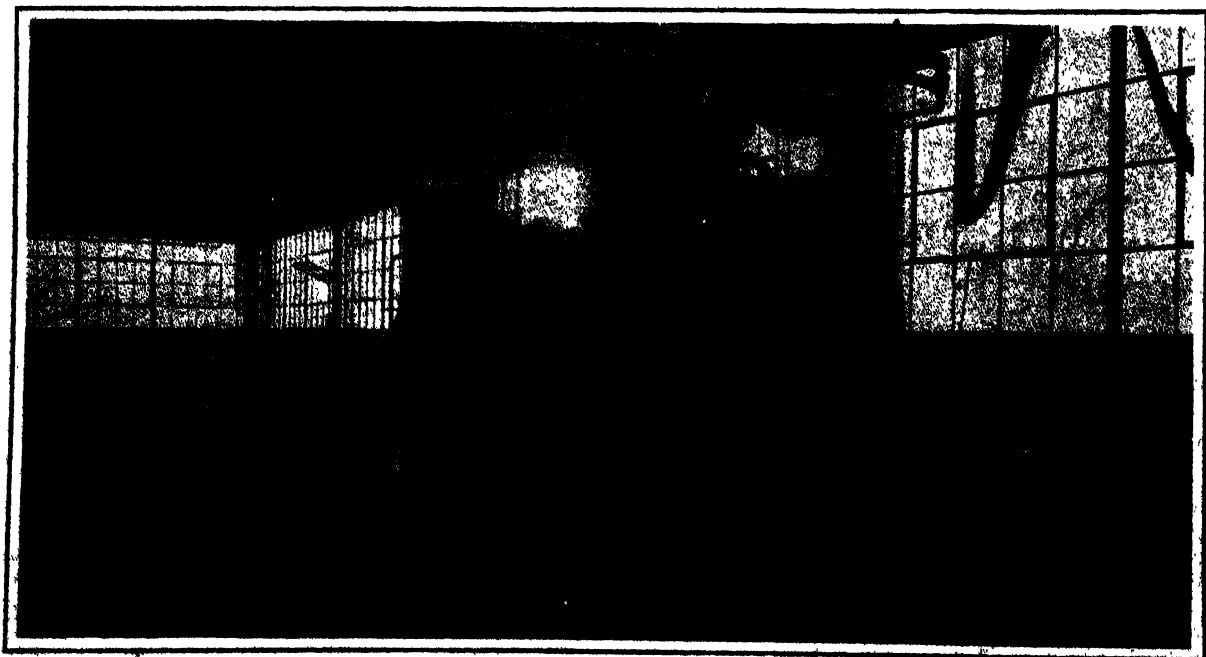
In connection with the question as to why industrial managers are reluctant to adopt an employee's suggestion system, S. DeHart of the R. K. LeBlond Machine Tool Co., Cincinnati, in a monograph on the subject, states that suggestion systems are an unqualified success when the employee making the suggestion is given proper recognition by the management. This recognition, he adds, may be in the form of money; honorable mention in the factory magazine; or merely a pat on the back. "It is short-sighted policy to receive a good suggestion without giving the person who made it proper credit. Even though the suggestion cannot be used, the employee should be told the reason and encouraged to make other suggestions.

"Not long ago I visited a factory in the Middle West and while there saw a condition which obviously needed improvement and which could have been made by any employee having the slightest mechanical training. I spoke to one of the employees about it, thinking that perhaps it had not occurred to him that such a condition could be improved. He informed me that he was fully aware that the defect could easily be remedied, but had long since stopped suggesting improvements as he had never received any credit for those he had previously made. This company had a large box, labeled 'Suggestions,' placed conspicuously in the shop, but it had long since passed into desuetude for lack of interest of both employee and employer.

As an instance of the proper recognition of employees, the monograph in question mentions one large concern which names machine safeguards after the employee who suggests it. Another company rewards its employees for finding defective links in crane and sling chains, presenting a pocketbook to the employee who discovers one defective link and a gold watch to the employee finding the largest number of defective links.

"There is no question that there is good psychology in having the employee understand that his efforts along these lines are appreciated. It reacts favorably on the employee and also benefits the management."

The recent development in the southwestern oil fields has created such a demand for oil well tools that the Cree-Becker Oil Tool Co., Newark, Ohio, has been obliged to put on a night force to take care of it.



Cement Foundations Are in Readiness for Additional Tumbling Barrels. Where equipment does not stand the flooring is of wooden blocks

Improved Punch, Shear and Bar Cutter

To obviate tilting the piece in making beveling or mitering cuts (inconvenient to say the least in handling large rolled sections), the Buffalo Forge Co., Buffalo, has developed the machine shown in the accompanying illustrations. It is known as the new Buffalo armor-plate No. 26 universal, diagonal-stroke punch, shear and bar cutter. The makers state that after extensive experiment it was found that by inclining the shearing end at an angle mitering could be accomplished with the work held in a horizontal plane, allowing heavy sections to be cut without any lifting.

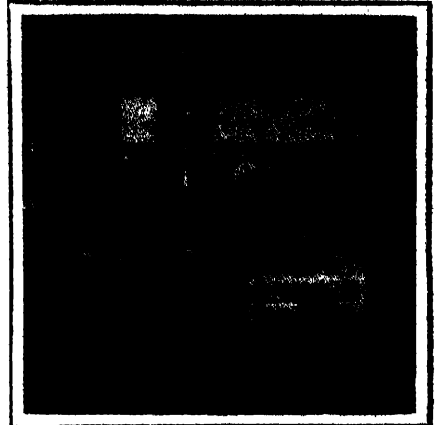
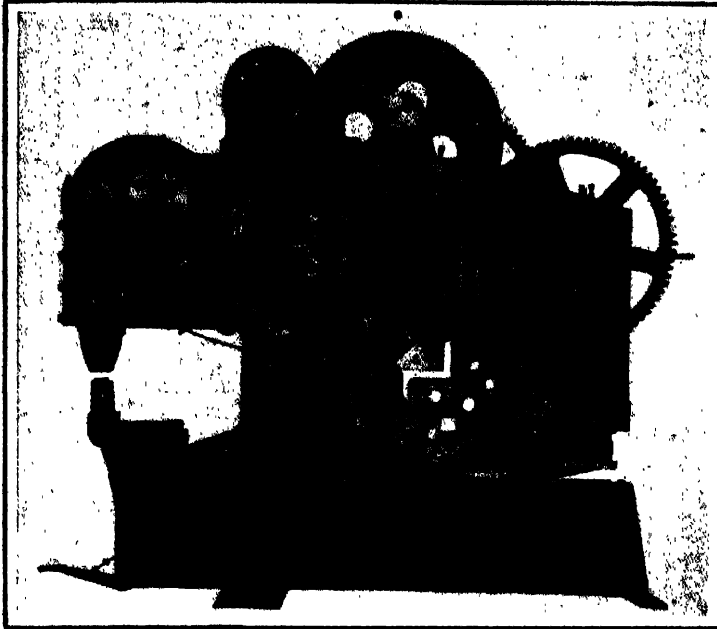
The machine is designed to take care of every punching, shearing and bar cutting requirement of a steel

over. For smaller beams the special dieblock is required.

The shear capacity includes $\frac{1}{2}$ -in. plates and $3\frac{1}{2}$ x 1-in. flats. Flats 8x5/16-in. or $2\frac{1}{2}$ x 1-in. can be handled with special upper knife. The throat is of special height to allow angles up to 6 in. to be trimmed.

Equipped with standard knives the bar cutter will handle $2\frac{1}{4}$ -in. rounds; 2-in. squares; 6x6 $\frac{1}{2}$ -in. angles square; 4 x 4 x $\frac{3}{4}$ angles, 45 deg. miter; and 4 x 4 x $\frac{1}{2}$, tee-square. With special knives 8-in. I-beams, 18 lb.; 9-in. channels 20 lb.; and 5-in. H-columns, 18.7 lb.; can be handled.

The capacity of the machine for coping is given as 5 to 10 in. beams in flanges; 5 to 9 in. channels in flanges; and up to 5x5x $\frac{1}{2}$ in. angles square. The width



Universal Diagonal-Stroke Punch, Shear and Bar Cutter. Full front view is shown at left. The arrangement for cutting left-hand miter is shown above and the head for punching in flange is shown below

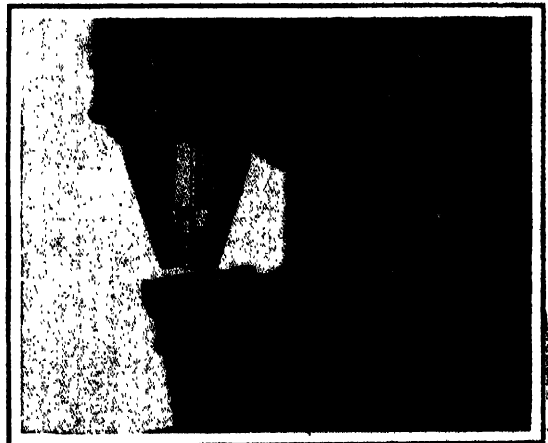
fabricating shop. The various operating points are located so that these operations can be performed simultaneously. The equipment includes two sets of punch holders and dieblocks for punching beams, channels, girders and H-columns of any size in both flange and web. Special attention is called by the makers to the fact that holes can be punched in any part of the web without turning the section over.

All gears are machine cut. Bearings are of ample proportion, bronze lined, and the flywheel bearing is of the ring oiling type. Power is furnished by a $7\frac{1}{2}$ hp. motor.

The frame is of the Buffalo "armor-plate" type, consisting of two rolled-steel plates with cast steel throat pieces, a construction permitting of considerable reduction in weight as compared with cast iron and steel-frame construction.

The punch has a 24-in. throat, 19 in. high. It is engaged by handle or foot treadle and is provided with a gag, making it semi-floating. The shear is engaged by means of a jaw clutch. The bar cutter is operated by shifting a ram by means of a counter-weighted lever. Stops for shearing angles square on 45 deg. miter are fixed, making it unnecessary to work the angles. The speed of the flywheel is 320 r.p.m. The strokes per minute of the punch and the bar cutter are 20.5; and of the shear, 21.5.

The following capacities are given: Punch, $1\frac{1}{4}$ x $\frac{1}{4}$ in. or 1x1 in. The standard dieblock and long punch holder punches flat material, the flanges of 8 to 26 in. girder beams; the flanges of 5 to 14 in. H-columns, with straight die; and the flanges of 7 to 30 in. I-beams, with bevel die. The additional dieblock and short punch holder punches flat material; the webs of 8 to 26 in. girder beams; (limited by the throat); the webs of 5 to 14 in. H-columns; and the webs of 5 to 26 in. I-beams (limited by the throat). All of the foregoing can be punched without turning the beams or columns



of the coping tool is 1 in. The capacity for 90 deg. miter notching is $3\frac{1}{2}$ x $3\frac{1}{2}$ x $\frac{1}{4}$ -in. angles.

Working Force Reduced

The Chicago, Milwaukee & St. Paul R. R. materially reduced its working forces on Dec. 17. At the seven shops of the road, 12,000 men were laid off. A 10 per cent reduction in the forces maintained at 400 roundhouses was made. About 50 per cent of the clerical employees were also dismissed for an indefinite period. In commenting on the order, H. E. Byram, president of the railroad, said: "Our employees have been asked to work half time and some to cease work entirely until the dull period is over. During the holidays, there is little freight traffic. This season of the year affords an opportunity to reduce forces temporarily. The order will be revoked immediately when business increases."

Sulphur and Oxides in Ordnance Steel*

Comparison of Open-Hearth and Electric Practice —Lower Sulphur Insures Superior Tough- ness—Details of Methods at Charleston Plant

BY WILLIAM J. PRIESTLEY

IN the manufacture of gun forgings and other steel parts that, in service, are subject to sudden high stresses and shocks, it is desirable to use steel possessing the greatest toughness and ductility possible without sacrifice of strength. In order to obtain this, it is necessary to procure steel that shows the highest possible elongation and reduction of area without lowering the tensile strength and elastic limit. Proper heat treatment of the steel can control this condition within certain limits. When heat treatment has failed to produce the desired results, metallurgists have used steels containing molybdenum, zirconium, vanadium, chromium, tungsten, etc.

The purpose of this paper is to describe a method by which these desired physical properties may be procured, by the elimination of certain impurities that in-

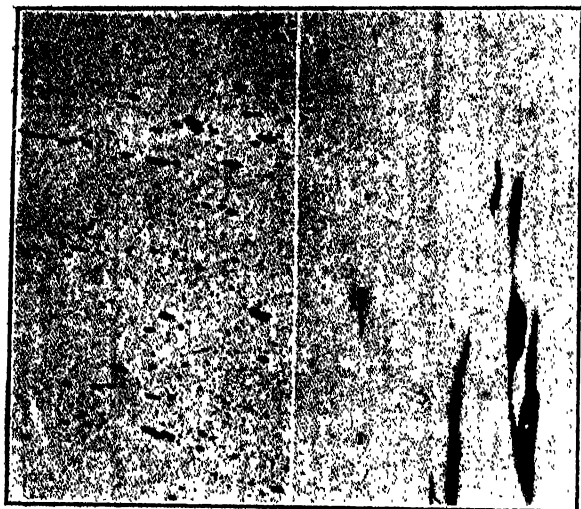


Fig. 1—Acid Open-Hearth Steel, Left, Unetched, $\times 25$. Right, Unetched, $\times 200$, Both Reduced About One-Third. This represents a longitudinal section taken from an acid open-hearth steel forging 11 in. in diameter, 28 ft long, $7\frac{1}{2}$ -in. bore, weighing 6000 lb.

The carbon was 0.35; manganese, 0.68, silicon, 0.240; phosphorus, 0.040; sulphur, 0.053, and nickel 3.00 per cent. The physical tests (given in detail in the paper) show normal tensile strength and elastic limit but poor elongation and reduction of area, although meeting the specifications.

The forging was given annealing at 1600 deg. Fahr., rough machined and quenched at 1450 deg. Fahr. and drawn to 1200 deg. Fahr.

herently exist in steel made by the open-hearth process, and without the use of expensive alloys.

Design of Gun Forgings

In the manufacture of gun forgings, a certain elastic limit is fixed by the designer, and the walls of the gun are made of the proper thickness, allowing a suitable factor of safety for the high stresses and sudden shocks that occur during gun firing. The elastic strength of the gun is about 1.4 times the stress set up at any point along the bore of the gun during firing with the maximum powder charge.

As the stresses set up in the walls of the gun during firing are mostly "tangential," all physical tests

are taken in this direction, or transverse to the direction of flow of the metal in forging. Furthermore, test bars taken across the grain of the metal will more frequently expose defects and foreign inclusions in the steel than will bars taken in the direction of flow of the metal in forging. Impurities in the steel will also be more readily detected by transverse test bars.

With a fixed tensile strength and elastic limit, a steel with higher elongation and reduction of area is more desirable for service where sudden stresses and great shocks are encountered. The high elongation denotes ductility and the high reduction of area denotes toughness.

Results Obtained with Electric Steel

Some interesting results were obtained recently in the manufacture of heavy ordnance forgings at the U. S. Naval Ordnance Plant, South Charleston, W. Va. The steel was made by the duplexing process, in which cold charges of pig iron and scrap were melted in a 75-ton basic open-hearth furnace, where the dephosphorizing was done, and subsequently the deoxidizing and desulphurizing was done in two 40-ton basic-lined electric furnaces. A comparison of the physical results obtained from forgings made by this process with similar forgings made directly in an acid open-hearth furnace at the works of one of the leading industrial steel plants, noted for high-grade open-hearth steel, shows that the steel with the lower phosphorus and sulphur has the greater toughness and ductility. Transverse tensile test bars from electric steel, though having the same tensile strength and elastic limit as the bars from the open-hearth steel, have a much greater elongation and reduction of area.

The results given in the table were obtained on tangential tensile test bars. All forgings received a green annealing before machining; after machining they were quenched and drawn. The first impression on comparing these results is that the higher elongation and reduction of area are due to the low phosphorus and sulphur, as shown by the chemical analysis; all the other elements are approximately alike.

Effect of Phosphorus

It would be difficult to draw any comparison between the open-hearth and electric steel in regard to the phosphorus content. This element is in solid solution with the iron as a phosphide and the percentages are too small in both the open-hearth and the electric steel to denote any difference even with a microscope. The lower phosphorus in the electric steel might have a slight effect on the elongation, due to producing a somewhat smaller grain and decreased brittleness in the steel.

Effect of Sulphur

It has been stated by a recognized authority on the manufacture of steel that "the effect of sulphur on the cold property of steel has not been accurately determined but it is certain that it is unimportant. In common practice, the content varies from 0.02 to 0.10 per cent. and, within these limits, it has no appreciable influence on the elastic ratio and the elongation or the reduction of area." This statement probably relates to commercial steels tested longitudinally. In this case the sulphur, in the form of manganese sulphide, has been drawn out into thin shreds in the direction of forging or rolling and is not so easily noticed in the results of longitudinal test bars as it would be in the case of transverse bars. With the overbalancing

*Abstract of a paper to be presented at the February, 1923, meeting of the American Institute of Mining and Metallurgical Engineers in New York. The author is steel superintendent U. S. Naval Ordnance Plant, South Charleston, W. Va.

amount of manganese present in all the steels referred to in this article, probably no iron sulphide is present in the steel for none of the ingots showed any signs of tearing during forging. Steel containing iron sulphide is known to tear in forging and is termed "hot short" by steelworkers. Manganese sulphide has been described as being present in the ingot in the form of small globules between the grains of the metal. Having about the same fusing point as the metal, these inclusions become equally plastic when the ingot is heated for forging and are drawn out into long thin shreds—just as slag is drawn out in wrought iron. If, however, the amount of manganese sulphide present is not enough to form these globules, these shreds will not be developed in forging and transverse test bars will show as good results in elongation and contraction as longitudinal bars.

The following test bars were taken from a piece of steel resembling that shown in Fig. 3. Two of the bars were drilled longitudinal with the forging and the other two tangential. They were given exactly the same heat treatment, quenched at 1425 deg. Fahr., and drawn at 1200 deg. Fahr.; the results were as follows:

	Tensile Strength, Lb. Per Sq.	Elastic Lim. Lb. Per Sq.	Elongation, Per Cent	Reduction of Area, Per Cent	
Tangential..	111,500	55,500	21.3	44.5	Fracture
Tangential..	108,500	58,000	20.9	40.2	Silky lippled
Longitudinal	109,600	58,500	24.1	55.8	Irregular and woody
Longitudinal	109,400	59,700	24.1	56.3	One-half cupped silky
					Three-fourths cupped silky

It will be noted that the tensile strength and elastic limit are practically equal in the tangential and longitudinal bars, but the non-metallic inclosures in the steel caused the tangential bars to show a lower elongation and lower contraction than the longitudinal bars.

Table of Tangential Tensile Tests of Various Sized Gun Forgings of Open-Hearth and Electric Steel

	Phosphorus, Per Cent	Sulphur, Per Cent	Nickel, Per Cent	Tensile Strength, Lb. Per Sq. In	Elastic Limit, Lb. Per Sq. In	Elongation, Per Cent	Reduction in Area, Per Cent
Open - hearth steel*	0.04	0.039	2.98	98,013	57,720	20.4	36.9
Electric steel	0.012	0.008	1.16	95,435	64,010	24.5	58.3
Physical re- quirements				80,000	50,000	21.0	30.0
Open - hearth steel	0.040	0.044	3.02	104,785	73,162	19.6	39.4
Electric steel	0.012	0.009	2.81	96,995	67,785	24.2	55.9
Physical re- quirements				90,000	55,000	18.0	30.0
Open - hearth steel	0.039	0.040	3.09	103,185	73,231	19.7	39.9
Electric steel	0.014	0.012	2.87	100,340	72,610	23.2	52.5
Physical re- quirements				90,000	55,000	18.0	30.0
Electric steel*	0.020	0.026	2.66	110,182	67,067	17.8	37.1
Electric steel	0.006	0.008	2.91	108,681	77,038	20.2	49.3
Physical re- quirements				95,000	65,000	18.0	30.0
Electric steel*	0.020	0.025	2.65	95,245	64,979	19.3	37.0
Electric steel	0.014	0.012	2.87	100,340	72,610	23.2	52.5

*These ingots were made by a private industrial plant during the war.

The results in each case represent the average of 15 to 40 bars from 5 to 10 forgings.

Effect of Oxygen

There is nothing in the usual chemical analysis to show how much oxygen is present in steel. It exists in small amounts in even the best steel and has bad results. In large amounts, it produces tearing during forging or rolling, and when cold is brittle under shock. If present, it is probably in the form of iron and manganese oxide and silicates. Oxygen is most prevalent in basic open-hearth steel. In the acid open-hearth furnace a more effective reaction between the slag and the steel tends to deoxidize the steel more thoroughly. This cannot be done completely on account of the air present in the acid open-hearth furnace.

A condition exists in the basic electric furnace which cannot exist in the basic or the acid open-hearth furnaces. With a reducing atmosphere in the furnace, it is possible to form a calcium carbide slag free from metallic oxides; with constant rabbling of the bath, any oxides in the steel will rise to the slag, where they are reduced by the carbon present. The iron and manganese are returned to the bath, and the resulting carbon monoxide is liberated to the atmosphere of the furnace. Unless the slag and bath are free from oxygen, it would be impossible to maintain a carbide slag; and unless the slag and bath were thoroughly deoxidized, it would be impossible to retain the sulphur in the slag as calcium sulphide.

Hence, the conditions that bring about the elimination of sulphur from the steel guarantee that oxides and other metallic impurities have also been eliminated. This is demonstrated in the case of the last two forgings in the table. While the forgings were made by the electric refining process in different steel plants, the test bars of steels containing the higher sulphur, show no better results than the forgings made by the acid open-hearth process. The photomicrograph of the

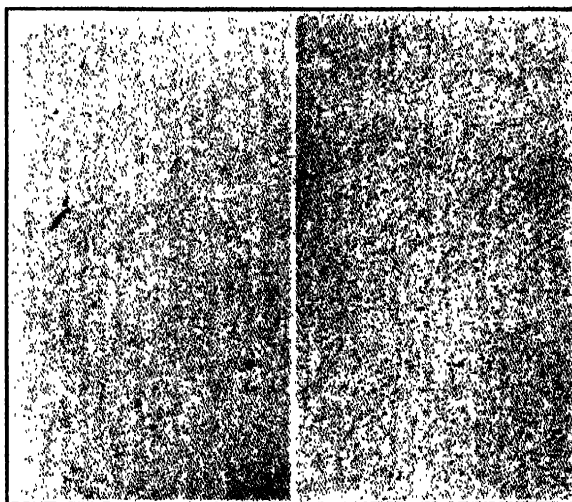


Fig. 3—Electric Steel with Low Sulphur. Left, Unetched, $\times 25$; Right, Unetched, $\times 200$, Both Reduced About One-Third. This represents a longitudinal section taken from a low sulphur electric steel forging 11 in. in diameter, 28 ft. long, 7½-in. bore, weighing 6000 lb.

The carbon was 0.28; manganese, 0.74; silicon, 0.140; phosphorus, 0.011; sulphur, 0.006, and nickel, 2.81 per cent. The physical tests (given in detail in the paper) showed superior results, particularly on tangential bars.

The forging was green annealed at 1600 deg. Fahr., rough machined and quenched at 1450 deg. Fahr., and drawn to 1190 deg. Fahr.

electric steel with high sulphur, Fig. 3, reveals more inclosures than the electric steel with low sulphur.

Photomicrographs of the Two Steels

Photomicrographs have been taken of bars picked at random from each of the three classes of steels described. The polished surface of these bars was parallel to the direction of forging. One set of photomicrographs was taken at 25 diameters, so as to include as many inclosures as possible and to show their distribution. A second set was taken at 200 magnifications, to show the formation of the inclosures. It will be noted that the non-metallic inclosures in the steel with low sulphur and highest elongation and reduction of area are smaller than in the steel with higher sulphur content and the lowest elongation and reduction of area. All the inclosures in the low-sulphur steel seem to be of the same kind, whereas, in the acid open-hearth and electric steel with higher sulphur, there are two types—the small round ones and those that were elongated and drawn out in forging. The light colored elongated inclosures in the acid open-hearth steel are

probably a mixture of manganese sulphide, oxides and silicates.

Manufacture of Steel at the Ordnance Plant

From the foregoing physical results and substantiating data, it is evident that the presence of sulphur, oxides, and other non-metallic inclusions are detrimental to the ductility and toughness of steel. Where the best quality of steel is required, it is necessary to keep these impurities to a minimum. The basic open-hearth furnace eliminates the phosphorus but only slightly reduces the sulphur; the oxides must be eliminated by the addition of deoxidizers, such as ferromanganese, ferrosilicon, aluminum, etc., which are sometimes added to the open-hearth furnace and rabbled after the air is shut off but more frequently are added to the metal in the ladle. If added in the ladle, the reactions are incomplete and the products of combustion remain suspended in the steel, forming harmful non-metallic inclusions.

Gun forgings and other ordnance material, where transverse tests are required, have never been successfully made from basic open-hearth steel. The bars generally fail in elongation and reduction of area tests, because of the presence of these inclusions. They generally break with a laminated and woody fracture.

The acid open-hearth furnace is better for making steel free from oxides and non-metallic impurities, and ordnance forgings have been obtained from acid open-hearth steel. While neither phosphorus nor sulphur can be eliminated in this furnace, the amount of these impurities may be kept down by the selection of high-grade scrap and pig iron. The oxides may be largely eliminated by the effective reaction between the slag and the steel.

The method of making steel at the U. S. Naval Ordnance Plant aims for the elimination of phosphorus, sulphur and oxides. The metallic charge of the open-hearth furnace consists of 40 per cent basic pig iron and 60 per cent miscellaneous scrap, including turnings, crop ends, etc., up to 8 per cent of limestone is added with the charge and sufficient ore to lower the carbon to approximately 0.20 to 0.25 per cent, which is slightly below the amount required in the finished steel.

The average analysis of the final slag taken from the open-hearth furnace on 19 consecutive heats just before tapping is as follows:

SiO₂, 15.43 per cent; FeO, 19.27 per cent; Al₂O₃, 3.66 per cent; MnO, 8.02 per cent; CaO, 45.02 per cent; MgO, 6.37 per cent; P₂O₅, 1.80 per cent; S, 0.031 per cent.

The average analysis of the steel prior to tapping these same heats was as follows:

Carbon, 0.23 per cent; manganese, 0.26 per cent; silicon, 0.010 per cent; phosphorus, 0.007 per cent; sulphur, 0.015 per cent; nickel, 0.66 per cent; chromium, 0.00 per cent.

After it is tapped from the open-hearth furnace into a 75-ton ladle, the steel is teemed through a 2½-in. nozzle into two 40-ton basic electric furnaces for deoxidizing and finishing. Usually 2 lb. of 50 per cent ferrosilicon and 3 oz. of aluminum for every ton of steel tapped from the open-hearth are added to the ladle, to take up any oxygen present, which might lower the carbon content while the steel was in the ladle.

An average analysis of the slag left in the ladle from the nineteen heats, after teeming into the 40-ton furnace was as follows:

SiO₂, 17.27 per cent; FeO, 18.32 per cent; Al₂O₃, 5.75 per cent; MnO, 7.84 per cent; CaO, 42.79 per cent; MgO, 8.15 per cent; P₂O₅, 1.65 per cent; S, 0.028 per cent.

The average analysis of the metal as teemed into the electric furnaces from the open-hearth on the same heats was as follows:

Carbon, 0.20 per cent; manganese, 0.23 per cent; silicon, 0.037 per cent; phosphorus, 0.007 per cent; sulphur, 0.016 per cent; nickel, 0.67 per cent; chromium, 0.00 per cent.

A comparison of the steel analysis will show that the silicon increased slightly; also, that there was a slight drop in carbon and manganese while the steel was in the ladle. The average phosphorus content of the charge into the open-hearth was about 0.08 per cent, because of the comparatively low phosphorus in the crop ends.

After teeming the molten open-hearth steel into the 40-ton electric furnaces, a new slag is made up of burned lime, fluorspar, and ground coke. This represents, in weight, about 8 per cent of the metal charged and is added from time to time, depending on the condition of the bath and the consistency of the slag. The operation from now on is a deoxidizing one. Under normal conditions the bath is held from 3 to 5 hr. in a reducing atmosphere.

The finished steel on six heats showed the following analysis:

Carbon, Per Cent	Manganese, Per Cent	Silicon, Per Cent	Nickel, Per Cent	Phosphorus, Per Cent	Sulphur, Per Cent
0.32	0.71	0.250	0.36	0.022	0.009
0.36	0.74	0.241	3.03	0.013	0.008
0.29	0.74	0.238	2.78	0.010	0.007
0.35	0.71	0.200	0.31	0.013	0.008
0.38	0.67	0.210	2.97	0.010	0.008
0.30	0.78	0.215	2.83	0.013	0.010

The low sulphur in the final slag denotes the possibility of removing a greater amount from a steel of higher sulphur content from the open hearth. This would result from using a lower grade of scrap and pig iron with higher sulphur content in making up the charge for the open-hearth furnace. This might occur

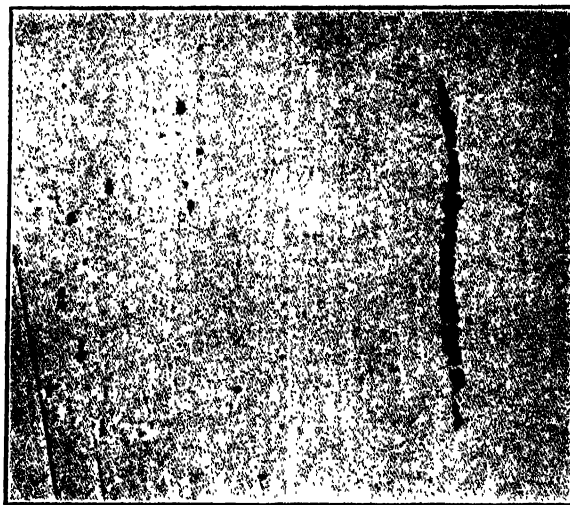


Fig. 3—Basic Electric Steel Made During the War in a Private Industrial Plant; Left, Unetched, X 25; Right, Unetched, X 200, Both Reduced About One-Third. This represents a longitudinal section taken from a basic electric steel forging 9 in. in diameter, 28 ft. long, 5½-in. bore, weighing 4000 lb.

The carbon was 0.41; manganese, 0.48; silicon, 0.168; phosphorus, 0.026; sulphur, 0.029, and nickel, 2.60 per cent. The physical tests (given in detail in the paper) show results inferior to the other electric steel, particularly in ductility.

The forging was green annealed at 1600 deg. Fahr., rough machined and quenched at 1450 deg. Fahr., and drawn at 1220 deg. Fahr.

in plants where miscellaneous scrap is purchased in the open market and where crop ends are not so low in sulphur as those at this plant.

[A discussion of the reactions involved is given in the original paper.]

Conclusions

The manufacture of ordnance forgings from electric steel is not an innovation. It was tried, during the war, in a number of plants. Some of these plants were not as successful as others, probably because the managers were not sufficiently experienced in the many other phases of manufacture necessary in the making of ordnance forgings.

Steel made in an electric furnace will not be of the best quality unless all operations and reactions are performed completely and satisfactorily. Electric steel with its greater freedom from oxides and non-metallic impurities is more uniform, more homogeneous and more dense than ordinary open-hearth steel, and if it is cast at too high a temperature or chilled beyond a certain point in the mold, incipient cracks will develop. These minute cracks are radial and are most frequently

found near the center of the ingot or forging. Numerous electric steel plants working on ordnance material, during the war, were troubled with these defects, which from their physical appearance in test bars were called "snow flakes."

A diversity of opinion has always existed between the leading ordnance steel plants regarding the method of teeming steel into the molds. Some have consistently adhered to bottom pouring while others have claimed better results from top pouring direct, or through fun-

nels or boxes. The method apparently makes little difference if the steel is placed in the mold at the proper temperature and has been properly cleansed before teeming. Top pouring direct obviates the danger of getting runner brick into the ingot, which frequently occurs in the case of bottom pouring. It also obviates the danger of sand washing into the molds with the metal from the funnel or box. Bottom pouring will give a better surface on the ingot and for some purposes may be more desirable.

FRICITION IN ROLLING MILLS*

Effects of Proper Lubrication Shown in Reduced Power Losses

Increased production as high as 1½ per cent has been secured [under proper lubrication] with reductions of 10 to 12 per cent in the power necessary to drive the mill. In straight mechanical engineering practice, increasing the speed of the mill to secure greater productiveness must always be accompanied by forced increase of power. Forcing machines to operate at higher speed, by changing the size of the pulleys or even by putting dressing on belts so that they will have greater traction, always places an extra load on the main engine. In lubrication engineering, however, the savings are all made up of reductions of losses of friction and resistance, and of the loss or slippage in belt transmission.

Illustrating an extreme case of friction losses, a test on a 10,000-hp. reversing rolling mill engine in Germany is cited. It is only necessary to say here that lubrication of this large unit, as found, was representative of conditions which existed in steel mill practice some years ago, and unfortunately are sometimes found to-day. Changing the manner and method of lubrication gave the following results:

Friction Losses				
Original r.p.m.	44.7	56.4	88	88
Original I. hp.	485.88	725.98	1,239.50	1,239.50
Later r.p.m.	42.8	57	79	88
Later I. hp.	148.49	178.72	224.39	249.95
Reduced I. hp.	337.39	547.26	952	989.66
Per cent	69.4	75.4	76.03	79.84

Analyzing these figures, it is seen that the original method of lubricating this unit gave results which approached the laws of solid friction; that is, while the surfaces were not apparently actually in contact, there was interspersed between them material of such a heavy nature that the resistance was so great as to approach the resistance of solid masses working upon themselves. As soon as lubrication was changed, the condition approached that given by consideration of the laws of fluid friction. It is, of course, quite impossible to secure, in a unit of this kind, either purely solid friction or perfect fluid friction. This test, however, indicates quite clearly a possible near-approach to each of these conditions, and represents what takes place in an extreme degree when lubricants are used that are entirely unsuited.

In this particular case the great resistance in the engine itself was reflected in the difficulty of handling the reversing levers. The reversing was done by auxiliary steam cylinders as well as by hand levers. It required a full opening of the throttle to the auxiliary cylinder and all of the power possible for one man to exert on the hand levers. After the change in lubrication was made, only partial opening of the throttle to the auxiliary cylinders was necessary, and the men operated the hand levers with the utmost ease. Further, it was observed and noted by the operators that the speed of the entire mill was increased. The engine was handled very quickly on the reverse, and would get up speed in a fraction of the time formerly required, and this mill was put from an ordinary,

average production unit to where it would make production records.

In this case all of the various rules shown in lubrication of spindles applied, as far as general lubrication was concerned. The lubrication of the steam cylinders, however, was handled through a new set of factors. The change which was made, and results obtained, in reducing the load of this part of the unit were entirely due to securing a better distribution of the lubricant, through having it properly atomized and carried with the steam where it could be spread upon all the surfaces with which the steam came in contact; whereas formerly large quantities of a heavy lubricant, not entirely suited for the work, were forced on the surfaces some seconds after the machine was placed in motion, and this oil would be worked back and forth on these surfaces in that form, resulting in much fluid friction. The oil fed in this manner would not spread to the upper part of the cylinders, which were undoubtedly, in consequence, operating metal to metal. Of the total 1250 hp. friction in this unit when it was turning 88 r.p.m., at least 50 per cent would be charged to cylinder and valve lubrication; the balance to the main bearings, pins, guides and connections.

The New Way to Success—A New Year's Address

The following is in part a New Year's address given before the employees of the Chapman Engineering Co., by William Brewster Chapman, president:

The old way of attaining success was by taking *advantage* of others. The new way is by taking *thought* of others. The psychology of success is the psychology of human brotherhood. The most successful companies of the future will be those that express the most sympathetic human understanding, thus insuring the best team-work and producing the most power with the least friction.

The first step in success is co-operation and co-operation starts with tolerance. The best thing I've heard on tolerance was from a modern minister who said to his congregation "Leave off trying to make other people like yourself; one's enough." It's novel advice from the pulpit, but it's good.

Next to co-operation comes "Iep." It can be kept alive only by exercise, play, good food and a happy state of mind. Important as it may be what food we eat, of vastly more importance is the state of mind in which it is eaten. Joy is a great creative power, it is the keynote to a successful life. Act as though you were glad to be alive and the response will be a new realization of life itself.

My final suggestion is that if you want to get on, you must study more. A vast amount of special information is quite as necessary as special experience. If you neglect either one you impose a limit on your future.

The Surface Combustion Co., Inc., industrial furnace engineer and manufacturer, 366-368 Gerard Ave., Bronx, New York, have been awarded the contract for an automatic heat treating furnace to be installed at the naval ordnance plant, South Charleston, West Va. This is a furnace for heat-treating 16 in. armor piercing shells as per Navy Department schedule and specifications 8996 opened Nov. 22, 1921.

S. L. Fuller, chief engineer, John F. Casey Co., Pittsburgh, was the speaker at the regular monthly meeting of the Engineers' Society of Western Pennsylvania, at the William Penn Hotel, Pittsburgh, Tuesday evening, Dec. 20. His subject was "Construction of the Monongahela River Bridge at Fairmount, W. Va." This bridge is of reinforced concrete with three 250-ft. arches.

*From a paper by William F. Parish, consulting lubrication engineer, Chicago, before the American Society of Lubrication Engineers, at its first annual convention, Chicago, Oct. 13.

New Horizontal Boring Machine

The Universal Boring Machine Co., Hudson, Mass., has placed on the market a new horizontal machine designed primarily for railroad shop and heavy work in general. It is offered as incorporating several features of improved design.

A conspicuous departure from the usual design is in the construction of its wide bed with three flat ways. The front and center ways serve as guiding surfaces, and the one at back supports the long carriage and correspondingly long and heavy standard table, the latter being 30 in. wide and 63 in. long. The machine derives its name, the original Tri-Way universal (horizontal) boring machine from this bed. The bed is rectangular and is so ribbed and braced, it is said, that even a slight degree of spring is prevented if the machine is not placed on a good foundation and properly leveled.

Large overhang on the table is eliminated, the electric motor and gear box, usually supported on brackets or overhanging, being embodied in the new machine. The generous width of the bed is intended to support the overhang of the work as well. The bed is also designed to accommodate the coolant system, the top sloping to the head end and the coolant running into a settling tank concealed in the end of the bed. From the settling chamber the coolant overflows into another tank, from which it is pumped direct, from the driving motor, to the work. In addition, the bed is provided with chip chutes from which the chips can be removed at the back of the machine.

All of the working mechanism is contained in the bed in two trays in one box, readily accessible in case any repairs are needed. The lower tray contains the speed mechanism, and the upper the feed gears. In the bottom tray the gears run in a bath of oil, the tray being provided with exterior oil gages as well as drain plugs. Oil is forced into the upper tray by the action of the gears in the lower tray. All changes are made on the sliding gear principle. The operation of the speed and the feed gears are identical, there being three levers arranged in a horizontal line for each tray, for locating speeds and feeds and for operating same.

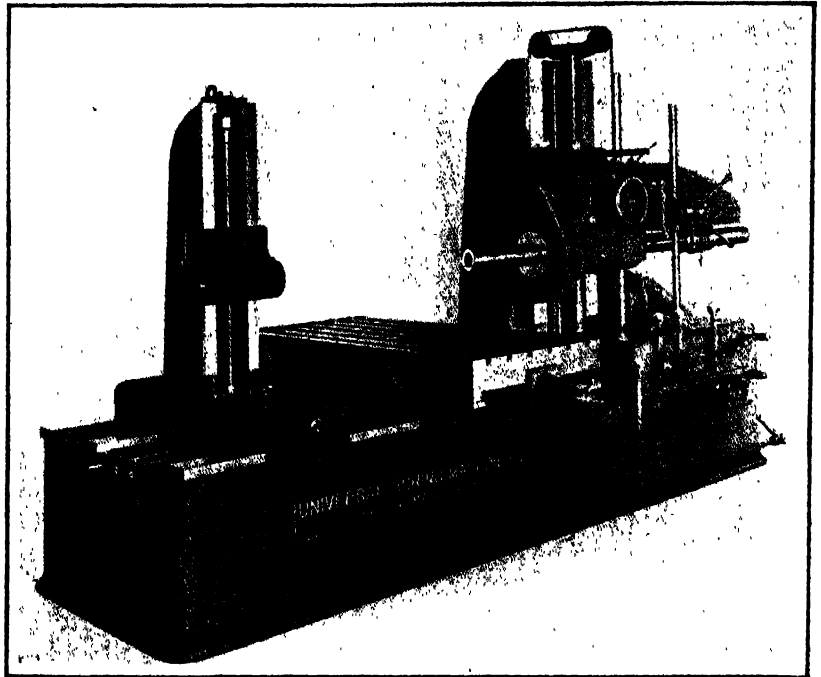
The starting and stopping lever, shown in front of the bed, is within easy reach of the operator's right hand. All levers are provided with ball handles. Both the feed and the gear mechanism is arranged in geometrical progression, a proper ratio of speed and feed for any kind of work being thus assured. There are twenty-four spindle speeds with a range of approximately 7 to 285 r.p.m., and twelve feeds, in either direction. Milling feeds run from $\frac{1}{4}$ in. to $5\frac{1}{4}$ in., and boring feeds from $\frac{1}{8}$ in. to $2\frac{13}{16}$ in. per minute. The driving gears are provided with a friction safety clutch, which can be adjusted to a certain horse power; which when reached, causes the clutch to slip out of place thereby releasing gears from excessive strain. All feeds are equipped with automatic stop motion.

In the company's other boring machines a rear post with the box travel in the center has been used, and more or less difficulty has been experienced in applying attachments on certain kinds of work. In the new machine the rear post is constructed along the same lines as the head, the box being on the side and having two bearings, as against four heretofore. The screw rod for raising and lowering the box in the old type of machines, is in one side of the rear post, whereas on the new machine it is in the center, thereby giving greater strength and accuracy. The compensating nuts for taking up wear in the elevating screw are shown at the

upper end of the screw. The beam post is in two parts, consisting of the base, which never need be taken from the bed, and the post itself, held in place by four bolts and two pins, and easily removable. A ring is provided in the top to facilitate removal of the post by hoist.

The head is simple in design, and is similar to the head on the company's No. 3 A machine. The new head, however, has a reversing lever for the boring bar, and a lever for throwing in the high or the low speed gear for the boring bar. The head rests on two ways having extra wide wearing surfaces.

The bar carrier on the bar is adjustable throughout and is equipped with ball bearings. The forward bearing in the spindle has an adjustable take-up sleeve and is lined with felt to assure continued clearance from dirt. The diameter of the main boring bar is $4\frac{1}{2}$ in.



The Front and Center Ways Serve as Guiding Surfaces, the One at Back Supporting the Carriage and Table

The taper hole in the main boring bar is a No. 6 Morse. The automatic travel of this bar is 30 in., but by resetting it can travel 60 in. and the length of the bar is 110 in. The power cross feed to the table is 48 in. and the power vertical feed to the head 30 in. The maximum distance from the table to the center of the bar is 30 in.

The machine occupies a floor space of 17 ft. by 9 ft. 5 in., is 8 ft. high and weighs approximately 20,000 lb. It is driven by an 18 in. x 4 in. pulley drive having 230 r.p.m. It can be driven either by belt or by motor.

Presentation to A. N. Flora

In recognition of his services during the past five years as president of the Western Sheet and Tin Plate Manufacturers' Association, A. N. Flora, vice-president in charge of sales of the Trumbull Steel Co., Warren, Ohio, was presented a chest of silver Dec. 23 by representatives of the organization. The gift consisted of a set of flat ware and a tea service. Charles B. Cushwa, general manager of the Brier Hill Steel Co., Youngstown, made the presentation, as chairman of the special committee handling the event. Other members of the committee were W. W. Lewis, general superintendent of the Falcon Steel Co., Niles; Warren F. Perry, assistant to the president of the Brier Hill Steel Co., in charge of industrial relations; D. R. Fithian, a superintendent of the Sharon Steel Hoop Co., Sharon, Pa.; L. E. Jurey, assistant to the second vice-president of the Republic Iron & Steel Co., Youngstown, and James H. Nutt, of Youngstown, for many years secretary of the association.

Electrification of Steel Plant Railroad

Difficulties Include Protection of Third Rail from
Hot Metal Spills—Saving in Cost 50 Per Cent
—Investment Offset by Low Operating Cost

BY R. B. GERHARDT*

ELECTRIFICATION of the steel plant railroad probably offers the largest field for development of any existing to-day in our plants, and should carry attractive possibilities. Most of our plants use to some extent electric locomotives or motor cars, but this use has been limited to some particular piece of transportation, such as handling hot coke from the coke ovens to quenchers and screening plants, or handling hot ingots from soaking pits or heating furnaces to the mills. In all these cases great benefit results over steam operation, but it is the scope of this paper to consider the complete displacement of the steam locomotive and do all transportation and shifting with electric locomotives, which in the larger plants approximates regular railroad yard operation.

Electrification of main line railroads in this country has, in general, been for special purposes, such as to relieve congestion or for terminal work. Only a very few roads have electrified with the view of handling general freight and passenger traffic.

In practically all cases where roads have been electrified, a considerable economy of operation has resulted, and in all cases the electrification has permitted more dense traffic. Considering the electrification of steam railroads in general, the following items as regards economy of operation, in addition to the fixed charges on any investment undertaken, have to be considered:

Fuel and other operating materials.
Repairs.
Operating labor.
Locomotive depreciation.
Hostler or station service.

Fuel

Under this item the greatest saving can be shown in yard service, due to the fact that the steam locomotive in yard service is idle a much longer time than in any other class of service, and during this time the losses, figured back into fuel, are very considerably greater than with the electric locomotive, particularly where the energy for such electric locomotive is obtained from a general system of power. It has been pointed out also, under this heading, that there is no creeping paralysis gradually impairing the efficiency of the electric locomotive, until temporary relief is obtained through frequent boiler washings and shifter house tinkering, as the efficiency of this unit remains very nearly constant over the entire life of the equipment.

In addition to the above, the steam locomotive efficiency gradually drops off from wear in the piston rings, piston and cylinder walls. With electric operation, however, there are some chances of inefficient operation, due to transmission, distribution and track bonding losses, and it is essential that as careful inspection be given these points as is given the locomotive itself. From results obtained by the New Haven Railroad it has been shown that for every 106.8 lb. of coal required by a steam locomotive in yard service, 38.3 lb. of coal will do the same work after electrification.

This gives a ratio of 36 per cent for this class of service, but for yard work recent tests have shown that this ratio drops to 18 per cent, not taking into account coal lost in the steam locomotives by banking the fires.

With electric locomotives receiving their energy from a central power system, the cost of electric power

has to be compared with the cost of fuel for the steam locomotive. However, there are no coal and ashes to be handled; likewise, in the case of yard service no water. There is, however, some operating material, such as oil, grease and sand, required in both cases, but the items of oil and grease are much less with the electric locomotive. Along with the elimination of fuel, ashes, and water, there can be discarded, in favor of electrification, the plants required to handle these materials.

Repairs

Under this item the fundamental difference between the two classes of locomotives is the length of time required to make major repairs, except possibly in the cases of turning tires and painting. Spare parts can be so easily and quickly substituted in the case of the electric locomotives, that the time for so doing will greatly overbalance that required for most repairs on the steam locomotive. An armature, motor, gear or controller on the electric locomotive can almost be changed in the time required to cool down and empty a locomotive boiler safely for boiler repairs, not to speak of engine cylinder repairs.

With electric operation, where power is taken from the general power system, the cost of additional apparatus required for supplying current to electric locomotives, of course, has to be taken into account; likewise, an item under repairs to be considered, which does not enter into steam operation, is the maintenance of transmission, distribution and contact line systems. With electric locomotives, however, there are no restrictions imposed by outside boiler inspection. The following figures indicate the locomotive repair cost for main line freight service:

	Steam Mallet	C. & St. P. Electric
Weight on drivers.....	240 tons	225 tons
Cost repairs per mile.....	60c.	14.65c.
Cost repairs per 100 tons locomotive weight on drivers.....	25c.	6.52c.

Operating Labor

In general yard work the train crews under electric operation do not differ from those under steam operation, except that the wages of the man taking the place of the fireman are usually somewhat less. For steel plant operation considerable additional economy can be effected as follows:

Each of the various departments, such as the coke ovens, open-hearth and mills, having considerable local shifter service, would be supplied an electric locomotive of its own to take care of such service, and the operating crews on these locomotives could be one man less than on locomotives in general service. These department locomotives would receive cars at a certain specified point from the yard department, deliver them to their destination in their own department, and return empty or loaded cars to the designated point again, for outbound or interdepartment handling by the yard department.

Locomotive Depreciation and Retirement

In the case of steam this is at an appreciably higher rate than in the case of electric operation. It is generally conceded that the life of a steam locomotive averages between 15 and 20 years, as against the life of an electric locomotive of 25 to 30 years. Substantiating this, I wish to point out that the electric loco-

*Electrical superintendent Bethlehem Steel Co., Sparrows Point, Md. The paper was presented at the Chicago convention of the Association of Iron and Steel Electrical Engineers.

†From paper read Oct. 22, 1920, before joint New York meeting of A. S. M. E. and A. I. E. E.

tives on the Baltimore & Ohio tunnel, in Baltimore, are already in their twenty-sixth year of operation.

Hostler or Station Service

With electric operation this service is reduced almost to a minimum. As a matter of fact if the locomotives are so designed as to allow easy accessibility for inspection and oiling, the inspector can look after his work without necessitating the locomotive being sent to the station or shop, and the only requisite in the usual course of operation would be that the locomotive go to a specified point for taking on sand, when the supply is exhausted. No fire cleaning and rebuilding is necessary; likewise, fueling, watering and washing are done away with. The electric locomotive is always ready to run, and pull its maximum load, with the turning on of the current; while it is first necessary, with the steam locomotive, to get up steam pressure to do this work.

In the above conditions the electric storage battery type of locomotive has not been included, for the reason that a greater saving of electric operation over steam is shown by the use of straight electric locomotives only. If the storage battery machine is considered, each of the above items would be increased over straight electric locomotive operation except the item—operating labor.

For yard work the storage battery machine, especially since it can now be secured in fairly large size units, offers attractive possibilities due to the fact that no overhead or rail contact systems are required. But it is not able to withstand such rough treatment as the straight electric machine; it can not maintain continuous service, since during certain periods it must be idle for charging the battery, or else exchanging batteries, and there is a high depreciation on the battery itself. A combination machine using both line contact system and battery may be used, and considerable benefits derived over the straight battery machine.

Practically all of the steel plants use direct current power at a potential of 250 volts, and it is very essential, for simplicity and economy, to use this same voltage for the electric locomotive. In most plants it should be entirely feasible to do this, for the reason that direct current generating or converting apparatus is so distributed that long distances of transmission are not encountered. In many cases the combination of the general plant load, which is highly diversified, due to crane and mill operations, with the railway load will considerably improve the load factor on the direct current apparatus, so that, to handle the yard electrification, it would not be necessary to install such apparatus to the full capacity required for this work.

The principal objection to the overhead trolley in the electrification of steel mill yards is from the interference with the work of locomotive cranes. This machine is so essential in the yard that it is almost impossible to pick out any section of track where the crane will not be required to work, at some time or other. It may be proved, however, that such construction can be used to advantage in the general classification yards, and this is a matter for further study.

One other objection to the overhead trolley is that it does not lend itself very readily to heavy operation at as low a voltage as we propose to use, and we, therefore, feel that the most satisfactory system would be the third rail. After reaching this conclusion, the first question that naturally presents itself is the feasibility of a third rail in the yard from the following standpoints:

Safety.

Blocking the free passage of switchmen or other employees through the yard.

Danger from material or hot metal spilling or falling on the third rail.

Methods of crossing frogs and switches.

Methods of construction through buildings or special places where conductor rail is objectionable.

Tie-up from wrecks.

Safety

The best answer to the question of safety is to refer to the operation on blast furnace trestles, where we have had electrified tracks with third rail construction

for many years, operating at the same voltage as proposed for yard electrification. Looking over our records during this time, I find that there has not been a single accident from contact with the live rail. There have been accidents on the trestle due to other causes, but none can be attributed to the electrified condition of these tracks.

Two hundred and fifty volts is the common plant voltage which our workmen are thoroughly familiar with, and particularly the yard department employees who have anything to do with locomotive cranes or handling of lifting magnets. If we should go to any higher voltage, then the proposition would be considerably more hazardous.

There are essentially two kinds of third rail contact systems, one using the over-top contact and the other underneath contact. We prefer the latter for steel plant work, due to the fact that it can be better insulated and more substantially protected from material falling into the rail and causing trouble. With this type of construction, it is almost impossible for anyone to come into contact with the live rail, except by getting down underneath the guard on either side and touching the head of the rail, which extends slightly below the guard; whereas, with the overtop contact there is not formed nearly as good a support for the guard and anyone stepping on this guard or anything falling on it is apt to break through and come in contact with the live rail. Also, it is entirely possible to come in contact with the rail from the side toward the track, where it is entirely exposed.

The underneath contact system lends itself more readily to a very close fitting guard, thus taking up considerably less space than the overtop contact rail with guard, and this close fitting guard can be purchased on the market, made up of impregnated insulating material in sectional lengths, which fit the rail exactly and require no supporting straps or brackets. The labor of installing or repairing such a guard is, therefore, reduced to a minimum. Such construction has been in satisfactory use for quite a number of years on the New York Central electrification in New York, also on the Philadelphia Rapid Transit system.

Blocking Free Passage of Switchmen or Other Employees Through the Yard

The type of third rail construction described above makes it very feasible to step over the rail without hazard of shock and without strenuous effort. Also, in crossing the rail, there is no danger in actually stepping on the guard, which will easily support just as much weight as the rail itself. At any point where it is desirable to do so, a gap of approximately 40 ft. can be left in the rail without interfering in any way with operation. Thus at road crossings there will be no difficulty, and at other necessary points such gaps can be allowed.

Where two or more tracks run parallel, the conductors' rails are located toward the inside of these tracks, so as to leave the outside area free of obstructions to the switchmen and brakemen. With electric operation the locomotive has operating control equipment on each side of the engineer's cab, so that he can use either side of the locomotive as desired.

Danger from Material or Hot Metal Spilling or Falling on Rail

With the type of third rail construction described above no material falling on the conductor rail guard will do any damage, unless it is actually heavy enough to cut through $\frac{1}{4}$ -in. impregnated insulation. To do such damage a piece of steel falling from an ordinary flat car would have to weigh between 1000 and 1500 lb.

As regards hot metal spillage, unless the metal should build up a sufficient puddle to burn the railroad ties, no damage would be incurred to the third rail, except in a case where a stream of hot metal might pour direct from a ladle continuously down over the guard, the ladle standing in one spot. Even this would not prevent the locomotive from operating, as the guard only would be burned off, and inasmuch as the trouble would be in a particular spot, repairs would necessitate only renewing the guard at this point.

We should not propose running the conductor rail up alongside of any of the blast furnace cast houses, where hot metal and slag messes often occur, but would stop the rail at the end of the cast house. It would be necessary for locomotives in this class of service to use an idler car, the same as under present operation, to reach ladles standing under pouring troughs.

Methods of Crossing Frogs and Switches

On a general first glance at a steel plant railroad yard, the complicated track system, with numerous switches and cross-overs, would seem to make third rail operation not practical. However, one needs only slight study of the situation to overcome these doubts. On many furnace trestle electrified tracks we have solved these difficulties, and we can easily improve on such systems, as there are considerable difficulties to contend with there, due to spillage of all kinds of raw materials and scrap down over the tracks, which would not be the case in general yard work.

By using four collector shoes, one at each corner of an electric locomotive, and by the use of the side approach conductor rail fitting at switches, it is entirely possible to keep current on the locomotive, even at most difficult track positions. Where gaps must necessarily occur in the conductor rail, it is only a matter of getting the proper distance between collector shoes, to solve the problem.

Methods of Construction Through Buildings or Special Places Where Conductor Rail is Objectionable

It is easy to provide on each electric locomotive a cable reeling device or power driven take-up reel, with about 500 ft. of flexible cable to be used in buildings or special places where conductor rail is objectionable or prohibited. At such places a receptacle should be mounted where one of the train crew could plug in the end of this flexible cable, and the locomotive would proceed on its way to deliver or remove a train from such buildings, as in the case of a locomotive maneuvering in the open-hearth pit, or going into any one of the other plant buildings.

In the open-hearth scrap yard, one track, the running track straight through the yard, would be provided with the third rail, with a guard construction over it, made of steel. The other track up against the scrap pile would not be electrified, but cars would be handled on this track in a train as far as possible, or by poling them from the running track, so as not to make it necessary for the locomotive to run along the track, which is apt to be blocked up with scrap metal. In the cinder dump, the pay-out reel and flexible cable described above would be used on the dumping track, and as regards steam for dumping the cinder ladles, air would be supplied instead from the locomotive, which would be equipped with a reservoir sufficient to handle the cinder ladle dumping cylinders.

Tie-up from Wrecks

The extent to which any section of the yard might be tied up from a wreck causing damage to the third rail depends entirely upon the degree to which the conductor rail system is sectionalized. These sections, in a dense traffic zone, might be slightly less than 500 feet, so that by using the pay-out reel with flexible cable described above, the locomotive could easily maneuver, in case of a wreck, over the dead conductor rail section. The only time the system would be out of power would be long enough to close a circuit breaker and switch in the power house, or any of the sub-stations.

To make a comparison between steam and electric operation on any particular proposition, accurate results require a service data test on one or more of the steam locomotives to be replaced in each class of service. Such a test, lasting three days last February, and made with a 115-ton locomotive having 75 tons on drivers, gives data on a steel mill yard locomotive in typical service of handling incoming and outgoing freight. This work is of a variable nature, as cars are spotted and collected all over the yard.

The heaviest trailing load handled was 1,330.5 tons, while most of the work consisted of considerably lighter shifts. The number of shifts per day is 88,

while the per cent of time idle, lost in throwing switches and making couplings, is only 40 per cent of total time. From comparison with other tests, it has been found that a locomotive working its maximum all day will vary its per cent time lost inversely with its length of shift. The average length of shift on this work was 1,682 ft.

Since the average load was only 199 tons, the trailing load could have been larger, and more work or ton miles could have been accomplished, but the time lost would have remained no less and probably some greater. The total mileage per day averaged 26.6 miles, which gives the average speed per shift at 5.1 mph. The trailing ton miles, which represent the effective work accomplished by the locomotive, were 3,590.4, while the locomotive ton miles expended to accomplish the effect were 3,064. The locomotive ton miles represent 46.5 per cent of the gross or total ton miles.

As the locomotive ton miles are ineffective ton miles, the shifting may be said to be only 53.5 per cent efficient. The tender ton miles averaged 1,010.3, and are the ton miles necessary only to supply fuel to locomotive. Trailing ton miles should be used as a basis for any calculations, since this value is the effective work, hence the amount of coal used to accomplish a trailing ton mile was 1.122 lb.

To give some idea as to what results might be secured after electrification, the figures below represent a case under study for some time past. They give actual steam operation costs averaged over a period of several years, against estimated costs with electric operation:

	Steam	Electric	
		Battery Locomotives	Straight Electric Locomotives with Third Rail
Number of locomotives...	27	27	23
Investment charges, including shop and service facilities, converting apparatus, transmission and contact systems	\$850,000	\$1,220,000	\$1,376,000
Fixed charges per annum	99,300	105,300	164,800
Locomotive depreciation	20,400	163,400	22,700
Fuel or power	116,100	28,000	18,900
Repairs	110,700	36,000	28,800
Operating labor	147,500	89,500	89,500
Station service, including miscellaneous operating material	43,000	16,000	9,400
Totals	\$567,000	\$438,200	\$335,100
Annual saving, compared with steam		\$128,800	\$231,900
Return on investment, in addition to normal interest included in fixed charges		10.5%	16.9%

This proposition covers a steel plant railroad yard having a total of 57 miles of single track. There are 27 steam locomotives ranging in size from 75 tons down to 25 tons, and it is assumed that 27 battery locomotives with extra battery units, or 23 straight electric locomotives, using third rail, would be required to do the same work. For standardization purposes and flexibility of operation it is assumed that electric locomotives would either be 40-ton or 80-ton units, each of the latter being made up of two of the 40-ton machines. This would mean a total of 37 of the 40-ton battery locomotives or 33 of the 40-ton straight locomotives to be considered. The figures given under electrification for investment charges really represent the net cost after an allowance has been made for the salvage value of the steam locomotives displaced.

These figures really show only part of the saving that can be made by electrification. After the yard is electrified (with third rail system) the next step is to equip the locomotive cranes for motor operation, and these machines could work in any part of the yard through the full 24 hr. of the day, if desired. The greatest item of saving in this case shows up in the additional amount of work which can be secured from these units, for with steam operation, present experience has shown that a general average of 50 per cent of the time is lost, due to the cranes having to drop their work and go for fuel or water. In some cases it is true that these items can be secured without any great movement, and in other cases many hours are lost for the same purpose, but in either event it is

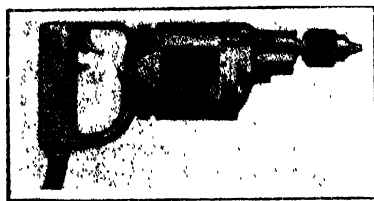
true that the cranes cannot continue with their work while taking on these requirements. It is rather hard to figure just what saving can be effected, without making an extensive investigation over quite a period of time, but for the case cited it is estimated that \$70,000 annually would be conservative for an average of ten cranes in operation. This would bring the annual saving in favor of electrification up to over \$300,000, cutting the cost over the present method of operation by almost one-half.

It would appear, therefore, that the general subject of electrification of the steel plant railroad is one which merits investigation and study, and the writer predicts that the electric motor will displace the steam engine on mill transportation systems just as it has in rolling mills.

Light-Weight Portable Electric Drill

A lightweight, $\frac{1}{4}$ in., portable electric drill of the type shown in the accompanying illustration and designed for drilling in metal or wood has been added to the line of the Black & Decker Mfg. Co., Baltimore.

The drill has an aluminum-alloy housing and weighs but 5 lb. It has double reduction gearing giving a no-load speed of 1600 r.p.m. Gears are stub toothed, cut from chrome nickel steel, heat treated and run in grease. Bearings are removable and renewable. The drill is equipped with a pistol grip and trigger switch, with the switch located in the handle to enable close corner work. The brushes can be renewed from the



The Spindle Is Arranged to Enable Drilling to Within About an Inch of Any Obstruction

outside of the case and by removing four screws the motor commutator, switch mechanism, field leads and cord terminals may be exposed. The commutator end bearing of the motor armature is carried in a spider, which is integral with the motor case, keeping the armature in alignment and facilitating inspection and cleaning of the commutator while the drill is running, as the removal of the cover plate does not interfere with the operation of the tool.

A light weight rubber covered cable is supplied and a clamp provided in the handle so that strains on the cable have no tendency to pull the terminals loose from the switch. A 3-jawed chuck, flexible cord and attachment plug are supplied with the tool.

Will Dispose of Hog Island Scrap

Washington, Dec. 27.—With the 110,000 tons at Hog Island the only considerable lot of surplus steel it has on hand, the Emergency Fleet Corporation has begun plans to dispose of this tonnage. It has announced that it will receive bids until Jan. 5, on a private competitive basis, for all fabricated and partly assembled material included in what is known as group 8 at the Hog Island yard. This involves 6,000 tons, of which 95 per cent is built-up members, the remaining 5 per cent being fabricated but not assembled material. The other portions of the 110,000 tons at Hog Island will be sold in groups from time to time.

The steel is to be sold "as is" and no claim for condition or quality will be allowed after the opening of bids. Bids are to be addressed to the United States Shipping Board Emergency Fleet Corporation, Nineteenth and B streets, N. W., Washington.

The National Association of Cost Accountants has inaugurated a drive for 400 new members by March 1, 1922. The organization has local chapters in the principal cities of the United States. The chapters meet monthly to hear papers on cost and accounting problems. S. C. McLeod, 130 West Forty-second Street, New York, is the national secretary and business agent.

Metals for Aeronautics

In the seventh annual report of the National Advisory Committee for Aeronautics, reference is made to the report of the sub-committee on materials for aircraft. Many subjects have been studied, including streamline wire, screw threads, steel strip and light alloys, etc. Some of the difficulties mentioned relate to the effect of vibration, the difficulty or practical impossibility of obtaining proper heat treatment of thin steel sheets or strip on a commercial scale, and certain difficulties in connection with welding.

Progress made during the past year in the development of all metal aircraft has not been altogether satisfactory. The trouble seems to be that, as yet, we have not developed suitable and economical methods of producing and fabricating aluminum alloys. The Bureau of Standards expects to conduct a series of investigations on the rolling and shaping of duralumin for aircraft construction, and has been equipped for this purpose. Heat treatment of the material will also be carefully studied, in connection with the results of cold working. Fatigue tests are to be continued, and vibration tests to be made on various types of airplane, to obtain some idea of the character of vibration to be expected.

A most serious drawback of the present type of airplane is the cost of manufacture and the short life. This cost is excessive, even in quantity production. If construction materials consisted entirely of metal, the parts would lend themselves better to quantity production, longer life would be assured and storage conditions improved.

The committee's estimates for carrying out its program total \$265,000. Additions for publications and the collection, classification and dissemination of scientific and technical reports and data, together with administration of the Washington office, will add \$76,000, making a total for the fiscal year 1923 of \$341,000. This compares with the appropriations for 1921 and 1922 of \$200,000 each year.

Long Range Planning of Public Works

Washington, Dec. 27.—Announcement has been made by Senator Kenyon, chairman of the committee on Education and Labor, that he will attempt to get action soon after Congress reconvenes in January on his bill embodying a portion of the recommendations made by the national unemployment conference. It deals chiefly with long-range planning of public works to overcome cyclical periods of business and industrial depression.

The bill was reported to the Senate last Thursday by unanimous action of the committee following a brief hearing on the measure. Members of the committee are of the opinion that it provides a partial remedy toward offsetting the slumps in employment and giving more stability to the situation.

All witnesses who appeared before the committee gave strong support to the measure. Among them was L. W. Wallace, secretary of the Federated Engineering Societies. Brig. Gen. R. C. Marshall, Jr., former head of the construction division of the Army, now general manager of the Associated General Contractors, pledged the support of that organization.

Portland Cement Production High

Figures of the United States Geological Survey show that the production of cement for the first eleven months of 1921 amounted to 91,734,000 bbl., and shipments to 91,354,000 bbl. This latter figure is about 1 per cent under the record shipments for the first eleven months of 1920, and about 9 per cent greater than the average for the first eleven months of years 1917 to 1921. Production of cement during November, amounting to 8,921,000 bbl., is a falling off from the record figure of October, 10,506,000 bbl., but is about 17 per cent higher than the average November of years 1917 to 1921 inclusive. Production for eleven months was only one-half per cent below the high record of 1920, and is 11 per cent greater than the average.

BRAZILIAN CONDITIONS

W. Vernon Phillips Comments on Situation in That Country as Affecting Our Trade

W. Vernon Phillips of F. R. Phillips & Sons Co., Pennsylvania Building, Philadelphia, who has just returned from a trip to Brazil, comments as follows on conditions there as affecting the demand for American products:

"During a three weeks' stay in Brazil (that is Rio Janeiro and Sao Paulo) I gathered no outstanding impression. I came in reasonably close contact with Brazilians of the better class, English, American and Italian merchants and manufacturers.

"I am most impressed by the evident independence of the Brazilians in so far as foreigners are concerned. They feel sufficient unto themselves as, in fact, they will be in a very short time. Unlike Europeans (except in the case of importers and exporters) they find no need to learn other languages. In this they are like Americans. They have comparatively few visitors and the bulk of the population resides very far from the borders. Curiously, while her neighbors all speak Spanish, the Brazilian with his rather unpleasant Portuguese tongue thoroughly dislikes Spanish and while he can probably read enough of it to understand, he absolutely refuses to read catalogs, letters, etc., sent him in Spanish; in fact, feels quite indignant. Americans endeavoring to trade in Brazil should bear this in mind.

No Color Line

"The population is principally negro, but no color line is drawn and it is difficult to tell what proportion is pure white. This blending of color, however, has not been as serious in its consequences as we regard the possibility in the United States as in a large measure the colored element, given equal opportunity, has arisen to the occasion and many black men occupy most important positions with great credit. However, the rank and file throughout the country are much like our Southern negroes, working only as long as they need money, which is not often. The climate requires but little change in clothing and food is often to be had for the effort of picking it. So that probably the greatest need is emigration of Europeans. Germans are particularly welcomed for their thrift and ambition.

"The next important need is increased railroad facilities tapping the rich lumber, ore, rice and cotton sections, and it is only the lack of capital and the present international depression which prevent this expansion, as the government is ambitious and has very far reaching plans which include the development of water power which they have in great abundance to electrify their railroads and operate their manufacturing, which are extensive, in Sao Paulo and Rio Grande du Sul. This will free them from the yoke of coal which must all be imported, though they do mine a couple of hundred thousand tons of very low grade coal per year.

Shipping Facilities

"The shipping facilities in Rio de Janeiro and Santos are splendid and can take care of a heavy trade movement, Santos for the enormous copper export and Rio for general cargo, but they are also developing an excellent port in the North, namely Ceara which will take care of cotton, cottonseed oil, rice and lumber when finished. Also the banking facilities are adequate; in fact, more than can possibly be properly occupied excepting when business is at its apex. Foreign banks predominate and every country is amply represented. The banks, however, are strong as during the collapse last year only one bank (French) had to close its doors, though many scores of merchants were forced to the wall through the terrific fall in exchange and loss in values.

"The American naturally looks upon the milreis as depreciated currency, but the Brazilians continue to regard it as a unit of value and blame the high cost of the dollar and with certain good reasons. The milreis still has approximately the same purchasing power that it had before the war, wages have not advanced much and a milreis still brings a pound of food and

three of them normally purchased one American dollar, but to-day it requires eight of them, whereas it will buy 1.85 in francs as against 1.75 normally and three lire as against 1.75 normally, though it takes 33 milreis to buy a pound of sterling as against 15 milreis normally. So the pound costs them twice as much and the dollar three times as much, whereas they can buy a larger number of French and Belgian francs and Italian liras than formerly. Thus trade is naturally drawn by the countries whose exchange is most greatly depreciated. Moreover, Brazilians seem to prefer dealing with the Continent. The United States has, of course, suffered severely in reputation from the actions of unscrupulous exporters and indifferent manufacturers during the war, and we not only have to live this down but overcome a natural prejudice also. Present conditions give no opportunity to do this in the bulk of their purchases, as the Belgians, Germans and French can undersell us so greatly that the Brazilian thinks it hardly worth while asking us for prices. However, this will be overcome in time by readjustment in exchange and the Americans should not let up for a moment in keeping before the buying public, as it offers one of the greatest natural opportunities in the world with its great potential possibilities.

Governmental Protection

"One thing will be all important in the development of this trade and that is good governmental protection, particularly for those making long time loans, bond issues, etc., and this protection may have to be in the form of a demonstration of strength—a strong show of naval force will do much more than all the argument in the world with these people who are used to being kept in order by a show of force.

"The political situation is very unsettled and street disturbances are of frequent occurrence. The president is popular and is generally respected, but his proposed successor is very unpopular. They have no fixed parties in Brazil, so the administration always has a very great advantage with its great host of hangers on and petty officials, including the principal railroads, steamship lines, etc., so that the opposition is unorganized, is without authorized leaders and can only voice a protest through street demonstrations and the uncontrolled newspapers. The administration always has the army and police and very effectively controls the opposition. Thus the only effective way of ousting the party in power is to successfully engineer a revolution, which is not as bad as it sounds, as it simply changes those in control, but is pretty sure to result in some loss of life. The present situation will probably be saved by the selection of a third and acceptable candidate but without a revolution the change in the presidency means no change in the control, which is, as usual, held by a few strong men."

Grain Side of Belts More Efficient

Under reasonable shop tension, the flesh side of a leather transmission belt, when placed in contact with the pulley, will average only 50 to 60 per cent as much horsepower as the grain side. At higher tensions the flesh side will do better, averaging from 50 to 100 per cent as much power as the grain, depending on the belt, the tension and the conditions of service. This is the conclusion of the Leather Belting Exchange, Philadelphia, which conducted experiments in the research laboratory at Cornell University.

For more than two months continuous tests were performed. Use was made of five 4-in. single belts, 30 ft. long, of different manufacture. They weighed from 16 to 18 oz. Conditions were standardized. All belts were run long enough before the experiments to insure that they had become thoroughly "run-in."

Illustrating the less degree of efficiency of a new belt, one belt under test transmitted 12 hp. when first put on the pulley at a slip of 1.2 per cent; after five hours running it reached 19 hp. with the same percentage of slip and same tension; at the end of 13 hours it transmitted 24 hp.; after 20 hours, 31 hp., with a slip of 1.6 per cent. According to horsepower tables its scheduled transmission should have been 26 hp.

Double-Head Grinder for Finishing Wrist-Pin Holes in Engine Pistons

A double-head internal grinder designed for finishing wrist-pin holes in engine pistons, but adaptable also to the grinding of holes in opposite ends of long pieces not conveniently handled with a single long wheel spindle, has been brought out by the Bryant Chucking Grinder Co., Springfield, Vt.

The machine, designated the No. 2, resembles in its main features the company's other grinders. Two separated grinding wheel heads, carried on the same wheel slide, operate to grind simultaneously the two holes in opposite sides of pistons. The grinding wheels are dressed by a diamond, absolute duplication in size of both the ground holes being guaranteed. Both wheels grind at the same time. A single motion of the pilot wheel serves to separate the grinding wheels clear of the work, which permits of swinging the wheels back

wrist-pin holes, the plug being of a size to fit the holes before they are ground.

With the piston in place ready for grinding, the wheel heads are swung down in position. To bring the wheels into position for simultaneous operation, it is merely necessary to turn hand wheel "B" shown in the front view. Slide "C" is attached rigidly to slide bar "D". Slide "E" moves longitudinally on the slide bar and is prevented from rotating on the latter by a bar at the rear. This bar allows longitudinal movement between the two wheel head carriers but keeps the wheels in line. This relative movement of the slides is obtained by means of racks which operate through bar "H".

As the wheels are advanced toward each other the crank arm "I" strikes a stop and clamps the slide to the bar in proper position—all this being obtained by one movement of the handwheel. Dropping the lever "J" throws out one rack, the two wheel heads then being operated as a single unit.



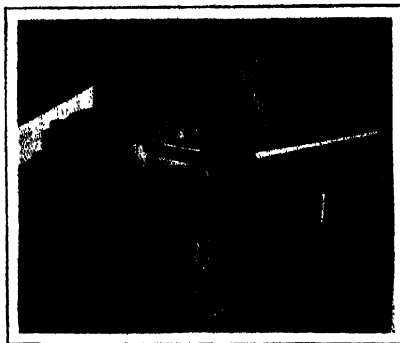
Two Separated Grinding Wheel Heads Operate to Grind Simultaneously the Two Wrist-Pin Holes in Opposite Sides of Pistons

out of grinding position and gives ample room for plugging and chucking the work.

Grinding the separated holes in pistons in this manner, at a single chucking of the work, assures absolute alinement of the ground surfaces, it is claimed, and also maintains a maximum length of bearing surface in each hole. Each hole is straight, there being no bell mouth at either end. Both sides of the piston are available for plugging or sizing the holes. The net result of this method of grinding two holes at the same time is to increase production; it is said to give higher accuracy and a piston capable of longer service.

In the illustration of the front view, the wheels are shown withdrawn from the hole preparatory to swinging the wheel head to the rear for gaging or changing the work. In the work fixture, shown at about the middle of the bed, the piston is located in V's and held by a clamp which operates against the inner surface of the piston over its contact points with the V's. The clamp is operated by a half turn of a wing screw. In the body of the fixture there is a ball race which serves as a control for the rotating part of the chuck. The rotating ring is held in place by a ball-thrust bearing which in turn is held in place by a ring. The work is driven from the countershaft by a round belt.

The open side of the chuck with the piston removed, showing the clamp in position for gripping the work is shown in a separate illustration. To locate the piston the skirt is slipped under the clamp. The hand-centering, plug shown, which fits the hole in the closed space of the fixture, is put in place and passed through the



Open Side of Chuck with Piston Removed Showing the Clamp in Position for Gripping the Work. To locate the piston the skirt is slipped under the clamp

Open Side of Chuck with Piston in Place for Grinding. Both sides of the piston are available for plugging or sizing of holes



The wheel traverse when grinding is provided for by a "load and fire" mechanism with reversing stops adjustable to give the desired length of stroke, the same as used on the standard Bryant grinders.

The cross feed is obtained in the manner usual with Bryant internal grinders, by means of handwheel "K" at the front of the machine. This operates against the control plate clamped to an arm on the wheel slide at the back of the machine. The cross feed is utilized also for cross feeding the wheel, when trueing.

The chuck range includes pistons up to 4 1/2 in. in diameter by 4 1/2 in. in length. The work spindle runs at 250 r.p.m. and the drive pulley on the countershaft at 750 r.p.m. The motor recommended is 3 hp. 1720 r.p.m. The weight, with countershaft, is 2300 lb. net and the floor space occupied, 3 x 6 ft.

The Otis Steel Co., Cleveland, is installing at its Riverside plant, complete galvanizing equipment, including sheet galvanizing machines, two galvanizing pots, cooling wheel, pickler, etc., furnished by the Erie Foundry Co.

The American Supply and Machinery Manufacturers' Association has accepted an invitation to meet with the Southern Supply and Machinery Dealers' Association at Birmingham, Ala., April 24 to 26, 1922.

Declaration of Government Policy Expected

Attorney General Daugherty and Secretary Hoover Giving Close Study to Supreme Court Decision in Hardwood Association Case

WASHINGTON, Dec. 27.—Determination of a definite policy by the Government toward trade associations is expected to be reached in the near future as the result of the Supreme Court decision in the case of the American Hardwood Manufacturers' Association. This is based on the statement by Attorney General Daugherty that the formulation of such a policy has been awaiting the decision. He is engaged in studying it carefully and has said that it affords a "clear path" for the conduct of such associations, but has not as yet given it sufficient analysis to announce a detailed policy. In co-operation with Secretary of Commerce Hoover, the Attorney General has for some time been considering the subject, but it was concluded to await the decision before mapping out a program which would provide a safe guide as to the conduct of such association.

Secretary Hoover's Attitude

Secretary Hoover, while attempting no interpretation of the decision, inasmuch as this does not come within his province, has expressed the belief that the Supreme Court's opinion will make it possible to work out a concrete program at an early date. The Secretary does not consider the decision to be so sweeping as do some attorneys who closely followed the case and thinks it will not interfere with co-operation between his department and trade associations. He stated that a survey conducted by the department showed that of the 1700 or 1800 trade associations of the country less than 10 per cent were shown to be engaged in "trade recruiting" in violation of the law.

His view is not shared by those attorneys who consider that the decision has such a range that it destroys the very principles of trade associations as to the handling of trade information, other than that relating to prices. There is no doubt on the latter point, in the opinion of legal authorities. Exchange of price information is held to be clearly in violation of the Sherman anti-trust law. But some of them go much further and maintain that the opinion handed down through Justice Clarke is much more restrictive.

Declared a Misnomer

They point to the following portion of the decision:

To call the activities of the defendants, as they are proved in this record, an "Open Competition Plan" of action is plainly a misleading misnomer. Genuine competitors do not make daily, weekly and monthly reports of the minutest details of their business to their rivals, as the defendants did; they do not contract, as was done here, to submit their books to the discretionary audit and their stocks to the discretionary inspection of their rivals for the purpose of successfully competing with them; and they do not submit the details of their business to the analysis of an expert, jointly employed, and obtain from him a "harmonized" estimate of the market as it is and as, in his specially and confidentially informed judgment, it promises to be. This is not the conduct of competitors, but is so clearly that of men united in an agreement, express or implied, to act together and pursue a common purpose under a common guide that, if it did not stand confessed a combination to restrict production and increase prices in interstate commerce and as, therefore, a direct restraint upon that commerce, as we have seen that it is, that conclusion must inevitably have been inferred from the facts which have been proved.

It is the opinion of some attorneys that the foregoing reaches far beyond the question of price, although leading up to it, and that it implies violation of the law in handling data such as those bearing upon stocks, production, etc., where the figures are used to restrain trade and fix prices. Concession is made that a test will prove that in individual cases there will be shown a marked difference in methods of conducting trade as-

sociations and that many will not come under the ban of the law. Meanwhile, however, there is widespread opinion that until the Government has mapped out a definite policy, many associations will feel so uncertain as to their legal standing in the light of the decision that they may decline to co-operate with the Department of Commerce or engage in any further activities. Despite the confidence they may have, based on their own opinions, as to their legality, it is contended that they will want assurance from the Government before proceeding further.

Favors Trade Associations

The Attorney General himself, in commenting on the decision, said he was unqualifiedly in favor of trade organizations which confined their operations to improving their services to the public, but he stated they would not be permitted to fix prices or apportion territory among themselves, resulting as it does, he asserted, in restricting competition. This plainly is a broad view and it is confidently believed, if left to itself, would mean that the decision would affect a decidedly small percentage of trade associations, as Mr. Hoover claims is the situation. But attorneys are insistent that the decision itself is much greater in its scope than the dealing with prices, apportioning of territory, etc., and think legislation will be necessary to insure the associations of their legality, a view that indicates a policy announced by the Department of Justice might even be insufficient.

The Attorney General proceeded to state that trade associations generally are showing a commendable willingness to confine their activities to the lines broadly suggested by the Department of Justice as in conformity with the law. Where the department's advice has been disregarded, however, it was pointed out, it has been necessary to proceed under the Sherman law. As a matter of fact, there are those who think the decision lacks in comprehensiveness and that consequently it will be necessary to try a number of other cases on their merits, although it is hoped that this will not be necessary and that it may be avoided either by the announcement of a definite governmental policy or through legislation.

It is no surprise, but it is interesting to note the remarks in the majority opinion where it makes a distinction between the exchange of information among sellers only and between sellers and buyers. The decision says:

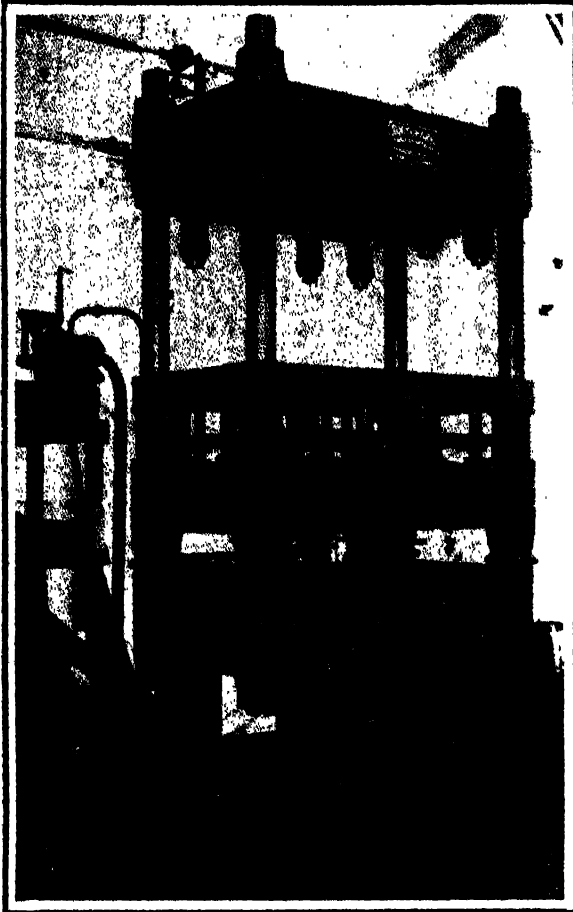
In the presence of this record it is futile to argue that the purpose of the "Plan" was simply to furnish those engaged in this industry, with widely scattered units, the equivalent of such information as is contained in the newspaper and Government publications with respect to the market for commodities sold on boards of trade or stock exchanges. One distinguishing and sufficient difference is that the published reports go to both the seller and buyer, but these reports go to the seller only; and another is that there is no skilled interpreter of the published reports, such as we have in this case, to insistently recommend harmony of action to prove profitable in proportion as it is unitedly pursued.

Obviously, as was to be expected, the decision does not affect publication of trade information in the lay and class press, nor does it have any bearing upon boards of trade and stock exchanges. Nevertheless the point has its value. This is particularly so because the Department of Justice in its proceedings in the so-called Southern Pine case, similar in many respects to the Hardwood case, made certain lumber publications defendants. The finding of the Supreme Court would indicate plainly that the Government's case as it applies to these publications will fall flat.

Hydraulic Automobile Body Press of 450 Tons Capacity

The Southwark Foundry & Machine Co., Philadelphia, has recently developed an all-steel automobile body press having a capacity of 450 tons. It is shown in the accompanying illustration.

With the intention of providing exceptionally sturdy construction the main ram is located in the lower base, to which are secured the four press columns. One clamping platen and one stripper platen are provided. The stripper platen is heavily made and carries four hydraulic cylinders, which act upon a forged steel plate which in turn carries 60 stripper pins $1\frac{1}{2}$ in. in diameter. These stripper pins project through the clamping platen. The clamping platen is a solid steel casting and is provided with Tee slots. The top platen



The Stripper Platen Carries Four Hydraulic Cylinders Which Act Upon a Forged Steel Plate.

carries eight hydraulic jacks which are used for clamping and which have 5-in. diameter rams with 5-in. stroke. The top platen itself is adjustable to meet conditions of the various size dies which may be employed under the press.

The control of the press is by a single lever operating valve which first admits low pressure to the four jack cylinders and at the same time admits low pressure to the main ram. As soon as the dies come together high pressure is admitted through the steam operating valve, thus completing the work on whatever shape is to be formed in the dies. The clamping cylinders are controlled automatically from a low-pressure filling tank and are capable of standing a hydraulic press of 5000 lb. per sq. in.

The press has a die space of 7 ft. x 5 ft. The minimum vertical opening between the platens is 18 in., and the maximum, 4 ft.

Executive offices of the Engineers' Society of Western Pennsylvania have been removed from the Union Arcade, Pittsburgh, to the William Penn Hotel, also in Pittsburgh.

Michigan Foundrymen's Association

KALAMAZOO, MICH., Dec. 27.—Foundries in Michigan are operating about 25 per cent capacity, and have enough pig iron on hand to run for close to three months without any additional purchases. That was disclosed at a meeting of the Michigan Foundrymen's Association, held at the Park-American Hotel, recently. The report on business conditions was prepared by A. W. Blodgett, secretary, and was based on 21 answers to questionnaires mailed to state plants. These answers showed that while the normal monthly melt of these 21 foundries is 9386 tons of pig, only 2337 tons were used in October and that the concerns have 6893 tons of pig in yard. October production compared with September showed an increase of 5 per cent.

The session in Kalamazoo was really the second of the organization's gatherings. Established only a few months ago, this association boasts 31 concerns enrolled to date. Six memberships were added the past month. Secretary Blodgett reports there are over 200 foundries in Michigan eligible for membership in the State association and that efforts are now being made to round them all up.

A large portion of Tuesday's meeting was devoted to the consideration of problems and troubles met by foundrymen. The question box promises to assume an important place on all programs. A discussion of trade conditions and the welfare of the association also occupied much time. Immediately following luncheon, John C. Hoekje, registrar of Western State Normal College, addressed the gathering.

The next session will be held in Battle Creek, Tuesday, Feb. 14. A. W. Blodgett, J. C. Jensen and H. J. Hartman, all of Grand Rapids, were empowered to arrange the program. Battle Creek has no members and it is believed the meeting there will induce many of that city to enroll.

Officers of the Michigan Foundrymen's Association are: President, J. Edgar Lee, Grand Haven; vice-president, W. O. Adams, Ann Arbor; secretary, A. W. Blodgett, Grand Rapids; treasurer, E. N. Turner, Manistee; directors, W. W. Sherman, Muskegon; A. K. Hanchett, Big Rapids; Henry J. Hartman, Grand Rapids; Charles Clarage, Kalamazoo; C. L. Pearce, Marquette.

Baltimore Tank Maker Expands

The Novelty Steam Boiler Works Co., Baltimore, is building another factory building, two stories, brick and steel, 110 x 155 ft., in the 900 block, South Howard Street. The concern specializes in the manufacture of steel tanks for the storage of air, water and oil. The company has 50 men working day and night and enough contracts to maintain full operation for a year or more. The company started in 1905. In August, 1920, it was reorganized, five former employees of a well-known manufacturing plant in Decatur, Ill., having secured the controlling interest. Each came from a different department and each is now head of a department in the Baltimore company to-day. Oscar S. Jennings is president, C. C. Lanman is vice-president and general manager; Raymond J. Kitchen is secretary.

Freyn, Brassert & Co., Chicago, have recently shipped boiler and hot blast stove burner equipment to the Rochester & Pittsburgh Coal & Iron Co., Punxsutawney, Pa., and the Chateaugay Ore & Iron Co., Standish, N. Y. The Shenango Furnace Co. has recently installed this company's Mathesius hot blast gate valve equipment. Freyn, Brassert & Co. have also been retained by the Mitchell-Diggins Iron Co., Cadillac, Mich., in reference to power plant matters.

Clinton E. Woods, receiver for the Bethlehem Motors Corporation, Allentown, Pa., manufacturer of automobile trucks, is developing plans for a sale of the property. It is said that an offer of \$400,000 has been made for the plant and equipment, with a creditors' committee asking not less than \$750,000 for the property.

Fuel Saving in Modern Gas Producers*

Avoiding Present Wastes of Fuel in the Industries Using Gas Producers, Producer-Gas Furnaces and Industrial Furnaces

BY W. B. CHAPMAN†

THERE are about 10,000 gas producers in the United States, divided approximately as follows: 6500 in the steel industries; 1500 in the glass industries; 500 in the chemical industries; and 1500 in miscellaneous industries. Under "miscellaneous" are included the ceramic industries, lime burning and about 200 gas producers used for power.

Engineers have given much attention to the engine room, some to the boiler room, a little to industrial furnaces, and least of all to the making of raw producer gas. Hence the backward condition of the gas house.

No definite data have been compiled by the Government on the amount of coal used in gas producers; but, with the assistance of such figures as are available, it is estimated roughly that in the steel industries about 15,000,000 tons of bituminous coal are transformed annually into raw producer gas for use, and in the glass industries about 2,000,000 tons.

In the steel industries about the same amount of coal is used for making gas to heat furnaces as for making steam. In glass making, three-fourths of all the fuel is used in gas producers. But wherever producer gas is used it is apt to be the most backward part of the business. A given amount of time and money, if spent on improving conditions in the gas house, will usually bring larger returns than in any other department. In most industries requiring large heating operations, more trouble arises in that department than in any other part of the business.

Savings with Mechanical Producers

With the usual more or less unskilled and indifferent handling, any of the four American mechanical producers can make a gas averaging 150 B.t.u. (low values), instead of the customary 125 B.t.u. obtained in hand-poked producers if operated with zeal. With skilled handling the best mechanical producers will average from 160 to 175 B.t.u., provided the coal is fair and the rate of gasification does not exceed 25 or 30 lb. per sq. ft. per hr., which is about twice the capacity of hand-operated producers.

A Duff producer, operating originally at 10 tons a day and making gas having 125 B.t.u., was fitted with a Chapman agitator and automatic feed, and at 36 tons a day gave an average of 163 B.t.u.

As there are more Duff producers in use in the United States than any other type of hand-poked producer, the test made by the engineers at one of the largest steel works will be of special interest. This producer was rebuilt to a diameter of 10 ft. 6 in. No hand-poking was done during the test, and no clinkers were made. A standard gas temperature of 62 deg. Fahr. was used. The West Virginia coal used had 37 per cent volatile matter. Data are given in Table I.

Similarly, a Von Kerpely producer, the most popular mechanical type in Europe, gasifying 20 lb. per sq. ft. per hr., making about 135 B.t.u. gas, was equipped with Chapman agitator and automatic feed and changed to 34 lb. gasified per sq. ft. per hr. and 178 B.t.u. This was maintained without difficulty, and without any hand poking. Data are given in Table II.

Like other European producers, the Von Kerpely producer has continuous ash removal and continuous agitation of the ash bed and lower part of the fire bed, and there is no agitation of the upper part of the fire bed and no automatic feed. Before installing the Chapman automatic feed and floating agitator, the capacity was 12 cwt. per hr., and in spite of an enormous

amount of hand poking the producer was usually full of clinkers. After the new equipment was added, the capacity was increased considerably over 50 per cent, no hand poking was required and no clinkers were made. The works engineer estimated that the saving in labor alone was sufficient to pay for the equipment in nine months. The B.t.u. content of the gas was increased about 30 per cent.

Properly operated, the best modern producers will usually save about 25 per cent of the coal and an equal amount of labor. These savings should amount to the total cost of the installation in from one to four years.

The temperature in a gas producer is highest at the bottom of the fire, and the thicker the fire, the cooler the top. The temperature at the bottom should be as high as the fuel will stand, without running too much risk of melting the ash. The melting point of the ash in all the good Pittsburgh gas coals is well above 2500 deg. Fahr.; and of the ash in Illinois coals, about 300 deg. lower. The temperature at the top of the firebed should be as low as will permit the gas to be conducted to the place of use without forming objectionable tar deposits, and also as low as possible without making the top too sticky and difficult to blow through.

Usually a "top temperature" of 1000 deg. Fahr. is about right, but, if the gas is to pass through a water-cooled reversing valve located some distance away, 1200 deg. would be better. A "hot top" destroys some of the richest gases and thus wastes fuel. More fuel is wasted in a producer, from running with a hot top, i.e., over 1300 deg., than from any other cause.

The Furnace Part of the Problem

But gasifying the fuel is only half the problem of conserving it. The other half lies in its utilization in the furnace. The two halves of the problem are inseparable. Space is too limited to take up more than one kind of furnace—the kind that holds the most promise for fuel conservation, and the kind that, until the last decade, has largely been a failure—the recuperative furnace.

A recuperative furnace is never "reversed" and, except in rare instances, only the air is preheated. It costs much less to build and to repair, is easier to operate and gives practically the same efficiency, as the expensive and cumbersome regenerative furnace.

Its field of application is very broad, and it can be used effectively in both large and small operations, for furnace temperatures as high as 2700 and as low as 1400 deg. Fahr. About the only uses to which it is not suited are for operations which periodically require a large overload, such as the open-hearth process and large forgings over 32 in. in diameter, also for large glass melting tanks. For almost all other purposes the recuperative furnace can be used with great economy.

In many operations, where the air is not now preheated, it will be found that from 20 to 40 per cent of the fuel can be saved by using a good recuperator—one that preheats the air to within 500 deg. Fahr. of the temperature of the furnace.

Table I—Test of Duff-Bradley Producer with New Blowers and Chapman Automatic Feed Floating Agitator

Analysis of Seven-Hour Continuous Sample of Gas						
Rate of gasification per 24 hr. = 37.36 tons.						
Rate of gasification per hr. per sq. ft. = 36 lb.						
Percentage Analysis of Gas Samples						
CO ₂	Cn H ₂ n	O ₂	CO	CH ₄	H ₂	N ₂
4	1.4	0.2	26.8	3.0	10.4	54.2
Calorific power of gas per min.					552,750 B.t.u.	
Sensible heat of gas per min.					94,100 B.t.u.	
Total useful heat of gas per min.					646,850 B.t.u.	

*Abstract of paper presented before the American Society of Mechanical Engineers, Dec. 6.

†President Chapman Engineering Co., New York.

Average coal fed per hr., by weight.....	3,114 lb.
Average coal fed per hr., calculated from above analysis.....	3,081 lb.
Difference.....	33 lb.

External Heat Balance					
Dr.	B.t.u.	Per Cent	Cr.	B.t.u.	Per Cent
B.t.u. per lb. coal.....	13,039.0	97.5	Calculated power of gas	10,660.0	79.7
B.t.u. steam and air.....	326.5	2.5	Sensible heat of gas.....	1,803.0	13.5
			Loss unburnt coal.....	146.5	1.1
			Other loss (radiation, etc.)	716.0	5.7
	13,375.5	100		13,375.5	100
Total losses, 6.8 per cent.					
Efficiency of producer, 93.2 per cent.					
Steam pressure, 52 lb. per sq. in.					

Table II—Test of Von Kerpley Producer with Chapman Agitator and Automatic Feed

Test on 9 ft. 7 in. inside diameter Von Kerpley gas producer, fitted with a Chapman agitator with automatic feed. Duration of test, 49½ hr. Average percentage analysis of gas samples taken hourly:

CO ₂	C ₂ H ₄	O ₂	CO	H ₂	CH ₄	N ₂
4.74	0.80	0.30	24.6	12.80	5.26	52.00

Not English heat values used:
CO—845, H₂—290, CH₄—975, C₂H₄—1590

Heat Balance					
Dr.	B.t.u.	Per Cent	Cr.	B.t.u.	Per Cent
B.t.u. per lb. coal.....	13,906.0	97.2	Calculated power of gas.....	11,498.9	80.34
Sensible heat of coal.....	13.2	0.09	Sensible heat power.....	1,925.0	13.50
Sensible heat of steam.....	328.3	2.3	Loss in unburnt coal.....	46.3	0.32
Sensible heat of air.....	54.0	0.41	Sensible heat of ash.....	1.8	0.01
			Sensible heat of water passed through agitator.....	55.46	0.38
			Other losses (radiation, etc.).....	774.54	5.45
	14,302	100		14,302	100

Total losses, 6.16 per cent.
Efficiency of producer, 93.84 per cent.
Producer equipped with Chapman 5-stage blower with 7/16 in. nozzle.
Coal used: Florence beans 17.62 per cent, Florence nuts 30.65 per cent, Stafford cobbles 20.73 per cent, Florence cobbles 31.00 per cent.
Average coal fed per hour, 2408 lb.
Coal gasified per sq. ft. per hr., 34.01 lb.
Total combustibles in gas produced, 42.99 per cent.
Steam used, 0.278 lb. per lb. of coal.
Gas per lb. of coal, 64.6 cu. ft.

Mining Experiment Station at Minneapolis

Work is now under way on the construction of a mine experiment station laboratory at the University of Minnesota at Minneapolis. It will house the north central experiment station of the United States Bureau of Mines. The superintendent of the station says it will be without exception the best laboratory in the world for the study of iron and manganese ores. The building, which is of factory type construction, is 60 x 280 ft. in plan, partly two stories and basement in height, partly five stories in height and the whole enclosing 1,000,000 cu. ft. The building and equipment will cost approximately \$300,000, not including \$20,000 additional for laboratory apparatus. Ground was broken Dec. 17 and the specifications call for completion on Sept. 1, 1922.

The Goodyear Tire & Rubber Co., 123 West Sixty-fourth Street, New York, with main plant at Akron, Ohio, has negotiations under way with the Brazilian Government for continuance of concessions previously granted on State property for the erection of a rubber manufacturing plant on the site. The project was planned, initially, some time ago but has been held in abeyance owing to conditions.

The Hoover Wagon Co., York, Pa., has arranged for a change of name to the Hoover Body Works, and in the future will concentrate operations on the manufacture of automobile bodies, with considerable expansion in production. A two-story factory on Webster Avenue, Long Island City, recently has been acquired, and will be equipped for a branch plant. It will provide about 18,000 ft. of floor space.

Results of Studies of Coal-Washing

Organic sulphur constitutes a larger proportion of the total sulphur in coal than is generally recognized, according to a report of the investigation of bituminous coal-washing practice in the Middle Western states by the United States Bureau of Mines, the mining department of the University of Illinois and the Illinois Geological Survey. Sulphur occurring in organic combination with the coal substance and finely disseminated pyritic sulphur can not be removed by washing. Of 110 face samples taken in four beds, two in Kentucky, one in Illinois and one in Alabama, in 53 samples the organic sulphur made up more than 50 per cent of the total sulphur.

In co-operation with the mining companies, the coal washeries at Issaquah, Grand Ridge, Ravensdale, and Wilkeson, in Washington, and at Beaver Hill, Ore., have been studied. All experimental work, except the supplementary laboratory tests, was done in the plants.

The principal results of the tests show: (1) The raw coal as it comes to the surface contains much bone, shale and clay, most of which must be removed before the coal is marketable; (2) the present washeries are inefficient, the washed coal containing avoidable impurities, and the refuse an excessive proportion of good coal. Proper adjustment of the washers not only improved the quality of the washed coal but also greatly reduced the loss of good coal in the refuse; (3) by re-arranging present flow sheets and replacing many old machines now in use with improved coal-washing equipment, the practice at each plant could be greatly improved.

Since the completion of these studies two coal companies have remodeled their plants and another company has started work on a new plant to replace its present one. Based largely on results of experiments by the Bureau of Mines, one mine is building a table-washing plant to treat a pile of refuse amounting to more than 1,000,000 tons, estimated to contain approximately 200,000 tons of recoverable coal of coking quality.

Two papers are being prepared for publication by the Bureau of Mines, one on the subject of "Specific gravity studies of Washington coals and their associated impurities," and the other on "Study of coal-washing problems in the Northwest."

Tests of the froth-flotation process, now widely used in concentrating various ores, showed that clean coal can be separated from ash in material passing a 20-mesh sieve, or finer. A great many coals, however, contain bone, or bony coal, in which the carbonaceous matter is so intimately mixed with ash that 200-mesh grinding does not separate them. As the bony coal is not as easily floated as the clean coal, re-treating the froth concentrate of coal yields clean coal, the bone forming a "middling." By the use of this method 95 to 98 per cent of the carbonaceous matter in the coal can be recovered in the concentrate and middling, and from 30 to 70 per cent of the ash discarded as tailing.

Puddling Rate Reduced to \$6

The Reading Iron Co., Reading, Pa., has reduced its rate for puddling from \$6.75 to \$6 per gross ton. Other tonnage rates are reduced in the same proportion and wages for workmen, aside from those paid on a tonnage basis, will be cut 10 per cent.

The Anderson Stove Co., recently organized at Anderson, Ind., will begin operations with the new year. It will make kitchen ranges for a Chicago mail order house. The directors of the company are John S. Keefe, Indianapolis; Jacob Keller, Belvidere, Ill., and Joseph McGinn, Louisville, Ky.

Harry W. Voss, head of the Evansville Association of Credit Men, Evansville, Ind., has been appointed receiver for the Hoosier Ice Machine Works, following a suit filed in the court by the Orr Iron Co.

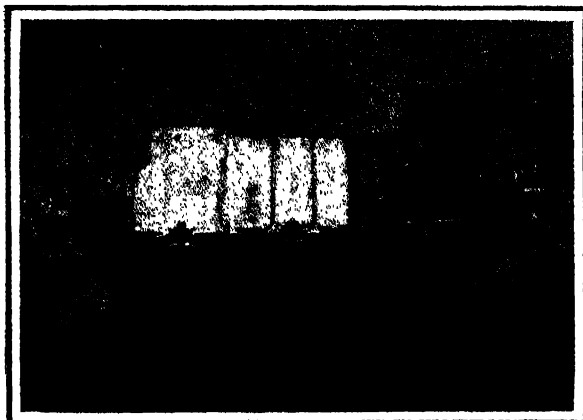
Wesley Fleming, receiver for the Cornish Co., Washington, N. J., manufacturer of talking machines, etc., has been granted permission by the Court of Chancery to continue the operation of the plant.

PULVERIZED COAL-BURNING

Aero Pulverizer Breaks Up Coal and Blows It Into the Furnace

At the plant of the Brier Hill Steel Co., Youngstown, Ohio, a new equipment for burning powdered fuel has been installed experimentally which has some points of interest. The installation includes an aero pulverizer furnished by the Erie City Iron Works, Erie, Pa., which has a capacity of 3000 lb. of coal per hour. This unit, which is shown in two views, is being used to provide fuel for a continuous heating furnace supplied by Alex. Laughlin & Co. for heating slabs for the 84-in. plate mill. The furnace measures 9 ft. wide and 44 ft. 6½ in. long outside, including the combustion chamber.

The pulverizer consists of a cylindrical case resting upon a bed plate and with the rotating parts driven by a 40-hp., 900 r.p.m. motor. These rotating parts consist of paddles on the entering end and fan at the delivery end, both mounted on the same longitudinal shaft. Coal is re-



Pulverizer Assembled for Delivering Coal, Through Self-Contained Blower, to Distributing System

ceived at the end opposite from the fan in pieces of regular crusher size. The paddles break it up to such effect that it is pulverized when it reaches the fan. This permits the fan to lift it and blow it into the furnace, together with the proper amount of air for combustion.

Crushed coal is delivered into a hopper above the pulverizer by a conveyor belt with a magnetic head pulley, the latter removing stray particles of iron from the coal. The pulverized coal is discharged into a pipe 18 in. in diameter, which carries it about 20 ft. and then branches into two 10-in. pipes, which enter the furnace 2 ft. 5¼ in. each side of the center line.

When this piping was first installed, it was not possible to obtain an equal distribution of the fuel because of curves in the pipe. This was easily remedied, however, by placing a deflector plate at the point where the pipe branches. As slack coal has been used, with a certain moisture content, the question of artificial drying has not been settled. As the installation has been run only a portion of the time, because of slack business, its future is not definitely determined, but reports indicate that it has given good service so far as it has been used.

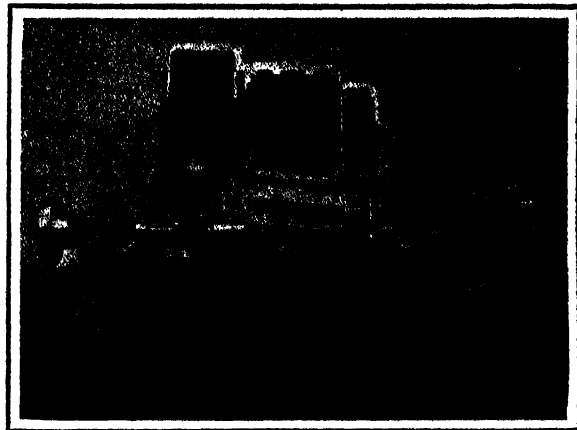
Foreign Trade Council to Meet in Philadelphia

The ninth annual convention of the National Foreign Trade Council will be held in Philadelphia on May 10, 11 and 12, 1922. Previous meetings have been held in St. Louis, New Orleans, Pittsburgh, Cincinnati, Chicago, San Francisco, and Cleveland.

Referring to the impression in some quarters that the foreign trade of the United States has all but disappeared, Secretary O. K. Davis of the Foreign Trade Council says: "I wonder how many people in this country realize that our exports for the last six months

have been 63 per cent greater in value than in 1913, and about 15 per cent greater in volume; and that in the six months ending September, 1921, we have exported commodities valued at \$2,025,236,000 and have imported goods valued at \$1,197,850,000.

"The truth of the matter is, that the productive capacity of the United States has been so greatly increased during the war that our former 'normal' exports are not nearly great enough to enable our factories and farms to operate profitably at full capacity. It is certain that our foreign trade, considerable as it is even at present, must be expanded if the United States is to enjoy real domestic prosperity. The National Foreign Trade Council believes that our foreign trade can and will be so expanded, even in the face of



Cover Lifted to Show Paddles and Fan Blower, by Which Coal Is Handled

present difficulties, provided all elements of American industry, agriculture and finance will co-operate to that end."

Will Not Build Warehouse

Reports that the Jones & Laughlin Steel Co., Pittsburgh, would build a large warehouse at Evansville, Ind., to be used in distributing steel products unloaded from barges being sent down the Ohio river by the company, are untrue, as the company has no such project in mind. However, the Jones & Laughlin Steel Co. has suggested to the proper authorities in the different communities at which its steel products are unloaded from the barges sent from the Pittsburgh and Alliquippa mills, that these different communities should provide proper unloading facilities. In any event, these would not consist of more than unloading equipment and possibly a covered platform from which delivery could be made to customers in these communities by truck or wagon.

Buy a Ton of Iron!

It would be lovely this Christmas season if someone could start an effective movement with the slogan "Buy a Ton of Iron," says the current trade bulletin of the Matthew Addy Co. "That worked all right in cotton. And there were hundreds who bought a bale of cotton and made a good thing out of it. Now if the general public would take notice of the low prices prevailing for iron and of the hard conditions that the furnaces face and would start buying iron in a kindly benevolent but speculative way, it would help. The only thing the iron market needs is more liberal buying. It is the small volume of trade that worries the iron master."

John A. Ortel, safety engineer Carnegie Steel Corporation, Pittsburgh, last week talked on Educating the Workman, at the Y. M. C. U., Boston, under the auspices of the Massachusetts Safety Council.

Leroy S. Starrett, president L. S. Starrett Co., Athol, Mass., machinists' tools, has organized the Metropolitan Air Goods Co., capitalized for \$200,000, to manufacture pneumatic and waterproof goods.

Special Crane for Ordnance Plant

A 75-ton electric traveling crane having features to meet unusual conditions including a runway 165 ft. above the ground, which is believed to be the highest lift ever provided in a crane of this type, has been completed by the Cleveland Crane & Engineering Co., Wickliffe, Ohio, for the government naval ordnance plant at Charleston, W. Va. It will be installed in the heat-treating department for handling large naval guns during the heat treating operations.

An unusually high lift is required as it is necessary to handle, in a vertical position, naval guns that, with their test piece, are 87 ft. long. A gun will be brought into the plant on a railroad car, placed in a vertical position in a heat-treating furnace, and, after being heated will be lifted from the furnace and placed vertically in a tempering tank 108 ft. deep. These tanks extend into a pit 54 ft. below the floor and 48 ft. above the floor. Consequently the upper end of the gun must be raised over 135 ft. to permit the lower end to clear the top of the tank.

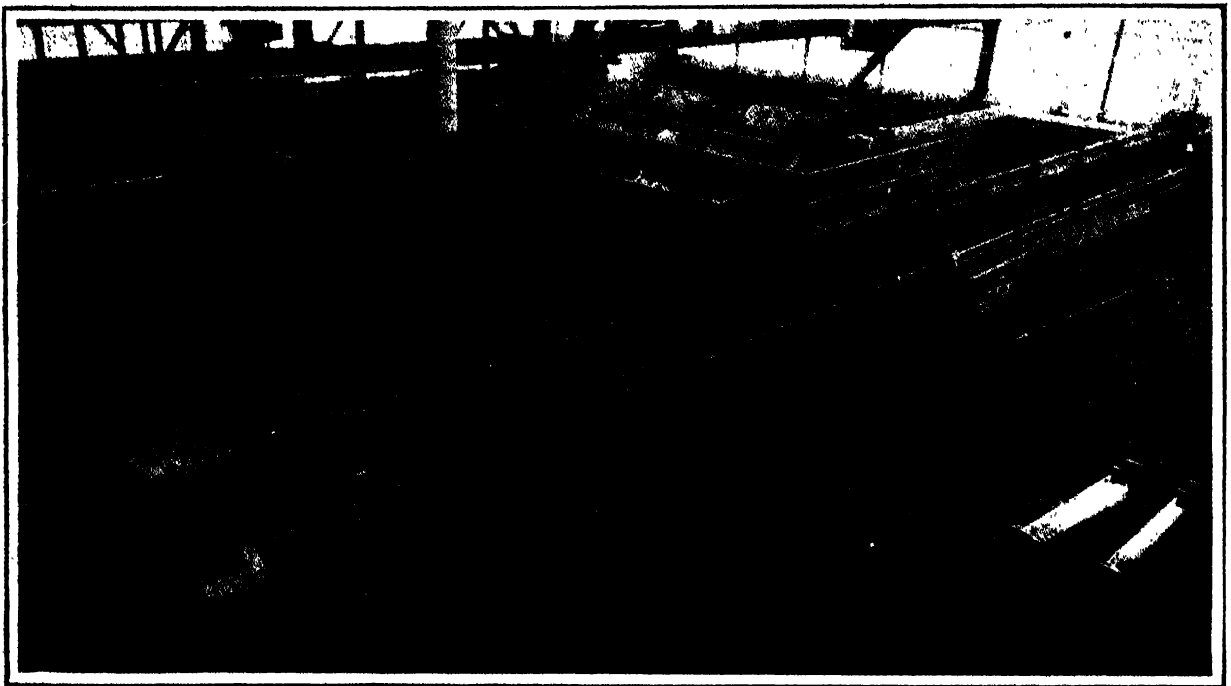
The crane runway being the height of a 15-story office structure required a building of unusually massive

and two 50 hp. motors for the bridge travel, there being one motor on each bridge girder. The hoist has a brake on each motor and on the second reduction shaft, making four brakes on the hoist. Because of the high lift, the hoist required 2600 ft. of 1½-in. rope.

Purchase of Ashland Iron & Mining Co. Ratified

Shareholders of the Ashland Iron & Mining Co., Ashland, Ky., at a meeting on Dec. 21, ratified the negotiations for the purchase of the property by the American Rolling Mill Co., and the assets of the Ashland company now become those of the Rolling Mill company. Besides the steel plant, consisting of two blast furnaces, six open-hearth furnaces, a modern electrically driven blooming mill, slab, billet, bar and sheet mills, the deal also includes the Ashland Coal, Iron & Railway Co., operating 48 miles of track, and the Interterminal Transit Co., which handles a large part of the industrial switching of Ashland. Some 22,000 acres of coal and timber are also included.

The purchase of the Ashland properties gives the American Rolling Mill Co. combined assets valued at



Crane for Handling Large Naval Guns in Heat-Treating Department of Naval Ordnance Plant, South Charleston, W. Va. The capacity is 75 tons, span 114 ft., and runway 165 ft. above the ground

construction to carry the load. A locomotive crane with a 250-ft. boom was used in handling steel during the erection. In addition to the high lift the predominating features of the crane include an unusually long span for its capacity, the span being 104 ft., and the high speed of the lift. The hoist speed is 50 ft. per min. and the lowering speed 100 ft. per min. both with a full load. These speeds enable quick handling of a gun from the furnace to the quenching tank. Another interesting feature is that when lowering at full speed with a full load the braking equipment that is provided, will stop the load within one foot. The crane has an automatic limit switch that stops the load 110 ft. below the crane rail. If the gun is to be lowered further, its lowering movement is continued by the operation of a push button.

The trolley travel and bridge travel are each 50 ft. per min. Rapid bridge travel is not required as the crane runway is comparatively short, being only of sufficient length to cover the furnaces and tempering tanks. The crane is operated from a pulpit, and magnetic control is provided throughout. Five motors aggregating 550 hp. are used in its operation. It has a double bridge drive. There are two 200 hp. motors on the main hoist, a 50 hp. motor for the trolley travel

\$55,000,000, according to a statement of President George M. Verity. The plans of the American Rolling Mill Co. at present are to continue operations at the same scale now in effect.

The Rolling Mill company has paid the equivalent of \$1,000,000 for \$6,000,000 net assets of the Ashland corporation. The Rolling Mill company also assumes the bonded indebtedness of the Ashland company, amounting to \$4,000,000. In the deal the Ashland stockholders received 39,875 shares of the common stock of the American Rolling Mill Co. for their properties. This stock is to be held in the corporate treasury until Oct. 1, 1923. Each shareholder of the Ashland company is entitled to one share of Rolling Mill common, par value \$25, for every 2½ shares of common stock of the Ashland company, the par value of which is \$50 per share.

The Kelley Island Lime & Transport Co., Cleveland, will absorb the Dolomite Products Co., Nario, Ohio, the merger becoming effective Jan. 1. Howard P. Eels, president of the Dolomite Co., will become vice-president of the merged organization.

SERIOUS STRIKE TROUBLES

Governor of Kentucky Orders Troops to Maintain Order at Newport

The strike now in progress at the plants of the Andrews Steel Co. and the Newport Rolling Mill Co., at Newport, Ky., has been marked with much shooting during the past ten days. About two hundred men are at present employed in the plant, and many of the men on their way to work have been waylaid and beaten, and at times revolver shots have been fired at automobiles carrying employees. The union officials disclaim all knowledge of these shootings. On a night recently it is estimated that about 200 shots were fired in the vicinity of the mills, and many houses were hit. An injunction restraining union members and sympathizers from interfering with the employees of the company engaged in the interstate commerce has been handed down by U. S. Judge Cochran, but mill officials claim that it is only observed in the breach.

Governor Morrow, of Kentucky, has ordered four companies of the Kentucky National Guard, numbering 160 men, to Newport. This action was taken following a request of the mill officials for protection to their workmen while going to and from the mill. The civic officials of Newport and Campbell County, refused to sign a requisition for troops to maintain order, stating that they were capable of handling the situation. The Governor's action came after an investigation conducted by two State officials who had been sent to inquire into conditions prevailing at Newport.

In the Field of Labor

The New York, New Haven & Hartford Railroad has practically closed its repair shops at Readville, Mass., and at East Hartford, New Haven and Norwich, Conn., for an indefinite period. The layoff at the Readville shops involves 1000 men, at New Haven as many, at East Hartford 400, and at Norwich in the neighborhood of 100. The action of the New York, New Haven & Hartford Railroad management followed the laying off of 400 employees at the Boston & Albany Railroad's West Springfield, Mass., locomotive repair shops for two weeks beginning Dec. 22. The car repair shops at West Springfield continue in operation.

The Boston & Maine Railroad has posted notices of a substantial wage reduction applying to all classes of railroad employees over the entire system. No date has been set for the wage reduction to go into effect, but the management proposes to confer with the men beginning Jan. 15. For shopmen, including machinists, boiler-makers, blacksmiths, etc., the proposed scale will be 52c. to 67c. per hour according to classification of the workman, as contrasted with 72c. to 82c., the present range of wages. Such a wage reduction will bring the pay of machinists and such classes of workmen down to the scale existing prior to May 1, 1920.

The Quincy, Mass., branch, an assembling plant, of the Waltham Watch Co., Waltham, Mass., has resumed operations after having been closed since July last.

The Hartford Machine Screw Co., Hartford, Conn., has reduced wages 10 per cent.

The plant of the Colt's Patent Fire Arms Mfg. Co., Hartford, Conn., employing about 950, closed Saturday, Dec. 24, for inventory purposes. It will reopen Jan. 7.

The Laconia Car Co., Laconia, N. H., which has \$1,500,000 car repair work for the Boston & Maine and the Central railroads on its books, is employing 350 men, but anticipates increasing this number after the turn of the year when the plant will be operated at capacity.

F. H. Payne, president Greenfield Tap & Die Corporation, Greenfield, Mass., in behalf of the company, last week presented annual Christmas checks to members of the Old and Junior Guards, employees, who have served the company more than ten and five years, respectively.

Refractories Prices Still Weak

PITTSBURGH, Dec. 26.—Refractories prices still are slipping because of the keen competition for orders generated by the fact that there is not enough business to give all a share. On high duty Pennsylvania and Ohio fire clay brick, the common basis of sales now is \$30 per 1000, f.o.b. works, though public quotations still range \$2 to \$5 above that figure. Kentucky makers of this grade of brick are holding rather well to \$32, but it is admitted that some shading would be developed by the appearance of a sizable inquiry. Missouri makers are reported to be seeking business in nearby districts, giving basis to a suspicion that they are not holding firmly to quotations in view of the much higher freights than those from Pennsylvania and Ohio plants.

We are revising down our prices of fire clay brick in all districts save Kentucky. At least four makers of Pennsylvania silica brick are taking business at \$27, and in the Chicago district no business to speak of now is being done at above \$35. There is little firmness in magnesite or chrome brick. Demand for all grades is purely hand-to-mouth and shipping instructions usually accompany every order. Stocks in consumers' hands are reported to include only a few standard sizes, for which there is daily use, but there are some pretty big stocks of special sizes.

We quote per 1000 f.o.b. works:

Fire Clay	High Duty	Moderate Duty
Pennsylvania	\$30.00 to \$35.00	\$28.00 to \$30.00
Ohio	30.00 to 35.00	28.00 to 30.00
Kentucky	32.00 to 35.00	30.00 to 32.00
Illinois	32.00 to 35.00	30.00 to 32.00
Missouri	32.00 to 35.00	28.00 to 32.00
Silica Brick:		
Pennsylvania		28.00
Chicago		35.00
Birmingham		40.00
Magnesite Brick:		
Standard size, per net ton.....		52.00 to 55.00
Chrome Brick:		
Standard size, per net ton.....		46.00 to 48.00

Officials of Falcon Tin Plate Co.

The Falcon Tin Plate Co., which has been organized to operate the plant of the Carnahan Tin Plate & Sheet Co., Canton, Ohio, following the purchase of the latter plant by Paul Wick and Lloyd Booth of Youngstown, who control the Falcon Steel Co. in Niles, has elected Lloyd Booth president and treasurer and Paul Wick vice president and secretary. The board of directors consist of these officers and W. A. Thomas, formerly president of the Brier Hill Steel Co., C. H. Booth, formerly associated with the United Engineering & Foundry Co., Youngstown, and J. E. Carnahan, Canton, formerly principal owner of the Carnahan company. The Falcon Tin Plate Co., through a Cleveland investment house is offering \$750,000 in first mortgage 8 per cent sinking fund gold bonds.

May Buy Steel Common at \$84

In accordance with the stock subscription plan heretofore adopted by the finance committee, the employees of the United States Steel Corporation and its subsidiaries have been given the privilege of subscribing, during the month of January, for 100,000 shares of common stock at \$84 per share. In January of this year the stock was offered at \$81 per share and in 1920 at \$106.

The Butler-Edwards Electric Co., Easton, Pa., has arranged for a change in company name to the Butler Automotive Steel Co., to provide for expansion in manufacture in the line of automobile products, to include shafts, axles, gears, propellers and automotive electrical devices. Parke H. Davis has been elected president to succeed William H. McCammon. W. E. Butler is vice-president and treasurer.

The Universal Machine Co., Boston, has incorporated under Massachusetts laws to manufacture and deal in machinery for cooling and conditioning textile fabrics; paper, etc. Manufacturing will be done on the other side of the water. Ivar L. Sjostrom, North Andover, Mass., is president and treasurer.

Further Gains in Iron and Steel Exports

Larger Outward Movement of Steel Sheets and Rails—Year's Figures to Date Are Less Than Half of 1920—Imports Fall Off

WASHINGTON, Dec. 27.—Further improvement was made in iron and steel exports in November, the total for 28 items being 122,290 tons, valued at \$28,543,142. This was a gain of 15,708 tons over October, with a movement of 106,582 tons, valued at \$29,706,437. For the 11-month period ending with November of this

month period of 1920. Imports for November, 1920, amounted to 74,477 tons, valued at \$1,080,429. It will be noted that the average import value per ton was \$5.76 in November, 1921, and \$14.51 in November, 1920.

Machinery exports for November showed a decline when compared with October, the respective totals being \$14,436,849 and \$16,814,995. For the 11 months ending with November, 1921, the total exports of machinery were valued at \$275,346,019, as compared with \$593,612,060 for the same period of last year. Exports for November of last year were valued at \$41,659,329.

The gain in exports of iron and steel is reflected in the comparatively large shipments of steel sheets. The outgoing movement of this product in November totaled 36,954 tons, compared with 20,930 tons exported in October. For the 11-month period the total exports of sheets were 159,069 tons.

Imports of Iron and Steel—Gross Tons

	November		Eleven Months	
	1920	1921	Ending November	1921
Ferromanganese	7,091	270	53,830	8,818
Ferrosilicon	710	1,456	13,502	6,698
Pig iron	35,313	2,193	153,381	23,126
Scrap	5,642	2,777	136,513	39,550
Bar iron	112	80	4,682	1,676
Structural steel	225	53	1,479	657
Billets, without alloys	447	1,034	19,165	4,559
All other billets	264	51	4,252	1,261
Steel rails	309	2,406	44,061	21,154
Sheets and plates	293	38	1,697	1,942
Tin andterne plates	22	54	344	393
Wire rods	654	198	5,246	775
Total	50,992	10,610	438,242	110,609
Manganese ore and oxide	74,477	8,620	542,189	386,454

year exports aggregated 2,075,674 tons, valued at \$577,924,704. This is less than half the 4,402,056 tons, valued at \$1,170,722,938, exported during the same period of 1920.

Imports of 12 items for November showed a decline, amounting to 10,610 tons, valued at \$2,041,772, as compared with October imports of 13,565 tons, valued at \$2,888,987. For the 11-month period ending with November of the current year, imports totaled only 110,609

Exports, January, 1920, to November, 1921, Inclusive

	Gross Tons		
	All Iron and Steel	Pig Iron	Semi-finished Material
Calendar year 1919	4,239,837	309,682	258,907
January, 1920	333,601	18,468	19,937
February	308,185	15,739	22,693
March	417,216	22,740	30,444
April	395,120	14,808	19,032
May	420,359	13,032	16,370
June	402,707	17,075	29,811
Fiscal year 1920	4,212,732	248,126	288,766
July	458,866	29,647	17,243
August	431,484	22,645	20,920
September	409,200	22,724	18,113
October	452,015	17,296	11,853
November	434,297	13,929	7,042
December	498,765	10,055	3,415
Calendar year 1920	4,961,851	217,958	216,873
January, 1921	547,394	3,710	315
February	393,328	1,307	92
March	230,635	2,320	1,023
April	162,592	1,234	678
May	142,551	2,541	749
June	119,081	1,689	1,106
Fiscal year 1921	4,168,619	129,541	82,549
July	86,523	2,744	363
August	75,827	2,424	2,447
September	95,169	3,078	1,318
October	106,582	2,830	153
November	122,290	1,299	1,869
Eleven months	2,075,674	25,755	10,113

tons, valued at \$26,787,570. This compares with imports amounting to 438,242 tons, valued at \$47,185,447, which came in during the same period of 1920.

Manganese ore imports for November were 8,620 tons, valued at \$49,681, as compared with 36,760 tons, valued at \$214,748, imported in October. For the 11 months of the present year imports of manganese ore totaled 386,454 tons, valued at \$3,289,962, as compared with 542,189 tons, valued at \$11,071,228, for the 11-

Exports of Iron and Steel—Gross Tons

	November		Eleven Months	
	1920	1921	Ending November,	1921
Ferromanganese	760	26	2,903	640
Ferrosilicon	2	..	603	318
Pig iron	13,167	1,273	203,267	24,797
Scrap	15,809	2,384	206,895	32,878
Bar iron	4,584	198	58,770	12,207
Wire rods	6,141	2,310	104,998	15,615
Steel bars	56,872	6,038	523,953	173,681
Billets, ingots, blooms	7,042	1,869	213,458	10,113
Bolts and nuts	2,349	888	34,806	28,106
Hoops and bands	5,318	1,174	49,034	18,640
Horseshoes	58	69	1,793	578
Cut nails	699	124	8,268	1,035
Wire nails	10,023	121	81,041	21,137
All other nails, including tacks	1,580	314	10,982	4,376
Cast pipe and fittings	6,819	2,152	55,898	46,998
Welded pipe and fittings	25,317	11,911	245,133	332,375
Radiators and cast house boilers	594	205	6,827	3,275
Railroad spikes	1,776	366	15,190	7,792
Steel rails	67,708	15,026	541,648	307,164
Galvanized sheets and plates	8,137	8,426	97,120	52,055
All other sheets and plates	2,557	821	27,297	11,994
Steel plates	79,424	8,835	306,404	327,496
Steel sheets	16,064	36,954	151,513	159,069
Ship plates, punched and shaped	5,480	283	40,696	9,532
Structural steel	42,839	11,005	420,159	287,600
Tin andterne plates	15,424	8,381	205,458	98,557
Barb wire	15,508	2,939	115,779	29,099
All other wire	21,346	3,178	187,865	63,547
Total	434,297	122,290	4,402,056	2,075,674

It is interesting to observe that of the exports of sheets during the 11-month period, approximately 64 per cent, or 97,710 tons, went to Japan. Of November sheet shipments, those to Japan represented a little more than 80 per cent of the total, 31,565 tons going to that country. Among other exports of sheets for the 11-month period and for November, respectively, were Canada, 31,516 and 2,196 tons; Argentina, 4,072 and 689 tons; and the Philippine Islands 2,742 and 504 tons.

Steel rail shipments for November totaled 15,026 tons, and for the 11-month period, 307,164 tons. Japan also was the largest single purchaser of this product for both the 11-month and the single-month periods, taking 32,589 tons for the 11 months, and 4,777 tons in November. Shipments of rails to other countries included: Canada, 20,790 and 2,502 tons; Honduras, 11,914 and 1,144 tons; Argentina 11,182 and 1,549 tons, and Philippine Islands 6,630 and 1,034 tons. Japan also was the chief market for welded pipe exports in November, taking 3,549 tons of the 11,911 ex-

ported. For the 11-month period exports of welded pipe amounted to 332,375 tons, of which Japan took 24,553 tons. Other shipments of this product in November and during the 11-month period were as follows: Argentina, 1,927, and 11,817 tons; Mexico, 1,868 and 110,979 tons; Peru, 799 and 16,069 tons; Cuba, 603, and 9,295 tons; and British India, 571 and 32,588 tons.

Exports of cast iron pipe in November amounted to 2,152 tons and for the 11-month period 46,998 tons. Canada took 874 tons in November, and 4,179 tons during the 11 months; Mexico, 271 and 16,289 tons; and Cuba 231 and 7,974 tons.

Japan was also the chief exporting market in November and for the 11-month period for tin plate. Of the 8,381 tons exported in November, Japan took 5,695 tons, and of the exports of 98,557 tons for the 11 months, Japan took 24,102, or 24½ per cent.

Exports of steel plates in November amounted to 8,835 tons and during the 11 months, 327,486 tons. Canada took 698 tons in November and 100,441 tons during the 11 months, while the United Kingdom took 668 and 54,511 tons, respectively. Of the structural steel exports of 11,005 tons in November, and 287,600 tons during the 11 months, Canada took 4,911 and 55,949 tons, respectively.

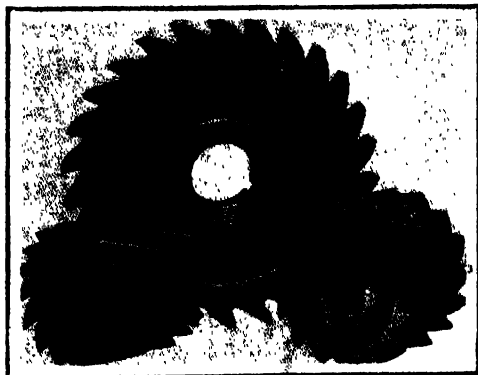
The largest single item of steel imports in November related to rails, the inbound movement of this product being 2,406 tons. Scrap ranked next with 2,777 tons and pig iron third, with 2,193 tons.

Exports of metal working machinery in November amounted to \$672,810, and for the 11 months \$18,862,988. Exports of lathes for these respective periods totaled \$67,911 and \$2,857,688; of machine tools, \$270,923 and \$4,554,586.

Develops New Milling Cutter

It is announced as the result of several years of research work, covering every phase of design and operation, the National Twist Drill & Tool Co., Detroit, has placed on the market a new type of milling cutter, known as the "parabolic" cutter.

A group of the cutters is shown in the accompanying illustration. The name "parabolic" is intended to characterize the distinctive construction of the teeth.



The Shape of Tooth Is that of a Parabola,
Slightly Modified at One End

It was found that in order to make a milling cutter tooth of uniform strength throughout its length, its shape would be that of a parabola slightly modified at the small end. This shape was then adopted. The number of teeth used is nearer to that of the conventional fine tooth cutter than to that of the coarse tooth type. In order to get the most efficient chip thickness per tooth without excessive peripheral speed a fairly large number of teeth was found desirable.

Plain-side and end-mill types are made, and also cutters for special purposes.

The entire sales force of the National Cast Iron Pipe Co. will convene at a banquet at the Tutwiler Hotel, Birmingham, Ala., on Jan. 5. The salesmen will be the guests of the management of the company for the entire week.

OLD RATES RESTORED

Tariffs Extending Temporary Schedule on Iron Ore Suspended

WASHINGTON, Dec. 27.—Railroad tariffs which had been filed with the Interstate Commerce Commission on statutory or 30 days' notice extending beyond Jan. 1 the operation of reduced rates on iron ore from Lake Erie ports to interior blast furnaces have been suspended by action of the commission. These tariffs were three in number, two of them having been filed by the Erie Railroad and one by the Pennsylvania Railroad and applied to rates from Cleveland, Lorain and Toledo, Ohio. They had been filed to become effective to-day, and were to remain in force until April 26.

This procedure of the commission means that all rates on iron ore from Lake Erie ports beginning with Jan. 1 will return to the old and higher level prevailing prior to Oct. 18. It was taken to establish uniformity in the rates by supplementing the recent action of the commission in declining to grant to other railroads the right to extend the lower rates to April 30 on short notice and under a sixth section application. Interior blast furnace interests, which, with the railroads, urged the granting of this application based their plea partly on the ground that unless this was done the rate situation as it applies to iron ore would be chaotic after Jan. 1 because the three suspended tariffs having been filed upon due notice would become effective to-day. The action of the commission overcomes this situation.

The reduced rates on imported iron ore, however, continue in effect and this has been the cause of complaint also. These rates cannot be suspended except by voluntary action of the railroads which have them in effect or through formal complaint.

The re-establishing of the old rates on ore from Lake Erie ports is the result of complaint by the lake front interests which maintained that by reason of the fact they did not benefit by the reduction, they were being discriminated against because they had received no benefit through lower coal, coke and limestone rates. Failure to obtain this relief, they pointed out, also upset the relationship between rates on raw materials used in the manufacture of pig iron. Interior blast furnace interests maintained that there is no relationship in rates between these commodities.

In any event the restoration of old ore rates is accepted by some of those in the iron and steel trade as an opportunity to seek a general rather than a piecemeal reduction in all commodities which they consume and manufacture. Preparations toward this end have been made and representatives of the trade will present their case before the commission at the general rate investigation, hearings on which will be resumed Jan. 9.

Jones & Laughlin Did Not Buy Chicago Tract

The 15 acres of lake shore property just east of and adjacent to the Illinois-Indiana State line purchased last April from Frederick and Ernest Eggers for \$322,500, and generally supposed to have been bought by the Jones & Laughlin Steel Co., Pittsburgh, was actually acquired by the Commonwealth Edison Co., Chicago, as disclosed by a recent announcement by Samuel Insull, president. The land includes three acres skirting Lake Michigan for 2700 ft. and will be improved with one of the largest power plants in the world to supply current to the steel mill district. No definite date has been set for the construction of the plant, however.

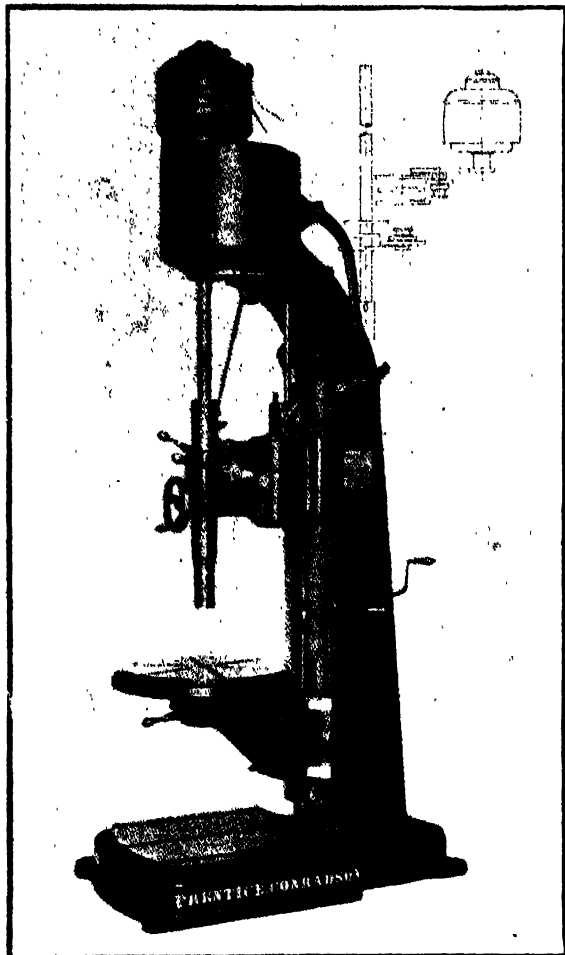
Rates Not Unjust

WASHINGTON, Dec. 27.—A tentative report prepared by Examiner Frank R. Mullen recommends that the Interstate Commerce Commission dismiss the complaint of the National Rolling Mill Co., vs. the Baltimore & Ohio, et al., against the rates on bar iron from Vincennes, Ind., to destinations in Indiana, Illinois, Missouri, Wisconsin, and Iowa, applied to shipments made between Dec. 5 and Aug. 25, 1920. The examiner states that the rates were neither unjust nor unreasonable.

Vertical Drill with Direct Motor Drive

A 32-in. vertical drilling machine, the chief feature of which lies in the direct application of the motor drive as shown in the illustrations, has been brought out by Prentice Conradson, Green Bay, Wis. Cone pulleys, belts, vertical shafts and other usual components have been eliminated. In this arrangement, it is claimed, tests show that no measurable loss takes place in the gearing and that smaller motors can be used, working at a higher power factor. The advantages resulting are said to include economy as to the cost of motor and in operating efficiency, as well as the saving in cost of the machine made possible by the elimination of many parts necessary in other designs.

The armature of the motor is built on a sleeve which



The Armature of the Motor Is Built on a Sleeve Supported in Ball Bearings Top and Bottom. The diagrammatic view shows the arrangement of the gearing.

is supported in ball bearings top and bottom. Mounted on this sleeve there is a pinion which engages with a gear mounted on the first intermediate shaft, as shown in the diagrammatic view. Sliding on splines on the intermediate shaft there is a cluster gear engaging with gears on the second intermediate shaft, the engagement of these gears being effected by means of a lever.

The cluster gear on the second intermediate shaft engages with gears keyed to the spindle driving sleeve, which drives the spindle through a key. The intermediate shafts and the spindle sleeve are mounted on ball bearings and oiled continuously by an oil bath. All gears on the shafts are of alloy steel, heat-treated.

There are nine speed changes, controlled by conveniently located levers. Six feeds are provided, ranging from 0.006 to 0.035. The thrust due to drilling is taken on a ball bearing. Rapid hand traverse is provided, also the usual hand feed, stop motion and depth gage. For tapping, the motor is reversed, acting as rapidly as if fitted with reversing clutches.

The motor shown in the illustration is the Watson,

built especially for the drill by the Mechanical Appliance Co., Milwaukee. The controller is also built especially for the drill, being developed by the Allen-Bradley Co., Milwaukee. The controller is designed to give snappy start and reverse and at the same time to protect the motor against accidental overloads. The controller is automatic in that the small master drum operates a clapper switch through a magnet, and at the same time the inverse time element protective device prevents abuse without stopping the motor when called on for a short overload. No voltage protection is included.

Either alternating current or direct current motors are provided, attached to the machine. A 3-hp. motor at 1200 r.p.m. is recommended for ordinary work and a 5-hp. motor at 1800 r.p.m. for very rapid work.

The frame of the machine is cast integral with the headstock, the column and base being one casting. The table has the usual adjustments, and rectangular and sliding tables can be provided. The distance from the floor to the top of the machine is 10 ft. 2 in., and to top of spindle, 11 ft. 8 in. The capacity is 3 in. high-speed drill in steel and 4 in. pipe tap in cast iron. The weight is 3700 lb. net and the floor space occupied 30x54 in.

The drill will be made also in 25-in. and 36-in. sizes.

January Meetings of Mechanical Engineers

Among meetings scheduled by branches of the American Society of Mechanical Engineers for the immediate future may be mentioned the following:

New Britain, Conn., Jan 3, address on the development and use of precision gages by Major W. E. Hoke, consulting engineer, Baltimore.

Worcester, Mass., Jan 3, at Higgins Hall, Boys Trade School address on "Mechanical Heating Problems Solved Electrically" by C. L. Ipsen, General Electric Co.

Buffalo, Jan. 4, "Patents and the Patent Law" by A. M. Halcombe, Emery, Booth, Janney & Varney, Washington.

Norfolk Va., Jan. 6, at the Chamber of Commerce, addresses on "Engineers as Industrial Managers."

New Haven, Conn., Jan. 16, "Labor and the Present Industrial Situation" by Dr. Magnus W. Alexander, managing director National Industrial Conference Board, New York.

New York, Jan. 17, at the Engineering Societies Building, 29 West Thirty-ninth Street, "A Modern Automobile Plant," by P. L. Battey, Willys Corporation.

Toledo, Ohio, Jan. 19, at the Toledo Commerce Club, "Influence of the Automobile on the Design of Presses and Dies" by Neal W. Dorman, Toledo Machine & Tool Co.

Chicago, Jan. 20, at the Hotel Sherman, addresses by Prof. Dexter S. Kimball, Cornell University, and Dr. S. W. Stratton director Bureau of Standards, Washington, following a dinner meeting.

New York, Jan. 24, Engineering Societies Building, "Industrial Power Requirements" with D. B. Rushmore, General Electric Co., presiding.

Worcester, Mass., Jan 24, in recreation room of the North Works of the American Steel & Wire Co., illustrated talk on "Manufacture and Use of Die Castings" by A. M. Brewster, president Atlas Die Casting Co., and "A Close-up of Stoker Combustion" by F. Harold Daniels, Sanford Riley Stoker Co., employing motion pictures.

Extensions at LaBelle Works

The Wheeling Steel Corporation, Wheeling, W. Va., contemplates making some large extensions to present equipment at its LaBelle Iron Works plant at Steubenville, Ohio. The company has inquiries out for a 35-in. two-high reversing blooming mill, together with tables, three heavy shears, transfers and other accessory equipment to be installed at LaBelle Works. It is expected that this contract will be placed very early in the new year, and possibly some other large equipment will be added to the LaBelle plant.

CONTENTS

DECEMBER 29, 1921

Casting Small Parts in Production Foundry	1653
Short Side Movements Supplement Continuous Forward Progress in Gilbert & Barker Plant	

Sulphur and Oxides in Ordnance Steel	1658
Comparison of Open-Hearth and Electric Practice—Lower Sulphur Insures Superior Toughness	

Electrification of Steel Plant Railroad	1663
Difficulties Include Protection of Third Rail from Hot Metal Spills—Investment Offset by Low Operating Cost	

Declaration of Government Policy Expected	1669
Attorney General and Secretary of Commerce Studying Supreme Court Decision in Hardwood Association Case	

Fuel Saving in Modern Gas Producers	1671
Avoiding Present Wastes in the Industries Using Producers, Producer Gas Furnaces and Industrial Furnaces	

Further Gains in Iron and Steel Exports	1676
Larger Outward Movement of Sheets and Rails—Year's Figures to Date Are Less Than Half of 1920	

Recognition of Employees in Shop Sug- gestion System.....	1656	Special Crane for Naval Ordnance Plant.	1674
New Punch, Shear and Bar Cutter.....	1657	American Rolling Mill Co. Buys Ashland Iron & Mining Co.....	1674
Labor Notes.....	1657, 1675	New Milling Cutter with Parabolic Teeth	1677
Friction in Rolling Mills.....	1661	Old Railroad Rates Restored on Iron Ore	1677
Success by Taking Thought for Others...	1661	Vertical Drill with Direct Motor Drive...	1678
Horizontal Boring Machine.....	1662	January Meetings of Mechanical Engi- neers	1678
Chest of Silver Presented to A. N. Flora.	1662	Editorials	1680
Light Weight Portable Electric Drill...	1666	The Normal in Pig Iron—Thrift and Progress—Hardwood Association Case—A Poor Coal Year—Wage Set- tlement on Industrial Prospects— Sulphur in Ordnance Steel	
Metals for Aeronautics.....	1666	Correspondence	1683
Long Range Planning of Public Works..	1666	Making a Gage to Signal Danger	
Portland Cement Production High.....	1666	Experimental Work of the Bureau of Mines	1696
Foreign Trade Conditions....1667, 1695, 1696		Open Price Association Case.....	1697
Grain Side of Belts More Efficient.....	1667	Industrial Health Measures in Cincinnati	1699
Double Head Grinder for Finishing Wrist Pin Holes.....	1668	Book Reviews.....	1702
Hydraulic Press for Automobile Bodies..	1670	Short Trade Items.....	1702
Michigan Foundrymen's Association Meets	1670	Industrial Finance.....	1709
Results of Studies in Coal Washing	1672		
Pulverized Coal Burning Equipment....	1673		
Foreign Trade Council to Meet in Phila- delphia	1673		

Iron and Steel Markets	1684
Comparison of Prices	1685
Prices Finished Iron and Steel, f. o. b. Pittsburgh	1698
Non-Ferrous Metal Markets	1699
Personal Notes	1700
Obituary Notes	1701
Machinery Markets and News of the Works	1703
New York Jobbers' Prices	1710

ESTABLISHED 1876.

THE IRON AGE

EDITORS:

A. I. FINDLEY

WILLIAM W. MACON

GEORGE SMART

CHARLES S. BAUR, *Advertising Manager*

Member of the Audit Bureau of Circulations and of
Associated Business Papers, Inc.

Published every Thursday by the IRON AGE PUBLISHING CO., 239 West 39th Street, New York

F. J. Frank, *President*

George H. Griffiths, *Secretary*

Owned by the United Publishers Corporation, 243 West 30th Street, New York. H. M. Sweetland, *Pres.*, Charles G. Phillips, *Vice-Pres.*, A. C. Pearson, *Treas.*, F. J. Frank, *Secy.*

BRANCH OFFICES.—Chicago: Otis Building. Pittsburgh: Park Building. Boston: 410 Unity Building. Philadelphia: 1420-1422 Widener Building. Cleveland: Guardian Building.

Detroit: 317 West Fort St. Cincinnati: Mercantile Library Bldg. Washington: 816 Fifteenth St., N. W. San Francisco: 320 Market St. London, Eng.: 11 Haymarket, S.W. 1. Subscription Price: United States and Possessions, Mexico, Cuba, Shanghai, \$6.00; Canada, \$8.50; Foreign, \$12.00 per year. Single copy 50 cents.

Entered as second class matter, June 18, 1879, at the Post Office at New York, New York, under the Act of March 3, 1879

The Normal in Pig Iron

If there were such a thing as a normal need or a normal output, as of pig iron, it would be proper to refer to current production as a percentage of this normal. Then industry might take comfort in the arithmetical argument that business must soon be better, when the percentage is low, or it might note the signal, though it rarely does, that business cannot long remain active when the percentage is much over 100. However, the nearest approach to such a mode of measurement is to express operations in percentage of capacity. Coming close to 100 is naturally regarded as satisfactory, while a very low rate has only one element of satisfaction—the belief that wear and tear requirements take roundly 50 per cent of capacity and cannot long be ignored. One fault there seems to be, that buyers do ignore necessity, as they have been doing this year's or it may be that the tradition as to the minimum consumptive rate at which the country can maintain its life needs redetermination. After an upswing of business is under way again we shall be able to reappraise what is the wear and tear basis.

If attempts are ever made to consider operations in relation to so-called normal needs, it will be necessary to establish what is the normal. The term continually creeps into financial analyses of the industrial situation and gives the casual reader an incorrect conception.

The normal production of a basic material might be judged from the amounts shown over a term of years as going into consumption. In pig iron this has been an ever increasing tonnage, dependent not merely on the population but on the increasing uses demanded by what we call the advance of civilization. In the light of the records of production, we should need 780 lb. of pig iron per person for 1921, yet the year's output will be less than 45 per cent of this amount. Seeing that in 1920 production was 2 per cent above the apparent normal for that year, and that in 1919, the first full year after the swollen output of the war period, production was only 11 per cent below the apparent normal, it is perhaps hardly surprising that demand has been relatively so low this year. Disregarding surface conditions, the relatively

heavy per capita outputs of 1919 and 1920 left for 1921 a slowing up until supplies could be absorbed and until demand and production could approach a parity.

Normal needs of pig iron for 1921 may be put at 37,000,000 gross tons, so that the year's theoretical deficiency is about 20,000,000 tons, or several times what we regarded as the theoretical surplus on Jan. 1, 1921, resulting from the stimulated pig-iron making of the war period and afterward. Figures leave the conclusion that under long continued depression there is a storing up of needs against a new intensity of manufacture once the change of sentiment in business occurs, for the theoretical requirements of 1922 are 38,500,000 gross tons and there can hardly be a theoretical surplus to-day.

Thrift and Progress

The buying activities of a people fall into two categories, those represented by current consumption, the consumption of materials and the utilization of service, and those represented by the accumulation of facilities of lasting character, which will continuously furnish comfort or enjoyment. In the household, a can of tomatoes or a pound of coffee falls in the first category, an electric smoothing iron or a carpet in the second category. In governmental affairs the Congressional Record falls into the one category, a new postoffice building into the other. In industry generally, mining coal, once the mine is equipped, is similarly distinguished from the erection of a modern economical power plant.

What is commonly known as "progress" in the affairs of a people is represented by additions like these to private, semi-public or public facilities. The aim of all peoples is, or should be, to make progress. It has been well understood in the past year that progress along these lines has not been at a normal rate. Much thought has been given, and many words have been used, in an effort to indicate the impediments that have stood in the way of normal progress being made. Upon two impediments much stress has been laid, while a third impediment has received little attention.

The first of the two much-mentioned impedi-

ments is high cost. Inasmuch as new facilities are installed for the purpose of rendering service in future, perhaps for many years, they represent an investment and the investor does not wish to see his investment greatly depreciate in replacement value by the cost declining in future. The principle applies similarly, though in varying degree, to an electric smoothing iron, a carpet, a power plant or an office building.

The second of the two much-mentioned impediments is the high income surtax in the federal taxation system, whereby the large investor or possible investor is not only taxed very heavily on his last dollar of taxable income but is prevented from securing an average return in a period of years because the good years are taxed heavily while in the poor years there is no refund.

These two impediments are important, but there is a third of no small importance, one that large investors no doubt have been taking into account. That is the change in the habits and ambitions of the people at large, whereby there is a disposition to spend more money than formerly on articles of current consumption and services of transient value, and less upon permanent facilities. Two impressive illustrations are the automobile and the cinema exhibition. There is current consumption of gasoline and tires and depreciation of the car itself, while the average film is old a few days after its release. It may be argued that when the people actually have the money to spend it really does not matter, but one can see that it does matter by reflecting on the large amount of the nation's productive labor that is expended in producing gasoline, tires and automobiles and in producing and exhibiting films. We are not working correspondingly harder than when we did not produce many automobiles and films, probably not nearly as hard.

The stress laid upon the two impediments to progress just mentioned would suggest that if the investor were offered a lower cost and a reduced tax, he would at once proceed to create great new facilities, but the investor might balk, on the ground that perhaps the public would not patronize his investment.

In other words, the habits of thrift of pre-war times are now not so much in evidence. Thrift is necessary if progress is to be made. For a time after the war, the absence of thrift was much commented upon and the condition was attributed to a psychological reaction from war-time conditions. It was assumed that the feeling would wear off. It is high time now to reflect that even in three years there has not been a full return to the pre-war attitude.

Business is pleased to note the activity taken by more than one agency looking to establish a demand for an international economic conference. Those on the outside think the executive department of the Government ought to take the initiative, as it did in the present political diplomatic conference. So far, the view obtains in Washington that either such a step is unwise or events have not proceeded far enough for a decision to

be reached. Put in a nutshell, world problems, after settling the question of naval disarmament, are economic and the help of men engaged in business, including finance and possibly farming, is needed. The political representatives are making the radical move of reducing naval expenditures, but it is vital, if the restoration of international credit be hastened, that the other expert be called to his responsibility and to his obligation. Selfish as well as altruistic reasons call for the economic conference and call for it as early as possible.

Hardwood Association Case

A study of the complete text of the decision of the Supreme Court of the United States in the so-called Hardwood Lumber case strengthens the opinion expressed in these columns last week that there is nothing in the decision to prevent trade associations from carrying on their work, provided they do not attempt, directly or indirectly, to influence prices. It would indeed be unfortunate if, at this time when the Government and business are co-operating more closely than ever, anything should interfere with that co-operation. One of the latest efforts in that direction has been represented by a meeting of Secretary Hoover with engineers, architects and contractors in an effort to bring about standardization of construction contracts. At this meeting it was pointed out that there are in common use over 250 different forms of contract throughout the construction industry and that no one State or section has been able to establish any one form as standard or customary. Secretary Hoover expressed the belief that standardization offers a great field not only in protection to the public but in the general improvement of ethics in the industry itself. There is not the slightest suggestion of attempting to control prices and it is difficult to see how, except in the imagination of interested attorneys, the decision in the Hardwood case can have any relation to such efforts.

The Hardwood association had a very able and energetic "manager of statistics" and it is clear that he lost no opportunity to show the members of the association the advantages of keeping down production and keeping up prices, as Justice Clarke pointed out in his decision. Constantly throughout the minutes of the various meetings of the association there is shown a discussion of the stock and production reports in which the shortage of supply was continually emphasized with the implication, not disguised, that higher prices must result. "Men in general are so easily persuaded," said Justice Clarke, "to do that which will obviously prove profitable that this reiterated opinion from the analyst of their association, with all obtainable data before him, that higher prices were justified and could easily be obtained, must inevitably have resulted, as it did result, in concert of action in demanding them." Repeatedly at the meetings, in the strongest possible terms, the danger of operating mills to such an extent as to affect prices is dwelt upon.

Letters of the manager of statistics threw a

flood of light on his activities. For example, in one stock report he tells how it can be said "to the eternal credit of the hardwood producers, that they have maintained a stout heart and stiff backbone; with the result that there has been exhibited a strength in the market which has been little short of remarkable in the face of the light demand and the vigorous efforts which have been steadily made to hammer down prices." Evidently, not merely a comparison of prices but also the comments upon the price charts and production played an important part in bringing the court to its decision, which indicates very clearly what business associations ought not to attempt to do.

A Poor Coal Year

In the fortnight ended December 10 the production of bituminous coal was at the lowest rate since last April, whereas in normal times the highest rate of production in the year would be seen. It may be worth while to reflect that circumstances have failed to justify the cry made earlier in the year that consumers should stock coal in the summer, lest they be freezing at this time. The existing condition also furnishes a commentary on the seasonal coal freight rate plan, whereby rates were to be lower in summer than in winter, to furnish the consumer a pecuniary reason for laying in stocks. The consumer has been looking for a general reduction in freight rates and is also in expectation that coal prices will be lower on account of revision in the union mining scale. Also, he was in the mood last summer to feel that if the state of his business required him to consume much coal this winter, he would be able to pay the necessary price, while if he accumulated coal that he found he could not use he would be in an unfortunate position. It is plain in the retrospect that the seasonal coal freight rate system would not have worked advantageously this year.

The present estimate is that production of bituminous coal this year will not prove in excess of 405,000,000 tons, and such an output is regarded as representing a very great recession. It is, as a matter of fact, 150,000,000 tons or 27 per cent less than the output in 1920 and 175,000,000 tons or 30 per cent less than the record output, made in 1918, in which year there was a very material accumulation of stocks.

Some industries show greater fluctuations in activity than others and it may be interesting to compare coal with steel. The steel ingot output this year will probably prove to be a trifle under 20,000,000 tons, representing about double the recession shown by coal. By another method of comparison, the 1921 steel output is equal to the output in 1905, then a record tonnage, representing a 16-year recession, while the coal output represents a recession to a point between 1909 and 1910, or a recession of between 11 and 12 years.

Such a difference is to be attributed to coal being more an article of ordinary every day con-

sumption than is steel. Both are used for the separate purposes of current operation and of improvement, but steel runs proportionately more to the latter than does coal.

The general activity of the country can be observed from various viewpoints. One is the freight ton-mileage of the railroads. That index shows the current year to be one of about 335 billion ton-miles of revenue and non-revenue movement, representing a recession of only about 25 per cent from the record, which was made in 1920, while in point of time it represents a recession only to a period between 1915 and 1916, or say five and a half years, against about 11½ years for coal and 16 years for steel.

Thus the railroad industry is a steadier one than the coal industry, and the coal industry is steadier than the steel industry. One is inclined to assume that it is on account of its sensitiveness that iron or steel is so frequently looked upon as the barometer of trade.

Wage Settlement on Industrial Prospects

Wage readjustments which take into account not only the cost of living factor but the conditions facing the specialized industry are arranged periodically by certain of the printing crafts of New York. Presumably the cost of living items could be based on the findings regularly published by the National Industrial Conference Board. It remains to ascertain what is the outlook factor. In the case cited, 200 employers are concerned. A questionnaire was sent to them to learn the promises of the future. The investigation was delegated to three accountants, one representing the employers, the second the employees, with the third serving as a neutral. Nearly 65 per cent of the questionnaires were returned, but 24 was the final number which could be used as throwing light on the question. These replies were considered sufficiently representative and therefore valid.

So far, the plan is claimed to work and it is worth reporting as a suggestion for like co-operation in the wage settlement of a local group of craftsmen. However, when the cost of living ceases to be widely fluctuating, there would then remain as the only basis of settlement the estimate of what the industry may or may not afford to do. Prophecy, difficult even for the economists, puts the scheme on a shaky footing. Dependence largely on the cost of living basis is not likely to become the vogue any more than it was before living costs were a thing of concern. If the attempt is to approach a scientific base, factors may well be included to compensate the individual worker. There is his proficiency, resourcefulness, punctuality, reliability, experience and possibly the term of his employment. Such a basis has been tried by a single employing company and no recourse was necessary to any arbitration board of accountants, which is likely to amount in operation to the conference of a judge flanked by two advocates. At best, the wage adjustment

system calling for the three arbitrator plan is not likely to remain satisfactory, no matter what is the basis of the briefs the arbitrators are to consider.

Sulphur in Ordnance Steel

New light is thrown on the subject of sulphur in steel by an abstract, elsewhere in this issue, of a paper on naval ordnance steel. There is also clearly brought out the difference between good and bad electric steel. The entire paper is a valuable contribution to the literature of the possibilities of the electric furnace when operated as it should be.

The meeting of the specifications for ordnance gun steel has for a long time been a *bête noire* of steel makers. This has been particularly true of even acid open-hearth steel as well as of some electric steel. The great difficulty has been, not so much the tensile strength or elastic limit of the ductility as measured by the elongation and reduction of area, especially on the tangential tests. The author shows that, in properly made electric steel, a lowering of the presence of sulphides and oxides contributes a product which, even in the severest tests, such as tangential, has ductile and other qualities which are superior.

On the subject of snowflakes in steel, which were a source of so much controversy and so many rejections during the war, the author states that electric steel can develop these, unless properly made. His explanation for them is: casting at too high a temperature. If this is the true solution, then genuine snowflakes are not likely to develop in carefully made acid open-hearth steel. In fact, one plant making large guns of acid open-hearth steel during the war claims to have had no trouble from such defects.

One of the future possibilities of the electric furnace is quality steel in quantity, especially with the advent of the larger units. A conclusion to be drawn from the author's paper, however, is that no matter what the process, electric or open-hearth, the product may be quantity and not quality, unless the best possible practice rules.

St. Louis Labor Conditions

ST. LOUIS, Dec. 27.—The labor situation in this district is reflected in the following table compiled by the Eighth Federal Reserve Bank from 210 leading employers in 21 of the largest cities of the district.

	Wage Earners—				Per Cent		Pay Roll
	Men	Women	Total	Normal	Normal	of	
Nov. 1, 1921.	150,727	21,813	172,540	208,163	—17.1	\$12,572,110.67	
Oct. 1, 1921.	148,492	18,753	167,245	203,219	—17.7	12,572,533.84	
Nov. 1, 1920.	180,156	22,120	202,276	208,163	—2.8	16,981,748.17	

From the above tabulation it will be noted that the number of employees of the reporting interests decreased 29,736 or 14.7 per cent (men 16.3 per cent and women 1.4 per cent) between Nov. 1, 1920, and Nov. 1, 1921. On Nov. 1, 1920, the number was 2.8 per cent under normal and on Nov. 1, 1921, the total was 17.1 per cent under normal. Wages, figures on a semi-monthly basis, decreased \$4,409,637.50, or 25.9 per cent, between Nov. 1, 1920, and Nov. 1, 1921.

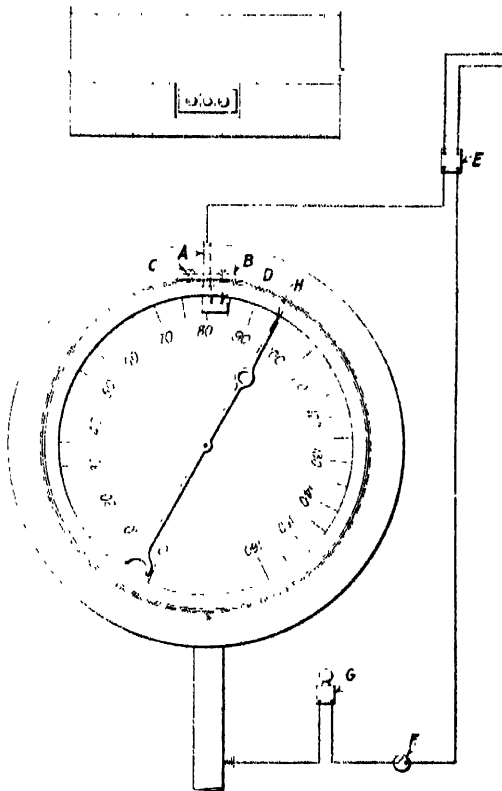
On July 1, 1921, the total of wage earners was 27.4 per cent under normal, on Aug. 1, 1921, 23.1 per cent under normal and on Sept. 1, 1921, 16.4 per cent under normal.

CORRESPONDENCE

Making a Gage to Signal Danger

To the Editor:—The accompanying sketch shows how I connected an air gage in my office to a buzzer, so that when the air pressure goes down to 80 lb. the buzzer will attract attention. It is a common thing for the superintendent or master mechanic to have gages showing pressure of steam, air, water, oil, etc., in his office, but they do not mean anything unless there is something to tell him when pressures are down.

It can be arranged so that a buzzer or bell will give warning when any certain pressure has been reached.



A Buzzer Gives Warning When the Pressure Drops to 80 Lb.

A slot was cut in the cast-iron base opposite the 80 lb. pressure mark to take a fibre (B). A $\frac{1}{4}$ -in. piece of copper wire (A) was threaded and one end soldered to a piece of 0.005 sheet copper (D). A hole was drilled in the fibre (B) and the copper wire was pushed through the fibre and a nut run down to hold it in place. Then the fibre was fastened to the base with two small screws (C), as shown. The hand (H) was soldered slightly on the end to make a good contact with (D), which was bent to give just enough tension to make contact and to hold the hand (H) only while the pressure is between 75 and 85 lb.

The power was taken off the lighting circuit to a small General Electric transformer (E) which reduced the voltage so that the current in the secondary circuit is 12 amperes. One wire extended from the transformer (E) to the copper wire (A) and one wire from (E) to the snap switch (F); then continued from (F) to the buzzer (G) and from (G) to the air pipe, which is the ground wire.

The snap switch (F) was arranged conveniently near my desk so that when the pressure would dance around 80 lb. and ring the buzzer continually, it could be shut off until the pressure was brought up again.

This has saved a great deal of time and trouble as sometimes the men in the shop would not know what was wrong with their machines until the pressure would get so low that they could hardly operate at all.

E. J. EDWARDS,
Superintendent foundry maintenance, Erie Works,
General Electric Co.

Iron and Steel Markets

PIG IRON BUYING

Year End Activity at Expense of Prices

Steel Operations Low—Promise Lies in Construction Lines, Tin Plate and Pipe

Encouraging activity in pig iron in several centers marks the end of the year. In steel, the condition is a reduced demand accounted for by deferring of deliveries until after Jan. 1. The buying of pig iron has been at the expense of prices, but so far as that goes the year end shows an average for steel prices not merely the lowest of the year, but lower than at any time since January, 1916.

The new year is promising at the outset chiefly in continued activity in construction lines, and also in a sustained demand for pipe and tin plate. By Jan. 15 a definite betterment in mill operations is expected, which is nothing to be wondered at, seeing that now operations generally average not over 30 per cent.

Many are the comparative terms in which 1921 may be described to emphasize the position which it will take in iron and steel annals for low production. In pig iron it will be necessary to go back 17 years except for the 12 months' interval after the 1907 financial panic, but whereas in 1904 production was 15 per cent below what was then the normal and the 1908 output was perhaps 30 per cent below normal, in 1921 the deficiency will amount to 55 per cent. To secure a tonnage parallel to the year's steel input, it is necessary to go back to 1905.

Pig iron sales in the Philadelphia district in the past two weeks have amounted to 50,000 tons and some of the tonnage went as low as \$18, furnace, although most of it was sold at \$19 to \$19.50. On sales of fair volume in the Chicago market, prices receded 50c. and prices of Southern iron are down 50c., or to \$17, Birmingham. Lower prices have also been made in the Cleveland market.

The immediate effect of the Steel Corporation's reduction of \$5 a ton on wire products in the few days since it was made, on Dec. 21, has been to stop buying. Wire makers generally have met the price. Its reduction of \$3 per ton in wire rods brings the corporation price to that which has been named for some weeks by independent producers.

Tin plate makers do not expect to stock as much product as usual in the first quarter, can companies showing a disposition to anticipate needs and prices remaining firm.

The prices on pipe, reduced Dec. 15, are holding well, but so little business is there in steel boiler tubes that an extra 5 per cent is allowed by several of the smaller makers. Practically all charcoal boiler-tube plants suspended operations several weeks ago.

Little encouragement was given to the rail makers. Not only have few new orders been entered, but specifications against existing contracts are not supplied with much freedom, and a good deal of production is being stocked. The Erie has placed 7000 tons with two mills, and the Kansas City

Southern 6000 tons, and fresh inquiries have appeared or are promised covering 67,500 tons, of which 50,000 tons is for the Louisville & Nashville.

In comparison with the diminished scale of shipments on domestic orders, exporting is proportionately larger. Japan is largely responsible. On the record of the first 11 months of this year 64 per cent of the steel sheets went to Japan. That country took more rails than any other country, probably buying 50,000 tons, and was third to Mexico and India in the absorption of welded pipe. It is now actively negotiating for 16,500 tons of rails, 13,000 of these for Government railways and the remainder for an electric railroad line.

An American company will provide some \$12,000,000 worth of machinery and equipment for removing a hill in Rio de Janeiro.

With 5000 tons of fabricated steel awards and only 2500 tons in new projects, structural mills nevertheless look for a continuance of the fair buying rate of the last three months. Reinforcing bars from new steel have sold at a price corresponding to 1.45c., Pittsburgh, and some fabricators have covered plates, shapes and bars at an equivalent of 1.425c., Pittsburgh. Rivet prices of \$1 a ton below the general market have been named.

THE IRON AGE finished steel composite price is now 2.062. per lb. The pig iron figure, \$18.68, is lower than any other for the year, with the sole exception of that (\$18.51½) for Aug. 9. These two figures are the lowest since September, 1916.

Pittsburgh

PITTSBURGH, Dec. 27.

The fag end of the year shows limited activity in iron and steel as regards both buying and plant operation. There is the seasonal factor embodied in the desire of all consumers that their year end inventories shall show a big cash item and a small one in materials.

The past week has been the lightest as far as business and mill operations are concerned since July. A number of independent plants both here and in the nearby districts shut down last Saturday night and will remain down until after Jan. 2. The general expectation is that not much activity will develop until about the middle of January. Fairly steady operations are expected after that, as in the meantime the mills have had a chance of accumulate orders.

A relatively good business still is being done in steel pipe and a revival of Japanese buying of light gage sheets has somewhat enlivened that market, more especially as far as the American Sheet & Tin Plate Co. is concerned. The recent reduction of \$5 per ton in wire products, which applies to unshipped orders as well as new business, has been without effect upon the demand. In heavier products, little is going on. Activity also is lacking in semi-finished steel and the pig iron market has developed little in the way of new features since a week ago. There seems to be an outlet at well sustained prices for the better grades of open-hearth scrap. Putting out of a number of ovens in the Connellsville district has resulted in a slightly steadier market in beehive oven coke.

Pig Iron.—Interest in the market on the part of consumers of all grades has been extremely low in the past week and in the absence of important transactions, it is impossible to make any change in prices. Most of

A Comparison of Prices

Advances Over the Previous Week in Heavy Type, Declines in Italics
At date, one week, one month, and one year previous

For Early Delivery

Pig Iron, Per Gross Ton:	Dec. 27, 1921	Dec. 20, 1921	Nov. 29, 1921	Dec. 28, 1920
No. 2X, Philadelphia...	\$21.34	\$21.34	\$22.34	\$34.79
No. 2, Valley furnace...	19.50	19.50	20.50	35.00
No. 2 Southern, Cin'ti...	21.50	21.50	22.50	42.50
No. 2, Birmingham, Ala.†	17.00	17.50	18.00	38.00
No. 2 foundry, Chicago*	19.00	19.50	20.00	33.00
Basic, del'd, eastern Pa.	20.25	20.25	21.00	33.86
Basic, Valley furnace...	18.25	18.25	19.00	33.00
Bessemer, Pittsburgh...	21.96	21.96	21.96	38.96
Malleable, Chicago*	19.00	19.50	20.00	33.50
Malleable, Valley...	20.00	20.00	20.00	35.00
Gray forge, Pittsburgh...	20.96	20.96	21.46	35.96
L. S. charcoal, Chicago...	31.50	31.50	31.50	43.50
Ferromanganese, del'd...	60.00	60.00	60.00	110.00

Rails, Billets, etc., Per Gross Ton:	Dec. 27, 1921	Dec. 20, 1921	Nov. 29, 1921	Dec. 28, 1920
O.-h. rails, heavy, at mill...	\$40.00	\$40.00	\$40.00	\$47.00
Bess. billets, Pittsburgh...	29.00	29.00	29.00	43.50
O.-h. billets, Pittsburgh...	29.00	29.00	29.00	43.50
O.-h. sheet bars, P'gh...	30.00	30.00	30.00	47.00
Forging billets, base, P'gh	32.00	32.00	32.00	51.00
O.-h. billets, Phila...	33.74	33.74	34.74	49.24
Wire rods, Pittsburgh...	38.00	38.00	40.00	57.00
Skelp, steel, Pittsburgh...	1.50	1.50	1.50	2.65
Light rails at mill...	1.55	1.55	1.55	3.00

Finished Iron and Steel,

Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Iron bars, Philadelphia...	1.85	1.85	1.95	3.85
Iron bars, Chicago...	1.60	1.60	1.65	3.25
Steel bars, Pittsburgh...	1.50	1.50	1.50	2.35
Steel bars, Chicago...	1.60	1.60	1.60	2.73
Steel bars, New York...	1.88	1.88	1.80	2.73
Tank plates, Pittsburgh...	1.50	1.50	1.50	2.65
Tank plates, Chicago...	1.60	1.60	1.60	3.03
Tank plates, New York...	1.83	1.83	1.88	3.03
Beams, etc., Pittsburgh...	1.50	1.50	1.50	2.45
Beams, Chicago...	1.60	1.60	1.60	2.83
Beams, New York...	1.88	1.88	1.88	2.83
Steel hoops, Pittsburgh...	2.00	2.00	2.00	3.05

*The average switching charge for delivery to foundries in the Chicago district is 70c per ton.
†Silicon, 1.75 to 2.25. ‡Silicon, 2.25 to 2.75.

The above prices are for domestic delivery and do not necessarily apply to export business.

Sheets, Nails and Wire, Dec. 27, 1921	Dec. 20, 1921	Nov. 29, 1921	Dec. 28, 1920
Per Lb. to Large Buyers:	Cents	Cents	Cents
Sheets, black, No. 28, P'gh	3.00	3.00	3.00
Sheets, galv., No. 28, P'gh	4.00	4.00	4.00
Sheets, blue an'd, 9 & 10	2.25	2.25	2.25
Wire nails, Pittsburgh...	2.50	2.75	2.75
Plain wire, Pittsburgh...	2.25	2.50	2.50
Barbed wire, galv., P'gh...	3.15	3.40	3.40
Tin plate, 100-lb. box, P'gh	\$4.75	\$4.75	\$4.75

Old Material, Per Gross Ton:

Carwheels, Chicago...	\$15.50	\$15.50	\$16.50	\$22.00
Carwheels, Philadelphia...	16.50	16.50	17.00	25.00
Heavy steel scrap, P'gh...	14.50	14.50	14.00	15.00
Heavy steel scrap, Phila...	11.50	11.50	11.50	14.50
Heavy steel scrap, Chicago	11.00	11.00	12.00	15.50
No. 1 cast, Pittsburgh...	16.00	16.00	16.50	25.00
No. 1 cast, Philadelphia...	16.50	16.50	17.50	22.50
No. 1 cast, Ch'go (net ton)	12.50	12.50	13.00	13.50
No. 1 RR. wrot, Phila...	14.50	14.50	15.50	20.00
No. 1 RR. wrot, Ch'go (net)	10.25	10.50	11.50	14.00

Coke, Connellsville, Per Net Ton at Oven:

Furnace coke, prompt...	\$2.75	\$2.75	\$2.75	\$5.50
Foundry coke, prompt...	3.75	3.75	4.00	6.50

Metals,

Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Lake copper, New York...	13.87½	13.87½	13.50	13.75
Electrolytic copper, N. Y.	13.62½	13.62½	13.87½	13.25
Zinc, St. Louis...	4.82½	4.90	4.65	5.60
Zinc, New York...	5.17½	5.25	5.15	5.60
Lead, St. Louis...	4.37½	4.40	4.35	4.50
Lead, New York...	4.70	4.70	4.70	4.50
Tin, New York...	32.75	33.00	29.87½	33.50
Antimony (Asiatic), N. Y.	4.50	4.50	4.50	5.25

Composite Price, Dec. 27, 1921, Finished Steel, 2.062c. Per Lb.

Based on prices of steel bars, beams, tank plates, plain wire, open-hearth rails, black pipe and black sheets	Dec. 20, 1921, 2.098c. Nov. 29, 1921, 2.135c. Dec. 28, 1920, 3.082c. 10-year pre-war average, 1.684c.
These products constitute 88 per cent of the United States output of finished steel.	

Composite Price, Dec. 27, 1921, Pig Iron, \$18.68 Per Gross Ton

Based on average of basic and foundry irons, the basic being Valley quotation, the foundry an average of Chicago, Philadelphia and Birmingham	Dec. 20, 1921, \$18.85 Nov. 29, 1921, 19.56 Dec. 28, 1920, 34.13 10-year pre-war average, 15.72
---	--

the steel makers in this district who buy their pig iron have shut down their plants for the holidays and are not much interested in the market. The foundries are taking on supplies only as needed and this means only carload lot buying of foundry iron. Sanitary ware and radiator manufacturers seem to have covered their immediate requirements, and also are only slightly interested. Producers of iron are not anticipating much contracting for the first quarter of the new year, but rather expecting that because of the effect upon prices of the expected reduction in railroad freight rates, melters will continue to buy closely to actual requirements.

We quote Valley furnace, the freight rate for delivery to the Cleveland or Pittsburgh district being \$1.96 per gross ton:

Basic	\$18.25
Bessemer	20.00
Gray forge	\$19.00 to 19.50
No. 2 foundry	19.50 to 20.00
No. 3 foundry	19.00 to 19.50
Malleable	20.00

Ferrosilicon.—There has been some activity in the local ferromanganese market in the last few days. The United Alloy Steel Corporation, Canton, Ohio, which has had out an inquiry for 1000 tons for next year's

delivery, has finally closed with the local producer for that quantity at the price of \$60 per ton, Pittsburgh, buyer to pay the freight to Canton. The Weirton Steel Co. has also closed for 150 tons 78 to 82 per cent material with the local producer at \$60, Pittsburgh, plus freight of \$1.82 to Weirton, making the delivered price \$61.82 per gross ton. A local open-hearth steel concern is in the market for 100 tons of 50 per cent ferrosilicon, and this may be closed before the end of the year. There is considerable demand for ferro-alloys, but it is believed that a good deal of the inquiry is to get correct ruling prices for inventory purposes. In regard to ferromanganese a local producer seems to be taking practically all of the new business offered in the Pittsburgh, Wheeling, Youngstown and other nearby districts. The delivered prices on ferromanganese of the local producer is from \$2 to \$3 per ton under the prices at which domestic and foreign material can be laid down at the various points of delivery. The fact that prompt shipments can be made by the local producer is also a factor, so that foreign and domestic, the latter made by producers away from Pittsburgh, have very little chance in this market at

the present time. Domestic and foreign makers are still quoting \$58.35, c.i.f. Atlantic seaboard, and German, which, however, runs only 76 to 80 per cent, is still offered at \$54 seaboard, and no sales are being made. The price on 50 per cent ferrosilicon seems to be a little weaker, and several small sales have been made at \$54 delivered, or slightly under that price. The market on spiegeleisen and ferrosilicon on low percentages is very dull, but prices are held fairly firm. It is stated that stocks of consumers are lower now than for many months.

We quote 78 to 82 per cent domestic ferromanganese at \$60 to \$63.67 delivered; 78 to 82 per cent foreign ferromanganese, \$58.35, c.i.f. Atlantic seaboard, German, for 76 to 80 per cent, \$54, seaboard. Average 20 per cent spiegeleisen at \$30 delivered, Pittsburgh or Valleys; 50 per cent ferrosilicon, domestic, \$54 to \$57, freight allowed. Bessemer ferrosilicon is quoted f.o.b. Jackson and New Straitsville, Ohio, furnaces as follows: 10 per cent, \$38.50; 11 per cent, \$41.80; 12 per cent, \$45.10; 13 per cent, \$49.10; 14 per cent, \$54.10; silvery iron, 6 per cent, \$27; 7 per cent, \$28; 8 per cent, \$29.50; 9 per cent, \$31.50; 10 per cent, \$33.50; 11 per cent, \$36; 12 per cent, \$38.50. The present freight rate from Jackson and New Straitsville, Ohio, into the Pittsburgh district is \$4.06 per gross ton.

Billets, Sheet Bars and Slabs.—There is so little going on that prices are very indefinite. The more common quotation is \$30, Pittsburgh or Youngstown, for sheet bars, slabs and 4-in. billets, but that price has found little or no basis in sales recently and since billets are offered at \$29 by some makers, that probably is as high as any business can be done. It is doubtful if a firm bid of \$29 for sheet bars or slabs would be turned down.

We quote 4 x 4 in. soft Bessemer and open-hearth billets at \$28 to \$30; 2 x 2 in. billets, \$30; Bessemer and open-hearth sheet bars, \$30; slabs, \$30; forging billets, ordinary carlons, \$32 to \$35, all f.o.b. Youngstown or Pittsburgh mills.

Wire Rods.—The new schedule of prices of the American Steel & Wire Co., effective Dec. 22, reducing quotations \$3 per ton, merely meets the prices which previously have been done by independent companies. All makers now are quoting a base of \$38, Pittsburgh or Youngstown for No. 5 common soft rods, but since this is no reduction to customers of independent companies there naturally has been hesitation among these consumers. The market really is rather unsteady and the appearance of sizable inquiries probably would develop recessions.

Structural Material.—Few structural awards of any considerable size are being placed with shops in this district and this makes for a dull market in plain material. So little is going on that prices are poorly defined. Quotations still range from 1.50c. to 1.60c. on structural beams, but only retail lots are bringing more than the lower figure. The McClintic-Marshall Co. has taken 250 tons for a warehouse for the H. J. Heinz Co., Pittsburgh, and 300 tons for a coal handling plant for the Ashland Coal & Coke Co., Ashland, W. Va., placed through the Pittsburgh Coal Washer Co., Pittsburgh. The Jones & Laughlin Steel Co. will fabricate 225 tons of tramway towers for the United States Smelting, Refining & Mining Co., for shipment to one of the Mexican properties of that company. Prices are given on page 1698.

Steel Rails.—The railroads are not specifying with much freedom against such orders as they have placed and a good deal of the current production of the Steel Corporation subsidiary here is being stocked. Demand for light rails is still moderate. Makers are quoting 1.60c. base, but are not adhering firmly to that figure when there is an order at stake.

We quote 25 to 45-lb. sections, rolled from new steel, 1.55c. to 1.60c. base; rolled from old rails, 1.50c. base; standard rails, \$40 per gross ton mill for Bessemer and open-hearth sections.

Iron and Steel Bars.—Demand is still on a tapering scale, but there seems to be a steadier tone to the market because of a realization that further concessions at this time probably would not result in orders. We regard the market as steady at 1.50c., Pittsburgh, on such tonnages as are coming from points that are not in competitive territory. With the Pittsburgh basing point largely disregarded, Pittsburgh mills would have to shade prices to get business at sources near other steel making centers, which have a lower freight rate than Pittsburgh. Reinforcing bars made from new steel have sold at 1.45c., and this price can be done again on desirable tonnages. Iron bars are slow and the

weaker tendency in other markets is not without effect upon local prices. As much as 2.25c. base is quoted on refined iron bars by Pittsburgh makers, but this is merely a negotiation quotation.

We quote steel bars rolled from billets at 1.50c.; reinforcing bars, rolled from billets, 1.45c. to 1.50c. base; reinforcing bars, rolled from old rails, 1.40c. to 1.45c.; refined iron bars, 2c. to 2.10c. in carloads, f.o.b. mill, Pittsburgh.

Plates.—There has been a decided decrease in the demand, which is directly traceable to the fact that tank builders are well protected against such orders as they have on their books, while new ones have been few in the past fortnight. Pittsburgh and Youngstown plate makers are not going below 1.50c. mill, but with makers in other centers ignoring the Pittsburgh basing point, business of the former is localized.

We quote sheared plates, 3/4 in. and heavier, tank quality, at 1.50c. to 1.60c. f.o.b. Pittsburgh.

Wire Products.—The announcement on Dec. 21 of the American Steel & Wire Co. reducing prices \$5 per ton, effective Dec. 22, was merely the public affirmation of prices which previously had been done by several of the independent companies, which apply also against unshipped orders. As yet the lower quotations have not been of much help to business. The new prices of the American Steel & Wire Co. are \$2.50, base per keg for bright nails, \$2.25 case 100 lb. for bright and annealed wire; \$2.75 for galvanized wire; \$2.15 for galvanized barbed wire and fence staples; \$2.65 for painted barbed wire and polished fence staples and \$2.10 for cement coated nails. One large independent is naming a price of \$2 base per count keg on cement coated nails. Other makers, although quoting \$2.10, are meeting competition.

We quote wire nails at \$2.50 base per keg, Pittsburgh, and bright basic and Bessemer wire at \$2.25 base per 100 lb., Pittsburgh.

Spikes.—Local makers say that the new demand is quiet, but some railroads are in the market with inquiries, probably largely for inventory purposes rather than with the idea of placing orders. Local makers say they have made practically no sales in the past week, and do not expect to do much until after the first of the year. Prices now in effect are given on page 1698.

Iron and Steel Pipe.—Although demands are smaller in all kinds of pipe as the end of the year approaches, business is good as compared with most finished products. Jobbers seem to be enjoying a good business in merchant pipe and find it necessary to specify pretty constantly to maintain their stocks. All of the large line pipe business for this year has been closed, but it is expected that soon after the turn of the year there will be additional awards against inquiries which now are pending. Business in oil well pipe could be better. There is very good observance of the Dec. 15 steel pipe card and no change in wrought iron pipe discounts, although the wide difference between steel and iron pipe occasions some anxiety among the makers of the latter, and there are intimations of a downward revision of prices after the turn of the new year. Discounts are given on page 1698.

Cold Finished Steel Bars and Shafting.—Makers report the local situation as extremely dull in demand, and one leading maker says he does not expect very much betterment in the new demand until April of next year. Practically no orders are coming in at this time from the automobile trade, and none is expected until pretty well after the turn of the year. It is stated that stocks held by automobile buyers, and also by the machinery trade, are sufficiently large to carry them over the next month or two, without any new buying. The severe declines in prices that have taken place in shafting and cold-finished steel bars, almost prohibit any lower prices, as makers say that even at present prices, there is no profit. Recently several sales of shafting were made at 2c. at mill, but these were fairly desirable orders under the present dull situation, and less desirable orders still bring 2.10c. to 2.15c. We therefore quote cold-finished steel bars and shafting at 2c. to 2.15c. at mill, the lower price being made only on the larger orders. Ground shafting still is quoted \$2.50 base per 100-lb. f.o.b. mill, in carload lots.

Boiler Tubes.—Demand for lap welded steel boiler tubes is steady enough, but apparently there is not enough business to give all makers a share and observance of the discount card is on the part of a few rather than the many. An extra 5 per cent is being given by several of the smaller makers. Charcoal iron boiler tubes are fairly firm, but practically all makers suspended operations several weeks ago and the only company active in this district is planning on an early shut-down. Discounts are given on page 1698.

Nuts and Bolts.—Local makers state that the quiet demand which has existed for some months has been accentuated by the inventory period, and almost no new business is being placed. There is no inclination on the part of large consumers or jobbers to anticipate their needs, and the present very light demand is only for small lots to meet current needs. Makers say that present discounts are holding firm, largely for the reason that not enough business is coming up to shade them, and further, that present prices are, and have been for some time, below actual cost of manufacture. Automobile makers are buying practically nothing, but are expected to come into the market early in the new year. On the present small orders being placed, discounts in the local market are holding fairly well and these are given on page 1698.

Rivets.—New demand is seasonably quiet, buyers not caring to place any new orders until after the turn of the year. Prices show no change, but on a very desirable order it is possible that the price of \$2.25 per 100-lb. on large structural and ship rivets, and \$2.35 on large boiler rivets might be shaded. However, local makers say they have not made any sales below these prices. Considerable buying is expected in rivets shortly after the first of the year. Prices are given on page 1698.

Sheets.—Business with all makers still is of moderate proportions because of the desire of consumers and jobbers to avoid heavy stocks and not much interest in future requirements is noted, presumably because of a desire to wait until the completion of the year end check up. The one bright spot in the situation is the revival of the Japanese demand for light gage sheets. This business calls for sheets of tin mill gages and dimensions and the bulk of it is going to the American Sheet & Tin Plate Co. because it possesses the best facilities for producing this material. In spite of the generally slow demand, there is remarkably close adherence to regular market quotations. The American Sheet & Tin Plate Co., last week, operated more than 65 per cent of its hot-sheet mills. Independents averaged about 40 per cent. This week's operations will be lower because of the holiday interruptions. Prices are given on page 1698.

Tin Plate.—New business does not amount to much, but orders covering the January requirements of container manufacturers are in and generally were accompanied by specifications. The first quarter of the year usually is a period of light consumption, but it is believed that the mills will not be obliged to stock as much production as usual during the next three months because it is doubtful that there will be any further decline in prices and the can companies are showing more of a disposition to anticipate their needs than they did a year ago.

We quote standard production coke tin plate at \$4.75 per base box f.o.b. Pittsburgh for carload lots.

Hoops and Bands.—The market is dull and irregular. On hoops makers are trying to maintain a base of 2.10c., Pittsburgh, but find it necessary to go to 2c. in some districts in competition with mills having a lower freight rate to the point of consumption. On bands, no recent business has been done above 1.90c. base, although the negotiation price of most makers is 2c.

Hot-Rolled and Cold-Rolled Strips.—Real activity still is lacking, particularly with regard to early shipment tonnages. There are still some makers who are quoting 2.25c., base, for hot-rolled and 4c., base, for cold-rolled, but the more common quotations are 2c. and 3.75c., and even these prices are being shaded on desirable orders.

Coke and Coal.—Two first quarter contracts for furnace coke, one of 12,000 tons a month and the other of 10,000 tons a month, have been closed in the past week. The larger contract, made by a Valley steel maker, went to a Connellsville producing interest, and while the details as to prices have not been made public, the common impression is that it carries a price of about \$3.25 per net ton oven. The other business went to a steel works by-product plant, but the price is withheld. Negotiations still are in progress covering the requirements of the furnace of the A. M. Byers Co., Girard, Ohio, calling for 15,000 tons per month, and for 18,000 tons a month for the Trumbull-Cliffs Furnace Co., Warren, Ohio. Negotiations also are in progress for several smaller lots of furnace coke, the price to be determined by THE IRON AGE quotation on prompt or spot tonnages. The company making this proposition feels that it is a more equitable plan than that of basing the price of coke on the price of pig iron. The spot market in furnace coke is slightly firmer, as the blowing out of a number of beehive ovens has considerably shortened the supply, and while some tonnages still are available as low as \$2.75 per net ton, oven, some recent business has been done as high as \$3. The spot market in foundry coke is quotable generally at \$3.75 to \$4, though choice brands still are selling up to \$4.25. A shortage of slack grade of coal, due to the fact that there is not much demand for or production of screened coal, has resulted in some stiffening of the price, recent sales having been done at \$1.80 to \$1.90. Mine run steam coal for prompt delivery is offered at \$1.40 to \$1.50 and mine run by-product from \$1.60 to \$1.85 for spot shipment and \$1.90 to \$2 for first quarter delivery. The spot market on gas coal, mine run grade, is \$2 to \$2.30.

Old Material.—There has been some considerable activity in selected heavy steel scrap in the local market in the past week. The National Tube Co. is credited with having bought upwards of 15,000 tons of selected heavy steel scrap for its Lorain, Ohio, works, while the American Steel & Wire Co. is said to have bought 10,000 tons or more for its Donora, Pa., works. These transactions were closed about a week ago, but since that time, demand has slowed down very considerably and very little new business is being placed. Consumers do not want to buy scrap until after the first of the year, and in addition, some large consumers have suspended shipments until after Jan. 1, among these being Republic Iron & Steel Co., Youngstown, Sharon Steel Hoop Co. for Sharon and Weirton Steel Co. for Weirton, W. Va., and probably others. Local dealers say they expect by Jan. 15 or Feb. 1, there will be considerable new movement in scrap, stocks in consumers' yards being reported as very low. There is very little demand for borings and turnings, and prices are largely nominal. Consumers will not pay over \$8 to \$8.50 for turnings and not over \$8.50 to \$9 for borings, prices quoted by dealers being about 50c. per ton higher. Prices, owing to the small amount of material sold in the past week or so, have shown no important changes.

We quote for delivery to consumers' mills in the Pittsburgh and other districts taking the Pittsburgh freight rate, as follows:

Heavy melting steel, Steubenville, Rollinsbee, Brackenridge, Monessen, Midland and Pittsburgh.....	\$14.50 to \$14.75
No. 1 cast, cupola size.....	16.00 to 16.50
Re-rolling rails, Newark and Cambridge, Ohio; Cumberland, Md.; Huntington, W. Va., and Franklin, Pa.....	15.50 to 16.00
Compressed sheet steel.....	12.25 to 12.50
Bundled sheets, sides and ends.....	10.25 to 10.50
Railroad knuckles and couplers.....	15.00 to 15.50
Railroad coil and leaf springs.....	15.00 to 15.50
Low phosphorus standard bloom and billet ends.....	18.00 to 19.00
Low phosphorus plates and other grades.....	17.00 to 17.50
Railroad malleable.....	13.00 to 13.50
Iron car axles.....	25.00 to 26.00
Locomotive axles, steel.....	22.00 to 24.00
Steel car axles.....	15.50 to 16.00
Cast iron wheels.....	15.00 to 15.50
Roller steel wheels.....	15.00 to 15.50
Machine shop turnings.....	8.50 to 9.00
Sheet bar crop ends.....	14.00 to 14.50
Heavy steel axle turnings.....	11.00 to 11.50
Short shoveling turnings.....	10.00 to 10.50
Heavy breakable cast.....	14.00 to 14.50
Stove plate.....	12.00 to 12.50
Cast iron borings.....	9.00 to 9.50
No. 1 railroad wrought.....	11.50 to 12.00

Chicago

CHICAGO, Dec. 27.

Mill operations are diminishing as the end of the year draws near, but this contraction in production does not reflect reduced demand so much as the desire of buyers to have deliveries deferred until January. In fact, one of the most important local producers reports that December bookings are larger than those of November. This is largely accounted for by the heavy individual tonnages which have been ordered by car builders and tank fabricators to apply against contracts which they secured some weeks ago. While some of this tonnage will not be rolled until January, enough of it has been released this month to sustain mill operations at a higher rate than would otherwise be possible, in view of the slump in general demand. Further business from the car and tank shops is not in immediate prospect, however, as the railroads have deferred action on pending inquiries for cars and no new tank work is reported. Notwithstanding this fact, the mills are not taking a gloomy view of the situation, as they expect jobbers and others who have withheld purchases during inventory taking to re-enter the market with the opening of the new year and close for a respectable tonnage. This buying will probably be confined to the replenishment of depleted stocks, as it is likely that caution will continue to actuate the policy of consumers until a general freight rate reduction has been made.

Except for a reduction in wire and wire nails announced by the leading producer, the price situation shows little change. Plates, structural shapes and bars are no weaker than heretofore and sheet prices remain firm. Whereas the situation in finished commodities, with the exception of wire products, remains in statu quo, pig iron has shown further weakness and has dropped another half dollar.

The Illinois Steel Co. still has 11 furnaces in blast, but has reduced its steel output to 40 per cent of ingot capacity. The Inland Steel Co. has shut down its sheet mills and its continuous bar mill between the holidays, but expects to resume at a 50 per cent rate early in the new year.

Pig Iron.—With spot buying at a low ebb, attention is centered on first quarter and first half business. Some good-sized tonnages for those deliveries have been closed and the terms of the transactions indicate further weakness in the market. A northern Indiana melter bought 1000 tons of foundry at \$19 base furnace for first quarter delivery, while another Indiana consumer closed for 750 tons for first half shipment at less than that price. In fact, a local user who purchased 2000 tons of foundry for January delivery is reported to have placed the order at \$18 base, local furnace. Considerable first quarter and first half tonnage is still pending and several new inquiries are reported, including one from a local manufacturer for 300 tons of malleable for delivery during January and February to a branch plant at Indianapolis and another of 300 tons of foundry from a northern Illinois melter for first quarter shipment. Sellers look for better business in the early months of the new year, as the stocks of most melters, except the implement manufacturers, are low and operations are sufficiently active to make some replenishment buying necessary.

Quotations on Northern foundry, high phosphorus malleable and basic irons are f.o.b. local furnace and do not include a switching charge averaging 70c. per ton. Other prices are for iron delivered at consumers' yards, or when so indicated, f.o.b. furnace other than local.

Lake Superior charcoal, averaging	
sil. 1.50, delivered at Chicago.....	\$31.50
Northern coke, No. 1, sil. 2.25 to 2.75.....	\$19.50 to 20.00
Northern coke, foundry, No. 2, sil.	
1.75 to 2.25.....	19.00 to 19.50
Northern high phos.....	19.00 to 19.50
Southern foundry, sil. 1.75 to 2.25.....	24.17
Malleable, not over 2.25 sil.....	19.00 to 19.50
Basic.....	19.00 to 19.50
Low phos., Birmingham.....	32.00
Low phos., Valley furnace, sil. 1 to 2	
per cent copper free.....	33.00
Silvery, sil. 8 per cent.....	32.82 to 34.82

Ferroalloys.—The market is inactive.

We quote 78 to 82 per cent ferromanganese, \$66.75, delivered; 50 per cent ferroallicon, \$50, delivered; spiegelisen, 18 to 22 per cent, \$86 to \$87, delivered.

Rails and Track Supplies.—Two more rail orders have been received by the Gary mill, one for 6000 tons from the Kansas City Southern and another for 4000 tons from the Erie. The railroads are evincing little interest in track fastenings for the time being. Among the few orders reported is one for 40,000 iron tie plates. The price situation shows little change, tie plates being slightly weaker as low as \$37.50 per net ton, f.o.b. mill having been done.

Standard Bessemer and open-hearth rails, \$40; light rails rolled from new steel, 1.70c. to 1.75c. f.o.b. makers' mills.

Standard railroad spikes, 2.15c. to 2.25c., Pittsburgh; track bolts with square nuts, 3.20c. to 3.25c., Pittsburgh; tie plates, steel and iron, 1.875c. to 2c., f.o.b. mill; angle bars, 2.40c., f.o.b. mill.

Railroad Equipment.—The Illinois Central, Burlington, Great Northern and Union Pacific have deferred action on their inquiries for cars and locomotives until January. The Central of New Jersey has ordered 25 mikado type locomotives from the American Locomotive Co.

Bars.—Except for tonnage coming from carbuilders, little new business in mild steel bars has developed. In the reinforcing field, considerable work is in prospect, but it will not come up for bids until next year. An alternate all-reinforced concrete design of warehouse No. 12 for the Belknap Hardware & Mfg. Co., Louisville, Ky. will call for a large tonnage of bars. Even in the structural steel design now in the hands of fabricators some tonnage of reinforcing bars is specified. At Memphis, Tenn., a hospital and an auditorium and market building are proposed and both of these projects will require a round tonnage of reinforcing. Bids on the general contract for the Grant Park stadium Chicago, requiring 2700 tons of reinforcing, have been rejected. Bar iron mills report their bookings somewhat improved although the tonnage coming in is far from sufficient to put them on a satisfactory operating basis. In hard steel bars pending business includes:

Reinforcing bars for new tuberculosis sanatorium at National Soldiers' Home, Milwaukee, 500 tons. Bids being taken by H. Schmitt & Son, Inc., 430-432 Farwell Avenue, Milwaukee, successful bidder on general contract at \$1,094,000.

Mill prices are: Mild steel bars, 1.60c. to 1.75c., Chicago; common bar iron, 1.60c. to 1.65c., Chicago; rail carbon, 1.65c., mill or Chicago.

Jobbers quote 2.68c. for steel bars out of warehouse. The warehouse quotation on cold-rolled steel bars and shafting is 3.55c. for rounds and 4.05c. for flats, squares and hexagons. Jobbers quote hard and medium deformed steel bars at 2.38c. base. Hoops and bands, 3.28c.

Wire Products.—The American Steel & Wire Co. has announced reductions in wire and nails the new quotations being \$2.50 base per keg on wire nails, \$2.25 per 100 lb. on bright Bessemer and basic wire, and \$2.10 per count keg on cement-coated nails. The same prices have been adopted by a number of independents. New business is light both from the railroads and the jobbers. The stocks of the latter are very low, however, and they are expected to come into the market in January.

We quote warehouse prices f.o.b. Chicago: No. 9 and heavier black annealed wire, \$3.13 per 100 lb.; No. 9 and heavier bright basic wire, \$3.25 per 100 lb.; common wire nails, \$3.25 per 100 lb.; cement coated nails, \$2.65 per keg.

Sheets.—Mills are holding firmly to the quotations named below but they are booking little new business. The mills of the local independent have been shut down for the holidays to permit the plant to be cleaned up after several months of capacity operation. Consumers' stocks, and particularly those of jobbers, are seriously depleted and better buying is therefore expected early in the new year.

Mill quotations are 3c. for No. 28 black, 2.25c. for No. 10 blue annealed and 4c. for No. 28 galvanized, all being Pittsburgh prices, subject to a freight to Chicago of 38c. per 100 lb.

Jobbers quote: Chicago delivery out of stocks, No. 10 blue annealed, 3.38c.; No. 28 black, 4.15c.; No. 28 galvanized, 5.15c.

Plates.—December steel bookings of local mills have been heavier than was generally supposed, one pro-

dacer reporting them larger than those of November. Much of this tonnage has been ordered to cover the needs of carbuilders and tank fabricators who secured large contracts several weeks ago. No new lettings of oil storage tanks are reported, however, and action on pending inquiries for freight cars has been deferred until next month. The price situation is unchanged and sellers find encouragement in the fact that no further weakness has developed. Attractive business in plates, shapes and bars is moving at about 1.60c., Chicago, while exceptionally desirable tonnages are still being placed at concessions of from \$1 to \$2 a ton.

The ruling mill quotations range from 1.60c. to 1.75c. Chicago. Jobbers quote 2.78c. for plates out of stock.

Bolts and Nuts.—A number of orders have been taken recently from manufacturers of bolted tanks who are busy supplying temporary oil storage in the new Mexia (Texas) field. Little business is coming from the automobile manufacturers and the jobbers, and railroad inquiries have dropped off. Word has been received from Detroit to the effect that the leading maker of cheap automobiles stopped production on Dec. 20, and will not resume until the second week in January. The price situation is still weak and confused. For mill prices, see finished iron and steel, f.o.b. Pittsburgh, page 1698.

Jobbers quote structural rivets, 2.43c.; boiler rivets, 3.53c.; machine bolts up to $\frac{3}{4}$ x 4 in., 60, 10 and 10 per cent off; larger sizes, 60 and 10 off; carriage bolts up to $\frac{3}{4}$ x 6 in., 60 and 10 off; larger sizes, 55 and 5 off; hot pressed nuts, square and hexagon tapped, \$3.75 off; blank nuts, \$4 off; coach or lag screws, gimlet points, square heads, 65 and 5 per cent off. Quantity extras are unchanged.

Cast-Iron Pipe.—The market is exceedingly quiet with the arrival of the holiday period, but considerable business is expected to develop to the point of bid-taking early next year. One seller has a total of 50 miles of such work listed. Hammond, Ind., has awarded 40 tons of 6-in. to the National Cast Iron Pipe Co. Denver took bids Dec. 23, on 343 tons of 6, 8, 10 and 12-in. The Michigan Central Railroad received tenders Dec. 23 on one-half mile of 6-in.

We quote per net ton, f.o.b. Chicago, ex-war tax, as follows: Water pipe, 4-in., \$47.10 to \$48.10; 6-in. and above, \$43.10 to \$44.10; class A and gas pipe, \$4 extra.

Structural Material.—A holiday lull has settled over the fabricating market and there is little new business to report. Fabricators look forward hopefully to the new year and in the meantime are taking work at extremely low figures to tide their shops over the slack period. Successful bids recently named are practically on a pre-war basis, \$47.50 per ton delivered having been quoted on one job recently placed and \$64 per ton erected on another. Recent awards include:

Six hundred and seventy-five tons to the Decatur Bridge Co. for a car repair shop to be constructed at McComb, Miss., for the Illinois Central.

Milwaukee Central Continuation School, second unit, 100 tons, to C. Hennecke Co.

Wisconsin State Highway Commission, truss span at Black River Falls, Wis., 300 tons, to Worden-Allen Co.

State of Illinois, cellhouse for Lockport penitentiary, 150 tons, to Worden-Allen Co.

Contracts Pending

Structural steel for new tuberculosis sanatorium at National Soldiers' Home, Milwaukee, 100 tons. Bids being taken by H. Schmitt & Son, Inc., 430-432 Farwell Avenue, Milwaukee, successful bidder at \$1,094,000.

The mill quotation on plain material ranges from 1.60c. to 1.75c., Chicago. Jobbers quote 2.78c. for materials out of warehouse.

Warehouse Prices.—Local jobbers have reduced wire and wire nails in proportion to the mills' price reductions. The new warehouse quotations are shown under the wire products.

Old Material.—Consumptive buying is at a low ebb and prices, although weak, have changed little. The Pullman Co., which started its rolling mill last week after a long period of idleness bought about 2000 tons of No. 1 wrought and other rolling mill grades. One recent sale of 250 tons of No. 1 wrought was made at \$10.25 per net ton, delivered. Railroad offerings include the Burlington, 4000 tons; the Santa Fe, 3500

tons, and the Pennsylvania Northwestern Region, 2500 tons.

We quote delivery in consumers' yards Chicago and vicinity, all freight and transfer charges paid, as follows:

Per Gross Ton

Iron rails	\$16.00 to \$16.50
Relaying rails	\$2.00 to \$2.50
Cast iron car wheels	15.50 to 16.00
Rolled or forged steel car wheels	13.00 to 13.50
Steel rails, rerolling	12.50 to 13.00
Steel rails, less than 3 ft.	12.50 to 13.00
Heavy melting steel	11.00 to 11.50
Frogs, switches and guards cut apart	11.00 to 11.50
Shoveling steel	10.50 to 11.00
Low phos. heavy melting steel	13.50 to 14.00
Drop forge flashings	7.50 to 8.00
Hydraulic compressed sheet	7.50 to 8.00
Axle turnings	8.00 to 8.50

Per Net Ton

Iron angles and splice bars	14.00 to 14.50
Steel angle bars	10.50 to 11.00
Iron arch bars and transoms	15.00 to 15.50
Iron car axles	19.00 to 19.50
Steel car axles	12.50 to 13.00
No. 1 busheling	8.25 to 8.75
No. 2 busheling	6.00 to 6.50
Cut forge	10.25 to 10.75
Pipes and flues	6.50 to 7.00
No. 1 railroad wrought	10.25 to 10.75
No. 2 railroad wrought	10.00 to 10.50
Steel knuckles and couplers	11.00 to 11.50
Coil springs	12.50 to 13.00
No. 1 machinery cast	12.50 to 13.00
No. 1 railroad cast	12.00 to 12.50
Low phos. punchings	11.00 to 11.50
Locomotive tires, smooth	10.00 to 10.50
Machine shop turnings	3.50 to 4.00
Cast borings	5.50 to 6.00
Stove plate	12.00 to 12.50
Grate bars	10.50 to 11.00
Brake shoes	10.50 to 11.00
Railroad malleable	11.25 to 11.75
Agricultural malleable	11.25 to 11.75

Birmingham

BIRMINGHAM, ALA., Dec. 27.

Pig Iron.—Sales made during week ending on Christmas Eve were on a basis of \$17. At the close of the week this was the admitted maximum. It is understood that one furnace interest had by that time made proffer of its make at around \$16.50. However, the week closed with \$17 the base as a general rule. Business of the week was a surprise to several makers. Radiator works came into the market for 1000 tons, a pipe maker took the same amount and sanitary manufacturing interests, which had already taken 1000 tons, purchased an additional tonnage. One maker booked 1500 tons and another 2500 compared with less than 1000 tons between the two the preceding week. The market is not capable of analysis and is so competitive that no price on a large tonnage would surprise. At the same time, the bookings of the past week have served to considerably stimulate the market and again there is consideration of what the eventual effect will be of the splendid position of the furnaces with regard to stocks. The Sloss-Sheffield Steel & Iron Co. blew in the Hattie Ensley furnace at Sheffield this week after months of total non-production by its furnaces, pending which the company worked off a large stock of pig iron. The Sheffield iron enjoys a differential of 40c. to 80c. over Birmingham in freight to Middle Western points of delivery. Indications point to fully as large melt by Southern foundries following the holidays as that of the fall and winter preceding. The general feeling is rather more optimistic than it has been in some time.

We quote per gross ton f.o.b. Birmingham district furnaces, as follows:

Foundry, silicon 1.75 to 2.25	\$17.00
Basic	16.00
Charcoal, warm blast	35.00

Finishing Mills.—The Tennessee Company and Gulf States Steel Co. are taking the usual holiday of a week and will resume Monday. It develops from port records that the Tennessee company shipped during the year for export about 12,000 tons of rails, plates, structural steel and track accessories monthly. This accounts for the not less than 50 per cent operation of its

finishing mills in 1921. A large portion of the exports moved down the Warrior River in barges to Mobile at a saving of 20 per cent of the all-rail freight rate.

Cast Iron Pipe.—Pipe makers report a very quiet season and will be closed until probably Jan. 15. Sale of municipal bonds in the South is going on in volume and presages a large amount of water main laying. Atlanta will soon be in the market for water mains provided out of a portion of an \$8,000,000 bond issue.

Coal and Coke.—Coke has weakened again and standard foundry is obtainable at \$5.25 to \$5.50 with furnace coke at \$5.

Old Material.—The scrap market is listless and prices tend to sag with the lower base for pig iron. So little is going on, however, that quotations have not been officially changed.

We quote per gross ton f.o.b. Birmingham district yards as follows:

Steel rails	\$11.00 to \$12.00
No. 1 steel	10.00 to 11.00
No. 1 cast	14.00 to 15.00
Car wheels	13.00 to 14.00
Tramcar wheels	12.00 to 13.00
No. 1 wrought	12.00 to 13.00
Stove plate	11.00 to 12.00
Cast iron borings	6.00 to 7.00
Machine shop turnings	6.00 to 7.00

Boston

BOSTON, Dec. 27.

Pig Iron.—No sales of importance are reported this week, business being confined to car lots, of which possibly half a dozen or so changed hands. A textile machinery maker this week is expected to close on 250 tons No. 2 plain, and a like amount of No. 2 X, January delivery, and the Framingham Foundries, Framingham, Mass., on 350 tons, silicon 2.75 to 3.25, and 150 tons, silicon 2.25 to 2.75, first quarter delivery. A Vermont foundry is in the market for 500 tons No. 2 X iron, second quarter delivery, but few furnaces apparently are willing to sell so far ahead. Eastern Pennsylvania furnaces are quoting firmer prices and in some instances making a \$1 differential between No. 2 plain and No. 2 X, and a \$1.50 differential between No. 2 X and No. 1 X. The market for Buffalo iron also is firmer, the available tonnage obtainable for less than \$19.50 having dwindled to small proportions and at least 50c. differentials being insisted upon. Virginia and Alabama irons are still out of range with Buffalo and eastern Pennsylvania, but an occasional car lot is taken for mixture purposes.

We quote delivered at common New England points as follows, having added to furnace prices \$4.06 freight from eastern Pennsylvania, \$5.46 from Buffalo, \$6.58 from Virginia and \$10.66 from Alabama:

East. Penn., silicon 2.25 to 2.75	\$24.56 to \$25.56
East. Penn., silicon 1.75 to 2.25	24.06 to 24.56
Buffalo, silicon 2.25 to 2.75	24.46 to 25.46
Buffalo, silicon 1.75 to 2.25	24.46 to 25.46
Virginia, silicon 2.25 to 2.75	30.08 to 31.08
Virginia, silicon 1.75 to 2.25	29.58 to 30.58
Alabama, silicon 2.25 to 2.75	29.16
Alabama, silicon 1.75 to 2.25	28.66

Finished Iron and Steel.—Mill representatives report little activity in iron and steel, some saying incoming business is back to the June, last, basis. The market on shapes, plates and bars is largely nominal at 1.50c., Pittsburgh. New England rolling mill interests are offered heavy bars at \$19 per gross ton alongside dock, New Jersey. Plates are selling in small lots, but the aggregate tonnage for the week is fairly large. Competition for business among the boiler makers continues keen. A Chicago concern bid \$71,800 on an Arlington, Mass., tank job, involving the destruction of one and erection of another 300-ton plate tank, while a Holyoke, Mass., firm bid \$29,737. These bids represent the two extremes. Stone & Webster, Boston, are asking bids on 800 tons of structural steel for a Western Union building at Philadelphia, and bids will be opened Jan. 12 on 400 tons for a Hudson County, N. J., hospital. A Providence, R. I., fabricator is awarded 300 tons for a local machine shop, and 214

tons for a Brookline, Mass., high school will be awarded this week.

Jobbers now quote: Soft steel bars, \$2.71½ per 100 lb. base; flats, \$3.21½; concrete bars, \$2.20 to \$2.71½; tire steel, \$4 to \$4.40; spring steel, open hearth, \$4.50; crucible, \$11.60; steel bands, \$3.31½ to \$3.78; steel hoops, \$3.11½; toe calk steel, \$5; cold rolled steel, \$3.55 to \$4.05; structural steel, \$2.71½; plates, \$2.81½ to \$2.99; No. 10 blue annealed sheets, \$3.73; No. 28 black sheets, \$4.50; No. 28 galvanized sheets, \$5.50; refined iron, \$2.71½; best refined, \$4.25; Wayne iron, \$5.50; Norway iron, \$5.50 base.

Warehouse Business.—The demand for warehouse products shows a further shrinkage, which is seasonable. Local quotations on cold-rolled steel have been reduced 20c. per 100 lb. to \$3.55 to \$4.05. Wire nails from stock are now \$3.75 per keg base, as against \$4, heretofore. Certain houses are eliminating all extras on horse shoes and offering to break packages, in an effort to reduce stocks. Picks and mattocks have been revised downward 10 per cent.

Old Material.—The old material market during the past week has been practically at a standstill. Even the American Steel & Wire Co., Worcester, Mass., has stopped buying, and purchases of machinery cast by the New England foundries is confined to minimum lots from local scrap dealers. In the absence of trading, prices have had little opportunity to change. Better conditions are anticipated after Jan. 1, when some of the eastern and central Pennsylvania steel mills are expected to enter the market for material.

The following prices are for gross ton lots delivered consuming points:

No. 1 machinery cast	\$18.00 to \$19.00
No. 2 machinery cast	16.00 to 17.00
Stove plate	14.50 to 15.00
Railroad malleable	13.50 to 14.00

The following prices are offered per gross ton lots f.o.b. Boston rate shipping points.

No. 1 heavy melting steel	\$7.50 to \$8.00
No. 1 railroad wrought	11.00 to 11.50
No. 1 yard wrought	9.00 to 9.50
Wrought pipe (1 in. in diameter, over 2 ft. long)	7.00 to 7.50
Machine shop turnings	3.50 to 3.75
Cast iron borings, rolling mill	5.75 to 6.50
Cast iron borings, chemical	7.00 to 7.25
Blast furnace borings and turnings	3.50 to 3.75
Forged scrap and bundled skeleton	4.50 to 5.00
Steel car axles and shafting	11.50 to 12.00
Car wheels	11.00 to 11.50
Re-rolling rails	10.00 to 10.50

Buffalo

BUFFALO, Dec. 27.

Pig Iron.—The American Radiator Co.'s current requirements are 4000 tons for use at Buffalo plants and all furnaces with one exception are seeking the business. The one producer not interested is producing basic iron and is not in position to consider the order as one of the conditions is that shipping must be completed within three weeks. A falling off in inquiry is likely due to firmness in prices. About 10,000 tons has been sold by one furnace and some unusual tonnages are involved, the entire lot consisting of six sales. The \$20 base price ruled except on one lot of 400 tons of off-grade iron which went at \$19. The \$20 figure prevailed on sales of 2500 tons by another furnace. Some inquiry has appeared for second quarter business, but no quotations have followed. Less than 15,000 tons of new business has been booked and, of course, this is all for first quarter delivery.

We quote f.o.b. per gross ton Buffalo as follows:

No. 1 foundry, 2.75 to 3.25 sil.	\$20.00 to \$21.00
No. 2X foundry, 2.25 to 2.75 sil.	19.50 to 20.50
No. 2 plain, 1.75 to 2.25 sil.	19.00 to 20.00
Basic	20.00 to 21.00
Malleable	20.00 to 21.00
Lake Superior charcoal	\$1.75

Finished Iron and Steel.—Holiday apathy is showing an effect on sales, but every indication is at hand that business will move briskly after Jan. 1. There is a more determined stand against price concessions and plus assurances that with inventories out of the way, a number of large buyers will come into the market, the entire prospect is very bright. Bars, shapes and plates are uniformly quoted at 1.50c. and but one mill is known to have dropped below this figure on ordinary tonnages, and this interest has quoted 1.40c. on bars, Pittsburgh. The sheet market is firm and an inquiry for 250 tons of black sheets brought out the same quotation from a widely-scattered group of sellers—\$3.

Pipe, which has been in satisfactory demand, is slower and bolt and nut orders have also shown the effect of holiday lack of interest. One order for half a minimum car—12 tons, of bolts and nuts, represents the high point in recent demand for this commodity. The Buffalo Steel Co. is operating at full capacity on New York Central and Lackawanna requirements and on Dec. 28 will begin construction of 1000 steel hopper and gondola cars for the Buffalo, Rochester & Pittsburgh Railroad. The Buffalo Structural Co. is fabricating 300 tons of shapes for the Empire State Ice Co., Buffalo. The New York Central Railroad has settled with city authorities the matter of grade crossing elimination at several streets and work involving 2000 tons of shapes will be started soon.

Warehouse Business.—All lines were sluggish but salesmen generally understand a buying movement will begin soon after the holiday season. Wire nails have been reduced \$5 per ton. On the whole, there is more confidence and definite information as to the lifting of several buying embargoes is given.

We quote warehouse prices f.o.b. Buffalo as follows: Structural shapes, 2.80c.; plates, 2.80c.; plates, No. 8 gage, 3.50c.; soft steel bars and shapes, 2.70c.; hoops and bands, 3.30c.; blue annealed sheets, No. 10, 3.55c.; galvanized steel sheets, No. 28, 5.25c.; black sheets, No. 28, 4.25c.; cold-rolled strip steel, 5.90c.; cold-rolled round shafting, 3.80c.

Coke.—About 2000 tons has been sold and some evidences are at hand that a livelier market is in prospect. Prices on best grades range from \$4.25 to \$4.75 ovens.

Old Material.—Production is very light and the slightest interest in any material would likely develop in advance in prices. The same two mills have been buying heavy melting steel but tonnages at \$13.50 are scarce.

We quote dealers' asking prices per gross ton f.o.b. Buffalo as follows:

Heavy melting steel.....	\$13.00 to \$14.00
Low phos., 0.04 and under.....	17.00 to 18.00
No. 1 railroad wrought.....	15.00 to 16.00
Car wheels.....	16.50 to 17.50
Machine shop turnings.....	7.50 to 8.00
Cast iron borings.....	7.00 to 8.00
Heavy axle turnings.....	10.50 to 11.50
Grate bars.....	12.00 to 13.00
No. 1 busheling.....	10.00 to 11.00
Stove plate.....	15.00 to 16.00
Bundled sheet stampings.....	8.00 to 9.00
No. 1 machinery cast.....	17.00 to 18.00
Hydraulic compressed.....	10.50 to 11.50
Railroad malleable.....	13.00 to 14.00

New York

NEW YORK, Dec. 27.

Pig Iron.—Inquiries for 4000 tons heretofore announced are still pending, but no new inquiries of importance have developed. The American Locomotive Co. purchased 800 tons for January delivery and the Essex Foundry 1000 to 2000 tons. An unusual fact at the close of the year is that many foundries, particularly in New England, have not bought a ton of iron the entire year and still have high priced iron on their yards or due on deliveries. Prices are about the same Buffalo merchant furnaces seem to be holding pretty closely to the \$20 base for delivery within the state, but steel companies are credited with shading the market. The company whose Southern iron was reported offered for sale at \$16.50 has made the explanation, telegraphed to this city, that the broker was not authorized to name that low figure.

We quote delivered in the New York district as follows, having added to furnace prices \$2.52 freight from eastern Pennsylvania, \$6.46 from Buffalo and \$6.16 from Virginia:

East. Pa. No. 1 fdy., sil. 2.75 to 3.25	\$22.52 to \$23.02
East. Pa. No. 2X fdy., sil. 2.25 to 2.75	23.02 to 23.52
East. Pa. No. 2 fdy., sil. 1.75 to 2.25	22.52 to 23.02
Buffalo, sil. 1.75 to 2.25	24.46 to 24.96
No. 2 Virginia, sil. 1.75 to 2.25	27.16 to 28.16

Cast-iron Pipe.—The year will close in contrast to its beginning; then operations were very slight, the most active plants operating at no greater than 25 per cent, while those same plants are now operating at 75 per cent capacity. As many new municipal administrations will be coming into office on Jan. 1, it is expected that many pipe orders will be placed. Much business is in sight for next year, particularly from New England. Judging by recent buying for delivery during the winter months, the consumers of pipe are not expecting any great drop in prices. We quote per

net ton, f.o.b. New York, carload lots, as follows: 6-in. and larger, \$47.30; 4½-in. and 5-in., \$52.30; 3-in., \$52.30, with \$4 additional for Class A and gas pipe.

Ferroalloys.—Sales of ferromanganese are confined to carload lots and the inquiries, amounting to about 600 tons, reported as before the market a week ago, have not yet developed into orders. A sale of a carload of British alloy at the full price of \$58.35, seaboard, is noted. Demand for spiegeleisen is also confined to small lots at prevailing quotations and the same is true of 50 per cent ferrosilicon, buying of this material being confined to the immediate needs of consumers who are operating at a much reduced capacity. There is absolutely no interest in high grade manganese ore. Quotations follow:

Ferroalloys

Ferromanganese, domestic, delivered, per ton.	\$60.00 to \$63.00
Ferromanganese, British, seaboard, per ton	\$58.35
Spiegeleisen, 20 per cent, furnace, per ton..	\$26.00
Ferrosilicon, 50 per cent, delivered, per ton,	\$55.00 to \$57.00
Ferrolungsten, per lb. of contained metal.	40c. to 50c.
Ferrocromium, 6 to 8 per cent carbon, 60 to 70 per cent Cr., per lb. Cr., delivered.	11c. to 14c.
Ferrovandium, per lb. of contained vanadium	\$4.50

Ores

Manganese ore, foreign, per unit, seaboard..	20c.
Tungsten ore, per unit, in 60 per cent concentrates.....	\$2.00 up
Chrome ore, 40 to 45 per cent Cr ₂ O ₃ , crude, per net ton, Atlantic seaboard.....	\$20.00 to \$25.00
Chrome ore, 45 to 50 per cent Cr ₂ O ₃ , crude, per net ton, Atlantic seaboard.....	\$30.00
Molybdenum ore, 85 per cent concentrates, per lb. of MoS ₃ , New York.....	45c. to 50c.

Warehouse Business.—The market is extremely quiet and no changes of prices are reported. There is a belief that the new year will mark a certain degree of stiffening in quotations on all materials out of warehouse and slight reductions in a few products. Practically all orders placed with warehouses this week are for delivery next month. We quote prices on page 1710.

High Speed Steel.—The prevailing dullness of this market is accentuated this week by the closeness of the new year. Prices on 18 per cent tungsten high speed steel continue at from 85c. per lb. to 95c. per lb. with special brands bringing up to \$1.05 per lb.

Finished Iron and Steel.—The recent reductions by the Steel Corporation in pipe and in wire products have had the effect of stopping buying rather than anything else. Many consumers approaching the new year with little or no stocks are intimating purchases of such a scale that if half of them do as is expected, the January volume will be encouraging to the mills. As it is, the year closes with structural steel unusually active for the season and continuing business promised in tin plate and pipe. So relatively little has been the buying in December that exporting has been proportionately quite a little larger than domestic business and for this Japanese buying is largely responsible. The Atlantic Refining Co. building, noted three weeks ago as awarded, has definitely been given to the American Bridge Co. Other awards include the Neumont Realty office building, West Forty-fifth Street, 600 tons; the Gunpowder Creek bridge, 500 tons, and to the Hedden Iron Construction Co., an apartment on the southwest corner of Eighty-fifth Street and Broadway, 800 tons. Bids have been taken on 650 tons for new stringers for the Queensboro bridge and bids will be taken this week on 1300 tons for 15 bridges for the Baltimore & Ohio. The Western Union Telegraph Co. is in the market for a 1000-ton building in Philadelphia. The Great Northern is asking for bids on a 200-ft. single track bridge span. Rail orders for 1922 are as yet disappointing. It is understood that the Louisville & Nashville has bought 50,000 tons and that the Carolina, Clinchfield & Ohio is in the market for 5000 tons for the summer of 1922, the Buffalo, Rochester & Pittsburgh for a like tonnage and the Florida East Coast for 7500 tons.

We quote for mill shipments, New York, as follows: Soft steel bars, 1.88c.; plates, 1.83c. to 1.98c.; structural shapes, 1.88c. to 1.98c.; bar iron, 1.98c. to 2.03c. On export shipments the freight rate is now 28.5c. per 100 lb., instead of 38c., the domestic rate.

Old Material.—The buying price of railroad heavy melting steel has been lowered 50c., due to a corresponding drop made by an eastern Pennsylvania steel mill.

which is now offering only \$12. The market is experiencing the usual holiday stagnation. Though one broker has raised buying prices slightly on four items, the general tendency is downward. The trade is still giving thought to the scrapping of war vessels. One proposition suggested is that the principal steel companies in eastern Pennsylvania combine in financing a company for dismantling such ships. A New York broker was offered some foreign steel vessels, but wrote back that we are not yet able to take care of our own war ships.

Buying prices per gross ton, New York, follow:

Heavy melting steel, yard.....	\$7.50 to \$8.50
Steel rails, short lengths, or equivalent.....	8.50 to 9.00
Revolving rails.....	9.50 to 10.00
Relaying rails, nominal.....	28.00 to 30.00
Steel car axles.....	10.00 to 10.50
Iron car axles.....	18.50 to 19.00
No. 1 railroad wrought.....	10.50 to 11.00
Wrought iron track.....	8.25 to 8.75
Forge fire.....	5.00 to 5.50
No. 1 yard wrought long.....	9.00 to 9.50
Cast borings (clean).....	6.50 to 7.00
Machine-shop turnings.....	4.00 to 5.00
Mixed borings and turnings.....	4.00 to 4.50
Iron and steel pipe (1 in. diam. not under 2 ft. long).....	6.75 to 7.25
Stove plate.....	9.00 to 10.00
Locomotive grate bars.....	9.00 to 10.00
Malleable cast (railroad).....	8.00 to 8.50
Cast wheels.....	10.50 to 11.50

Prices which dealers in New York and Brooklyn are quoting to local foundries, per gross ton, follow:

No. 1 machinery cast.....	\$16.50 to \$17.00
No. 1 heavy cast (columns, building materials, etc.), cupola size.....	15.50 to 16.00
No. 1 heavy cast, not cupola size.....	14.00 to 14.50
No. 2 cast (radiators, cast boilers, etc.).....	10.00 to 10.50

St. Louis

ST. LOUIS, Dec. 27.

Pig Iron.—The demand for pig iron may be said to be not large enough to establish a market price. Prices are made for each piece of business, and it is a case of barter between buyer and seller. Sales ranged from a carload to 300 tons, a Texas melter buying 100 tons of foundry iron and 200 tons of malleable and 100 tons of foundry iron. Inquiries include several totaling 700 to 800 tons for first quarter shipment, 1000 tons of foundry iron for immediate shipment to a western Missouri melter, and 700 tons for a southern Illinois melter. Inquiries are out for several cars each of ferromanganese and ferrosilicon, and for a carload of spiegeleisen. The eight stove and range interests reporting to the Federal Reserve Bank show declines of from 12 to 31 per cent in November sales as contracted with the same month last year, and losses of from 2 to 16 per cent under October totals.

We quote delivered consumers' yards, St. Louis, as follows, having added to furnace prices \$2.88 freight and war tax from Chicago and \$5.91 from Birmingham:

Northern foundry, sil. 1.75 to 2.25.....	\$21.88 to \$22.38
Northern malleable, sil. 1.75 to 2.25.....	21.88 to 22.38
Basic.....	21.88 to 22.38
Southern foundry, sil. 1.75 to 2.25.....	22.40 to 23.40

Finished Iron and Steel.—The usual holiday quiet prevails in the markets for finished iron and steel. Jobbers' stocks in this district are reported low, and business from this source is expected after the first of the year. The Missouri Pacific has an inquiry out for two cars of plates and the St. Louis & San Francisco Railroad wants 50 tons of structural bars and plates. Locally there is nothing being done in the building line. The contract for the Medical Arts Building, Dallas, Tex., involving 450 tons of bars has been awarded to George Hewitt, that city. Contracts will be let Jan. 3 for the Auditorium and Market House, Memphis, Tenn., involving 3000 tons of structural steel and 400 tons of bars.

For stock out of warehouse we quote: Soft steel bars, 2.77½¢, per lb.; iron bars, 2.77½¢; structural shapes, 2.87½¢; tank plates, 2.87½¢; No. 10 blue annealed sheets, 3.47½¢; No. 28 black sheets, cold rolled, one pass, 4.15¢; cold drawn rounds, shafting and screw stock, 3.65¢; structural rivets, \$3.52½ per 100 lb.; boiler rivets, \$3.66; tank rivets, 7/16 in. and smaller, 60-10-10 per cent off list; machine bolts, large, 60-10 per cent; small, 60-10 per cent; carriage bolts, large, 55-5 per cent; small, 55 per cent; lag screws, 65-5 per cent; hot pressed nuts, square or hexagon blank, \$4; and tapped, \$3.75 off list.

Coke.—There has been a stronger movement of coke the last week against existing contracts. Miscellaneous orders were placed for carloads to 100 tons of foundry

coke, but no tonnage of consequence was placed. Domestic coke is in heavier demand because of colder weather. The inquiry noted last week for 3000 tons of foundry coke is still open.

Old Material.—Except for a purchase of about 2000 tons of special heavy melting steel by a large consumer, the market for old material has been inactive. Rolling mill grades continue weak. Re-rolling steel rails are also off, and are now quoted at \$12 to \$12.50 per gross ton. There is very little trading between dealers, and as the mills will not accept any more material during the remainder of this year, there is nothing to do but mark time, although dealers look for a better market shortly after the turn of the year. Railroad offerings before the market this week are: Atchison, Topeka & Santa Fe, 3700 tons; Pennsylvania, Northwestern Region, 2800 tons.

We quote dealers' prices f.o.b. consumers' works, St. Louis industrial district and dealers' yards, as follows:

Per Gross Ton

Iron rails.....	\$15.50 to \$16.00
Steel rails, re-rolling.....	12.00 to 12.50
Steel rails, less than 3 ft.....	12.00 to 12.50
Relaying rails, standard section.....	23.00 to 28.00
Cast iron car wheels.....	15.00 to 15.50
No. 1 heavy railroad melting steel.....	11.00 to 11.50
No. 1 heavy shoveling steel.....	10.50 to 11.00
Ordinary shoveling steel.....	10.00 to 10.50
Frogs, switches and guards cut apart.....	11.00 to 11.50
Ordinary bundle sheep.....	4.50 to 5.00

Per Net Ton

Heavy axles and tire turnings.....	\$5.50 to \$6.00
Iron angle bars.....	13.50 to 14.00
Steel angle bars.....	10.00 to 10.50
Iron car axles.....	18.00 to 18.50
Steel car axles.....	13.50 to 14.00
Wrought iron arch bars and transoms.....	13.50 to 14.00
No. 1 railroad wrought.....	9.50 to 10.00
No. 2 railroad wrought.....	8.50 to 9.00
Railroad springs.....	11.50 to 12.00
Steel couplers and knuckles.....	11.50 to 12.00
Locomotive tire, 42 in. and over, smooth inside.....	8.50 to 9.00
No. 1 dealers' forge.....	7.50 to 8.00
Cast iron borings.....	6.00 to 6.50
No. 1 bushellings.....	9.00 to 9.50
No. 1 boilers cut in sheets and rings.....	7.50 to 8.00
No. 1 railroad cast.....	13.50 to 14.00
Stove plate and light cast.....	12.00 to 12.50
Railroad malleable.....	9.50 to 10.00
Agricultural malleable.....	9.00 to 9.50
Pipes and flues.....	7.50 to 8.00
Heavy railroad sheet and tank.....	6.50 to 7.00
Light railroad sheet.....	4.50 to 5.00
Railroad grate bars.....	9.50 to 10.00
Machine shop turnings.....	5.00 to 5.50
Country mixed iron.....	7.00 to 7.50
Uncut railroad mixed.....	7.50 to 8.00
Horseshoes.....	10.00 to 10.50
Railroad brake shoes.....	9.50 to 10.00

Cleveland

CLEVELAND, Dec. 27.

Iron Ore.—With the restoration of the higher rail rates on ore from Lake Erie docks to interior furnaces, to become effective Jan. 1, dock shipments continue fairly heavy. These up to Dec. 22 aggregated 544,710 tons, or at the rate of about 700,000 tons for the month. The ore balance on Lake Erie docks and in furnace yards Dec. 1 was 38,300,000 as compared with 41,500,000 tons on the same date a year ago. The amount of lake ore consumed in November was 2,188,000 tons as compared with 1,833,000 tons in October.

We quote delivered lower lake ports: Old range Bessemer, 55 per cent iron, \$6.45; Old range non-Bessemer, 51½ per cent iron, \$5.70; Mesabi Bessemer, 55 per cent iron, \$6.20; Mesabi non-Bessemer, 51½ per cent iron, \$5.55.

Pig Iron.—Sales have kept up to about the recent volume in spite of the holiday period and inquiry is slightly more plentiful, particularly from the East. The market continues weak. While no lower prices are reported than have appeared during the past two weeks, lower quotations on foundry iron seem to have become more general. On this grade there is a spread of from \$19 to \$20 in quotations, depending upon the amount required and whether the inquiry comes from a competitive point having about the same freight rate from two or more furnaces. However, for No. 2 foundry iron \$19.50 seems to have become the more common quotation. One local interest sold over 5000 tons during the week and another lake furnace 2800 tons. One order for 1000 tons was placed by a Pittsburgh district consumer with a Cleveland producer at \$19.50 at a western Pennsylvania furnace. The Cleveland delivery local

furnace prices are unchanged at \$20 to \$20.50 at furnace for No. 2 foundry. Most sales are in small lots for early shipment, but some business has been taken for the first quarter delivery, including a 500-ton lot of foundry iron placed by a Springfield, Ohio, consumer. Two inquiries for malleable iron aggregating 1000 tons have come from Columbus and Indianapolis melters. There is no activity in steel-making iron. The Trumbull-Cliffs Furnace Co., Warren, expects to blow in its stack Jan. 15 and will have some surplus basic iron for the market. Stocks in many furnace yards are low and an improvement in shipment is expected in January.

Quotations below are f.o.b. local furnace for Northern foundry iron, not including a 56c. switching charge. Other quotations are delivered Cleveland, being based on a \$1.96 freight rate from Valley points, a \$3.36 rate from Jackson and a \$6.67 rate from Birmingham:

Basic	\$20.21 to \$20.71
Northern No. 2 fdy., sil. 1.75 to 2.25	19.00 to 20.00
Southern fdy., sil. 2.25 to 2.75	24.67 to 25.17
Ohio silvery, sil. 8 per cent.	32.86
Standard low phos., Valley furnace	34.00

Coke.—Some carlot sales of foundry coke are being made with \$4 to \$4.25 as the more common quotations for the better makes of Connellsville foundry coke.

Finished Iron and Steel.—With the holiday lull, the volume of new orders is very light. However, the leading interest reports that its December business will exceed that of November in this district. Generally prices are holding firm to 1.50c. as a minimum on steel bars, plates and shapes, although an Ohio fabricating shop is understood to have secured a lower price on part of an order for approximately 1750 tons of high-way bridge material which was divided between two mills. Small lots of boiler plates are being booked at 1.60c. and on plates lighter than 3-16 in., 1.65c. seems to be the common quotation. Sales of hoops are reported at 1.90c., or \$2 a ton lower than the recent minimum quotation. The purchase of 3000 tons of reinforcing bars for the Baldwin Reservoir of Cleveland has been deferred, as none of the steel will be needed before spring. In structural lines the Fort Pitt Bridge Works has taken the Warranty Secured Discount Co. building, Akron, requiring 1100 tons of structural steel. Lake shipyards are asking for prices on plates and shapes apparently for use in making estimates on the cost of boats with a view of interesting boat operating companies in placing orders. It is believed that the reduced cost of lake freighters will bring out orders for some boats next year. The large number of lake vessels damaged at Buffalo recently will necessitate repair work probably requiring a considerable tonnage of plates.

Jobbers quote steel bars, 2.54c.; plates and structural shapes, 2.64c.; No. 9 galvanized wire, 3.50c.; No. 9 annealed wire, 3.25c.; No. 28 black sheets, 3.75c.; No. 28 galvanized sheets, 4.75c.; No. 10 blue annealed sheets, 3.10c.; hoops and bands, 3.14c.; cold-rolled rounds, 3.55c.; flats, squares and hexagons, 4.35c.

Warehouse Business.—Price concessions are appearing on round lots of steel from warehouse, but prices are well maintained on small orders. The demand is light.

Wire Products.—Independent mills have followed the lead of the American Steel & Wire Co. in reducing prices to 2.50c., Pittsburgh, on nails and 2.25c. on plain wire. Orders will be taken for the first quarter at the new prices, but so far the price reduction has done little to stimulate business. The leading interest has named \$38 as its new price on wire rods.

Sheets.—Some carlot orders are being placed for January shipment, but as a whole the market is dull. Mills are maintaining regular prices, but a Valley district broker is offering black and galvanized sheets at a price concession of \$3 a ton.

Bolts, Nuts and Rivets.—New orders for bolts and nuts are very light. There is some inquiry for rivet contracts for the first quarter, but the leading local maker is declining to make contracts for that delivery until after the first of the year. Prices as low as 2.20c. for structural and 2.30c. for boiler rivets are reported, but small lot sales are being made at regular prices.

Old Material.—A West Virginia mill has placed an order with a local dealer for 500 tons of compressed steel scrap for January delivery at \$11.75 and a Cleve-

land consumer has purchased a small tonnage of heavy melting steel. Outside of these sales, the market was very quiet during the week, but considering the dullness, prices are firm. Shipments have slowed down owing to the holding up of deliveries by mills during the holiday season. In addition to temporary suspensions by other mills reported last week, the Sharon Steel Hoop Co. has held up deliveries. Cast borings and mixed borings and turnings are slightly firmer locally because of some recent Cleveland demand.

We quote per gross ton, f.o.b. Cleveland, as follows:

Heavy melting steel	\$11.50 to \$12.00
Steel rails, under 3 ft.	12.50 to 13.00
Steel rails, rerolling	14.00 to 14.50
Iron rails	12.00 to 12.50
Iron car axles	18.00 to 19.00
Low phosphorus melting	13.00 to 13.50
Cast borings	8.50 to 9.00
Machine shop turnings	7.50 to 7.60
Mixed borings and short turnings	8.50 to 9.00
Compressed steel	8.75 to 9.00
Railroad wrought	12.00 to 12.50
Railroad malleable	12.50 to 13.00
Light bundled sheet stampings	6.00 to 7.00
Steel axle turnings	9.00 to 10.00
No. 1 cast	15.00 to 16.00
No. 1 busheling	8.25 to 8.75
Drop forge flashings, over 10 in.	7.50 to 8.00
Drop forge flashings, under 10 in.	7.50 to 8.00
Railroad grate bars	12.75 to 13.00
Stove plate	13.00 to 13.25
Pipes and flues	8.50 to 9.00

Philadelphia

PHILADELPHIA, Dec. 27.

Pig Iron.—In an otherwise dead market, a flurry in pig iron buying during the past week is outstanding. Competition among furnaces for sufficient business to remain in blast without piling iron brought out such low prices that some buyers decided they could do no better by waiting and a few substantial tonnages were placed, the largest of which was 3000 tons bought by a cast iron pipe company at \$18, furnace, for No. 2 plain. In this instance, however, the furnace company had a freight rate which brought the delivered price to more than \$20, and this is not far out of line with delivered prices which have been made by other furnaces closer by. Most of the week's foundry iron business has been taken at \$19 to \$19.50, furnace, for No. 2 plain and \$20 to \$20.50 for No. 2X. The bulk of the low-priced business was taken by two furnaces, one of which has only recently gone in blast. It booked 9000 tons within 10 days and then advanced its prices to a minimum of \$20 for No. 2 plain and \$20.50 for No. 2X. Other furnaces are also quoting these prices, though some quotations at or around \$19 for No. 2 plain are still outstanding. As the furnaces which have been making the lowest prices are now fairly well filled up for the present, there is a better tone in the market. In the past two weeks fully 50,000 tons of foundry iron has been sold by eastern Pennsylvania furnaces and the total of all grades for three weeks is about 75,000 tons. Some fairly good-sized inquiries are still pending, including one for 2000 tons from the Central Foundry Co. Buyers have become a bit hesitant because of the weakness in prices and on this account there has been delay in closing certain business for first quarter. An Eastern steel company last week bought 2000 tons of basic at \$20.25, making a total of 8000 tons contracted for by this company within two weeks, delivered prices being identical, though three furnaces divided the business. Makers of low phosphorus iron have reduced prices in an effort to stimulate buying, copper free iron now being quoted at \$30, furnace, and copper bearing iron at \$28, furnace. Other grades are inactive and prices are nominal. The Brooke furnace was blown in to-day.

The following quotations are, with the exception of those on low phosphorus iron, for delivery at Philadelphia, and include freight rates varying from 84 cents to \$1.54 per gross ton:

East. Pa. No. 2 plain, 1.75 to 2.25 sil.	\$20.34 to \$21.26
East. Pa. No. 2X, 2.25 to 2.75 sil.	21.34 to 21.76
Virginia No. 2 plain, 1.75 to 2.25 sil.	27.74 to 28.74
Virginia No. 2X, 2.25 to 2.75 sil.	28.24 to 29.74
Basic deliv. eastern Pa.	20.25
Gray forge	21.00 to 22.00
Malleable	23.00 to 24.00
Standard low phos. (f.o.b. furnace)	30.00
Copper bearing low phos. (f.o.b. furnace)	28.00

Cincinnati

CINCINNATI, Dec. 27.

Ferroalloys.—There is very little business and no changes in prices of ferromanganese or spiegeleisen. The former is quoted by Eastern makers at \$58.35, sea-board, which is also the British price, and spiegeleisen is quoted from \$25 to \$27; furnace.

Coke.—Foundry coke is obtainable at \$4, Connells-ville, and furnace coke from \$3.10 to \$3.25 on contract, with distress coke offered at lower prices.

Billets.—Open-hearth rerolling billets have sold at \$28 and forging billets at \$32, Pittsburgh. There is very little demand.

Finished Steel.—Consumers and jobbers have been buying very sparingly in the past week. Some steel companies' local sales offices have taken almost no business worth mentioning. Prices nominally remain unchanged, 1.50c., Pittsburgh, for plates, shapes and bars, but as has been usual for several months, concessions are made on desirable business. On a round lot of plates, shapes and bars for an Ohio fabricator an Eastern steel company quoted 1.425c., Pittsburgh, and got part of the business at this price. One order for a few hundred tons of sheets for car work stands out as exceptional in the quietness of the steel market. An inquiry for 1200 tons of shapes for the proposed new Western Union Building is in the market.

Bar Iron.—Not enough business in bar iron has been done to test the current price of 1.50c., Pittsburgh, which is quoted by most of the Eastern mills.

Warehouse Business.—There have been no changes in prices on steel out of stock in the past week. Quotations for Philadelphia delivery are as follows:

Soft steel bars and small shapes, 2.65c.; iron bars (except bands), 2.65c.; round edge iron, 2.80c.; round edge steel, iron finish, 1½ x ½ in., 2.95c.; round edge steel planished, 3.70c.; tank steel plates, ¼-in. and heavier, 2.75c.; tank steel plates, 3/16-in., 2.925c.; blue annealed steel sheets, No. 16 gage, 3.50c.; light black sheets, No. 28 gage, 4c.; galvanized sheets, No. 28 gage, 5c.; square twisted and deformed steel bars, 2.65c.; structural shapes, 2.60c.; diamond pattern plates, ¼-in., 4.60c.; 3/16-in., 4.785c.; ½-in., 4.90c.; spring steel, 4.10c.; round cold-rolled steel, 3.25c.; squares and hexagons, cold-rolled steel, 3.75c.; steel hoops, No. 13 gage and lighter, 3.50c.; steel bands, No. 12 gage to 3/16 in., inclusive, 3.25c.; iron bands, 3.90c.; rails, 2.75c.; tool steel, 8c.; Norway iron, 5c.; toe steel, 4.50c.

Old Material.—Demand for scrap has fallen away almost to nothing. Prices are unchanged. The following quotations stand, in the absence of transactions, as nominally the market on the various grades for delivery at consumers' works in this district:

No. 1 heavy melting steel.....	\$11.50 to \$12.50
Scrap rail.....	11.50 to 12.50
Steel rails, rerolling.....	16.25 to 16.75
No. 1 low phos., heavy 0.01 and under.....	17.00 to 18.00
Car wheels.....	16.50 to 17.00
No. 1 railroad wrought.....	14.50 to 15.00
No. 1 yard wrought.....	12.00 to 12.50
No. 1 forge fire.....	9.50 to 10.00
Bundled sheets (for steel works).....	9.50 to 10.00
No. 1 busheling.....	12.00 to 13.00
No. 2 busheling.....	10.00 to 11.00
Turnings (short shoveling grade for blast furnace use).....	9.00 to 9.50
Mixed borings and turnings (for blast furnace use).....	9.00 to 9.50
Machine-shop turnings (for rolling mill and steel works use).....	9.00 to 9.50
Heavy axle turnings (or equivalent).....	9.50 to 10.00
Cast borings (for steel works and rolling mills).....	11.50 to 12.00
Cast borings (for chemical plants).....	13.50 to 14.00
No. 1 cast.....	16.50 to 17.00
Railroad grate bars.....	14.00 to 14.50
Stove plate (for steel plant use).....	14.00 to 14.50
Railroad malleable.....	13.50 to 14.00
Wrought iron and soft steel pipes and tubes (new specifications).....	11.50 to 12.00
Iron car axles.....	No market
Steel car axles.....	17.00 to 18.00

The Gehl Brothers Mfg. Co., West Bend, Wis., manufacturer of farm operating equipment, and conducting a foundry and machine shop business, has increased its capital stock from \$200,000 to \$350,000, of which \$250,000 is common and \$100,000 preferred stock. The new issue will be employed in the development of the business. No immediate enlargement of plant and equipment is contemplated.

Ralph A. Kellogg, secretary of the Lackawanna Bridge Co. and the Ferguson Steel & Iron Corporation, Buffalo, has called a special meeting of stockholders on Jan. 3, at the company's offices, 536 Ellicott Square, for approval of the proposed sale of both properties to the Lackawanna Steel Co., Buffalo.

Pig Iron.—As was expected, the holiday week in the market was a quiet one. There were, however, occasional carload sales made, and in one case 500 tons of Southern iron was bought by an Ohio melter. This was the only sale of consequence in the Cincinnati district. Radiator interests are reported to have booked considerable tonnages of iron for first quarter delivery, the iron coming from Buffalo, Valley and Birmingham districts, and it is reported that the price on the Northern iron was \$19, furnace, while that on Southern was \$17. There is very little inquiry. An Indianapolis melter is in the market for 300 tons of malleable, a northern Ohio melter for 300 tons of foundry, and an Indiana melter for 100 tons of low phosphorus. A Cleveland district melter is inquiring for 1000 tons of Bessemer iron. An Illinois car wheel manufacturer is inquiring for 250 tons of high silicon iron and 200 tons of ferromanganese for shipment to its Michigan plant. There have been no price changes reported, Southern iron being quoted at \$17, Birmingham and Northern at \$19.50 to \$20. The trade is rather expectant of some business developing during the month of January, and is very much encouraged over the prospects. Sarah Furnace of the Kelly Nail & Iron Co. in southern Ohio will blow in Jan. '1, while Jisco Furnace in Jackson County will go out during the present week. It is expected that the Portsmouth stack will be lighted soon after New Year's.

Based on freight rates of \$4.50 from Birmingham and \$2.52 from Ironton, we quote C.O.B. Cincinnati:

Southern coke, sil. 1.75 to 2.25 (base)	\$21.50
Southern coke, sil. 2.25 to 2.75 (No. 2 soft)	22.00
Ohio silvery, 8 per cent sil.	30.02
Southern Ohio coke, sil. 1.75 to 2.25 (No. 2)	\$22.02 to 22.52
Basic, Northern	22.02
Malleable	22.52

Finished Material.—The market is passing through the customary quietness of the holiday period, and very few orders are being placed. Orders for wire products for delivery during the first quarter have been booked on the basis of the new prices quoted by the American Steel & Wire Co., effective Dec. 21. This new schedule makes the price of common wire nails \$2.50 per keg base, Pittsburgh, and plain wire \$2.25 per 100 lb., Pittsburgh. Corresponding reductions have been made on other wire products. An independent company reports receipt of an order for 300 tons of structural steel from a central Ohio fabricator. This business was placed on the basis of 1.50c., Pittsburgh. A number of inquiries for reinforcing bars are also before the trade. Prices on the heavier steel products show very little change, the usual quotations on bars, shapes and plates being 1.50c., Pittsburgh. In sheets there is very little inquiry and the prices are holding firmly at 3c. for black and 4c. for galvanized. Some activity is apparent in the structural field. The largest project up for bids is a warehouse for the Belknap Hardware Co. at Louisville, Ky. This will take 2200 tons of reinforcing bars and 3000 tons of structural steel. Bids will close on Dec. 29. Bids are also in for a Shriner's Temple at Charleston, W. Va., taking 600 tons. The Elks Temple, Cincinnati, taking 300 tons, will likely be awarded this week. An hotel in Johnston City, Tenn., taking 550 tons, will be up again shortly, as some revision has been made in the plans. Pending projects include an office building at Memphis, Tenn., 600 tons, and the Catholic Club at Memphis, Tenn., 900 tons. These are expected to come up shortly after the first of the year. Lettings include 300 tons to the Belfontaine Bridge Co. for an erecting shop for the Illinois Car Co. at Urbana, Ohio, and a hotel at Frankfort, Ky., 250 tons, to a Louisville fabricator.

Coke.—There is very little activity in the coke market. A southern Ohio furnace has closed on 2500 tons of furnace coke per month, for three months, at a reported price of \$4.50, West Virginia ovens. A central Ohio melter also purchased 300 tons of foundry coke for February shipment. With these exceptions, sales are confined to carloads. There is practically no inquiry.

Warehouse Business.—Warehouse business is very quiet, due no doubt, to the holiday period. In view of the depleted condition of stocks, however, it is expected that much improvement will be shown after the first of the year. Prices are unchanged.

Iron and steel bars, 2.90c. base; hoops and bands, 3.50c. base; shapes and plates, 3c. base; reinforcing bars, 2.97½c. base; cold rolled rounds, 1½-in. and larger, 3.70c.; under 1½-in. and flats, squares and hexagons, 4.30c.; No. 10 blue annealed sheets, 3.60c.; No. 28 black sheets, 4.25c.; No. 28 galvanized sheets, 5.25c.; wire nails, \$3.25 per keg base; No. 9 annealed wire, \$3 per 100 lb.

Old Material.—Dealers report business as still stagnant. It is reported that a Valley consumer bought in the neighborhood of 2000 tons of heavy melting steel, at an unnamed price. Locally the market is very quiet, but prospects for the future are brighter, in the opinion of local dealers. Prices are unchanged.

We quote dealers' buying prices, f.o.b. cars:

Per Gross Ton	
Bundled sheets	\$3.50 to \$4.00
Iron rails	12.00 to 12.50
Relaying rails, 50 lb. and up	25.00 to 26.00
Revolving steel rails	10.50 to 11.00
Heavy melting steel	9.00 to 9.50
Steel rails for melting	9.00 to 9.50
Car wheels	12.00 to 13.00
Per Net Ton	
No. 1 railroad wrought	8.50 to 9.50
Cast borings	3.00 to 3.50
Steel turnings	2.00 to 2.50
Railroad cast	12.00 to 12.50
No. 1 machinery	13.50 to 14.50
Burnt scrap	7.50 to 8.00
Iron axes	15.50 to 16.50
Locomotive tires (smooth inside)	9.50 to 10.00
Pipes and flues	4.00 to 4.50

Belgium Feeling British Competition

BRUSSELS, BELGIUM, Dec. 8.—The dullness in the Belgian iron and steel market continues, although there is some exporting to neighboring markets. Belgian bars are being consumed in fair quantities by the United Kingdom manufacturers of screws and bolts, and there is a more pronounced demand from English shipyards for iron of the quality used in making chains. Of late there has been a slight diminishing in the exports of Belgian and French irons to England, Cleveland makers having reduced quotations by about 10s.

With the approach of Christmas a heavy influx of cutlery and other metal utensils from Sheffield, England, has been noted to the detriment of the domestic product. Spanish speaking markets and the British colonies have inquired for, and purchased, sheet copper products, valves, filters, water meters, pressure and steam gages, small metal specialties of German and Austrian manufacture have almost completely displaced the British products in Belgium and in England. The British Board of Trade is considering protests of English manufacturers, who claim that this influx of Continental products constitutes dumping.

The strong effort of British rolling mills for export business is beginning to be felt by the Belgian export trade, which considered that it had gained a permanent and fairly secure foothold in many foreign markets. Much capital seems to be made by British sellers of the unsettled and disorganized conditions of Continental sellers and the consequent uncertainty of deliveries in view of strikes and other obstacles. The situation among Belgian rolling mills is not of the best, but one of the principal reasons has probably been the extremely independent attitude of many mills toward rolling any but specification material, which they consider sufficiently remunerative. The recent increase of 2s. to 5s. per ton on semi-finished material has resulted in the almost complete stoppage of English orders.

Among recent export contracts of size is about 5000 tons of rails sold to Japan at about \$45 per ton, c.i.f. port. Belgian foundry iron has been offered at \$25 per ton on the Pacific Coast of the United States.

It is announced from Wabash, Ind., that the Service Motor Truck Co. of that city has completed negotiations with the Polish Government for 1300 trucks, parts and tires, representing a value of \$3,500,000, the first shipment of which has gone forward.

British Iron and Steel Market

Holiday Season Has Curtailed Business—Galvanized Sheets Weak—Railroad Rate Reductions Less Than Expected

(By Cable)

LONDON, ENGLAND, Dec. 24.

As there is a holiday until Wednesday (Dec. 28) most works are closing until after the new year begins. Railroad rates for raw materials and certain classes of manufactured iron and steel have been reduced 25 per cent. Traders, however, are not over hopeful, as a greater reduction had been anticipated.

There is more inquiry for Cleveland pig iron, but little business. Steel rails have been reduced 20s. (\$4.20) for home buyers. There is more business moving, but not enough to keep the works employed.

German merchant bars have been sold to India at £8 7½s. (1.57c. per lb.) c.i.f. China bought merchant bars at £9 15s. (1.83c. per lb.) c.i.f., but is now offering £9 5s. to £9 7½s. (1.73 to 1.76c. per lb.) c.i.f.

German structural steel (beams) is being sold at £7 10s. (1.41c. per lb.) f.o.b., for January shipment. Belgian angles are quoted at £7 10s. to £7 15s. (1.41 to 1.45c. per lb.) f.o.b., for first half of January. German wire rods are being sold at £8 10s. (\$35.70) f.o.b. for first quarter shipment.

Tin plates are weaker on the continuance of forced liquidation. Prompt 28 x 20's have sold at 40s. (\$8.40) f.o.b. for December delivery. For far forward shipment, sales are done at less. Export demand has decreased. Home trade is buying odd sizes at 20s. (\$4.20) basis for January delivery.

India has bought fair lines of 24-gage galvanized sheets at £16 12½s. and £16 10s. (3.12c. and 3.09c. per lb.) f.o.b. for January delivery. The market is weak.

We quote gross ton, except where otherwise stated, f.o.b. maker's works, with American equivalent figured at \$4.20 per £1 as follows:

Durham coke, delivered	£1 8½ to £1 10	\$5 38 to \$6.30
Cleveland No. 1 foundry	5 5 & 5 10*	22.05 & 23.10*
Cleveland No. 3 foundry	5 0 & 5 5*	21.00 & 22.05*
Cleveland No. 4 foundry	4 15	19.95
Cleveland No. 4 forge	4 10	18.90
Hematite	7 0*	29.40*
East Coast mixed	5 0 & 5 2½*	21.00 & 21.52*
Ferromanganese	15 0 & 14 10*	63.00 & 60.90*
Rails, 60 lb. and up	8 10 to 9 10	35.70 to 39.90
Billets	8 0 to 8 5	33.60 to 34.65
Sheet and tin plate bars		
Welsh	7 15	32.55
Tin plate, base box	0 13¼ to 1 0½	4.15 to 4.36
C. per lb.		
Ship plates	9 10 to 10 10	1.78 to 1.97
Boiler plates	14 0 to 14 10	2.62 to 2.72
Tees	10 0 to 11 0	1.87 to 2.06
Channels	9 5 to 10 15	1.73 to 2.02
Beams	8 0 to 10 0	1.80 to 1.87
Round bars, ½ to 3 in.	10 5 to 10 10	1.92 to 1.97
Galvanized sheets, 24 g.	16 10 to 17 0	3.09 to 3.19
Black sheets	14 0	2.62
Steel hoops	12 0 & 12 5*	2.25 & 2.30*
Cold rolled steel strip, 20 g.	24 10	4.59

*Export price.

Continental Competition in Pig Iron and Steel Rapidly Diminishing—Sentiment Better

LONDON, ENGLAND, Dec. 14.—The improvement in trade conditions, which has been eagerly looked for so long, has only made its appearance in a few branches of the iron and steel industry, such as the galvanized sheet and tin plate trades, though generally speaking all improvement is very gradual. However, sentiment is considerably better, based on settlement of the Irish question, the favorable progress which is being made at the Washington conference and the talk of some new conditions being arrived at in respect of payment of reparations by Germany. These factors, together with the fact that labor has more or less settled down, gives a generally more hopeful feeling. At the time of writing no strikes are threatened, though wages are being cut.

Business in pig iron does not expand. Makers keep cutting prices but buyers are shy at placing or-

ders for anything like substantial quantities while the uncertainty of values lasts and while there are reasonable hopes of railroad rates being considerably reduced. No. 3 Cleveland iron at 100s. per ton, delivered consumers' works, easily competes with Continental pig iron, and supplies of that material coming to this country are diminishing, especially as Continental prices have been raised, owing to shortage of fuel there. During the week two Cleveland furnaces, which were producing basic pig iron, have been transferred to foundry iron, making five furnaces producing the latter. The hematite market is weak. There is some scattered demand, but it is insufficient to absorb production, especially as four more furnaces have recently been started. Rather than put this iron into stock, makers are cutting prices. East Coast mixed numbers are now worth not more than about 102s. 6d.

Foreign ore is to all intents and purposes a dead market. Here and there one hears of small cargoes changing hands, but the Spanish mine owners are not at all inclined to reduce their selling prices. Best Bilbao rubio is nominally about 26s. to 27s., ex-ship Tees.

In finished and semi-finished iron and steel, Continental competition is out of the running for semi-finished material, but in finished steel competition from that source is still an important factor. Makers here, however, are, as far as they are able, taking steps to secure orders and very low figures are heard of in connection with special sales for export. How long they hope to be able to do so is uncertain, as selling at these figures entails considerable loss, and while some makers are adopting this policy, others would sooner curtail or cease production. Of course, if railroad rates came down, as indeed it is hoped they will, steel makers would have a chance to secure orders, but the general demand at the present time is totally inadequate.

Swan, Hunter & Wigham Richardson, Ltd., has secured contracts for two small vessels for use on Canadian lakes. The order is not an important one in respect of size, but it is distinctly encouraging.

Experimental Work of the Bureau of Mines

At the experiment station of the Bureau of Mines at Seattle, Wash., further studies of the carburization of iron have been made in connection with the production of synthetic gray iron from scrap steel or from sponge iron. This study includes the introduction of carbon in presence of varying amounts of silicon, manganese, sulphur, etc. New and interesting results bearing upon the carburization of iron are being obtained.

In a general study of drill steel problems, being conducted at the Mississippi Valley station of the bureau, a report on the results of rock drill tests in the Missouri-Kansas-Oklahoma zinc district has been completed. Another phase of the drill steel problem, to determine the best composition of a straight carbon steel for drilling in granite, has been assigned to two "fellows" in the Missouri School of Mines, with Prof. C. R. Forbes and C. Y. Clayton acting in an advisory capacity. Plans and specifications are being drawn for constructing an oil-fired furnace to heat drill steels.

Work formerly done at the Berkeley, Cal., station of the bureau on the reduction of iron oxides with various reducing gases (producer gas, oil gas, etc.), showed that methane probably does not function actively in the reduction of iron oxides at temperatures up to 1470 deg. Fahr. To check up this point and to find out at just what temperature it does begin to function actively, work is being done on the preparation of pure methane and its application to various oxides of iron.

In connection with the general study of Neumann bands in steel, being conducted at the station of the bureau at Minneapolis, Minn., a special study has been made of the results obtained in subjecting mild steel disks to sudden distortion by means of explosions of various velocities.

In the course of the experiments regarding the reduction of iron oxide, 75 experiments were recently performed at the Minneapolis station of the bureau on

the resistance encountered by a stream of air in passing through a bed of ore and of coke. Fifty additional experiments on the transfer of heat from a gas to a solid were carried out, for the case of air passing through a bed of lead shot. These experiments on the resistance of gases, and the transfer of heat, constitute data necessary to the design of the experiments on the reduction of ore by gases, and are a particularly essential pre-requisite to any attempt at an engineering application of the results.

Investigations at the Pittsburgh experiment station of the bureau on the technology of aluminum, include studies of causes for and prevention of cracks in aluminum-alloy castings; disintegration of aluminum-manganese alloys; analysis of aluminum and aluminum alloys; the contraction and shrinkage of aluminum alloys; and the effect of remelting aluminum alloys.

BRAZIL BUYS MACHINERY

Excavating Machinery Will Be Supplied for Rio de Janeiro Contract—Japan Closing on Heavy Rail Tonnage.

NEW YORK, Dec. 27.—There is but little change in the export situation as the year ends. Japanese buying continues at about the same level and Japanese export houses report numerous orders, principally for sheets, booked with American mills for delivery, c.i.f., Japanese ports, during the first quarter of 1922. Government purchasing of railroad material as well as private purchases is continuing up until the last days of the year. The Imperial Government Railways in Japan will decide this week upon the purchase of 13,000 tons of 60-lb. and 75-lb. rails and the Hanshin Electric Railways will close before Jan. 1 on 3500 tons of 100-lb. rails. Rails purchases in the United States by the Government railroads in Japan during the past year are estimated to have been in the neighborhood of 50,000 to 60,000 tons total.

Other foreign markets are generally quiet, although oil and other developments in South America have resulted in some inquiry from South American markets. Besides the development of the oil fields of the Comodoro Rivadavia in Argentina, discovery of some oil in the province of Antofagasta, Chile, has resulted in the formation of the Comunidad de Petroleos de Antofagasta. Oil fields in Santa Cruz, Bolivia, will probably be exploited by an American company formed for the purpose, according to the Bureau of Foreign and Domestic Commerce.

The Austin Machinery Corporation, 30 Church Street, New York, will supply the total equipment used in the removal of a hill in the city of Rio de Janeiro, Brazil. The work, which will be performed by Kennedy, Leonard & Co., New York, involves the removal of a hill in the city, covering about 145,000 square meters. The equipment used will total about \$12,000,000 and includes coal handling machinery, steam shovels, excavators, concrete mixers, trenching machinery, back fillers, cranes and gasoline locomotives. The Austin corporation recently booked an order for \$145,000 worth of road-making machinery for the city of Mexico, which included a tonnage of narrow gage track and six steam shovels.

In connection with the electrification of the Chilean State Railroad, operated by the Government of Chile, Santiago, Chile, the contract for which has been awarded to the Westinghouse Electric & Mfg. Co., 165 Broadway, New York, five electric power houses will be constructed for power supply, with estimated capacity of about 60,000, and feeder and operating lines for a distance of over 230 miles. The entire project is estimated to cost about \$6,500,000, and will require close to 24 months to bring to completion. The line will operate between Santiago, Valparaiso, Llay Llay and Los Andes. A total of 59 electric locomotives will be provided, averaging from 39 to 112 tons each.

NOTHING IS SETTLED

Such Is the Opinion of the Attorney for the National Lumber Manufacturers' Association as to Recent Decision

L. C. Boyle, counsel for the National Lumber Manufacturers' Association, has made an extended statement in regard to the recent decision of the Supreme Court of the United States in what is known as the Hardwood Lumber case, in which the majority opinion was delivered by Justice Clarke, with Justices Brandeis, Holmes and McKenna dissenting. Mr. Boyle's statement in part was as follows:

"The majority opinion adopts the theory as outlined by the Government in its briefs. It would be an idle thing for me at this time to quarrel with the opinion. That the majority of the court has reached an erroneous conclusion is to me manifest. In the nature of things that would be my natural reaction. The great and disappointing thing to me, however, is that the decision does not settle anything. It is true the court holds that this group of hardwood lumber manufacturers were in a conspiracy to restrain trade. However, no yardstick is laid down whereby other groups may find guidance. The great and outstanding thing that we urged the court to decide, to wit, Would it be lawful to gather and distribute statistics covering records of past sales, stocks on hand and production? is left in a confused and doubtful position. In a word, the court assembles all of the activities in which our group indulges, to wit, the publication of the market letter, the distribution of the questionnaire, the collection of sales and stock data, the holding of monthly meetings, and holds that these things comprehend the conspiracy; whereas it was our earnest appeal to the court to indicate what would be legal touching any of these activities as distinguished from what might be illegal as to any of them.

The Vital Element

"There is language in the decision that would indicate that our conduct might have been held legal had we not indulged in certain activities. In other words, if all we did was to collect statistics and distribute the same, such course might not have been held illegal. However, this vital element is left undecided and uncertain.

"There still remains an opportunity to have this question further considered by the Supreme Court. The rules of the court permit the filing of a petition for a rehearing during the term in which a decision is handed down; therefore, we will have opportunity to challenge to the court's attention matters of fact and law wherein it will be pointed out the opinion is in error.

"It may be of interest to here and in a very brief way call attention to certain of these items; it will be noted that the opinion adopts the Government's charge that the plan was designated to and did achieve curtailment of production, whereas counsel representing the Government in the first oral argument frankly admitted to the court that there was no evidence in support of the charge of curtailment and in the Government's original brief this phase of the Government's charge is formally abandoned. Of course, the Government was driven to this position due to the unquestioned state of the record. Nevertheless, the court's opinion is largely devoted to this curtailment phase and the conclusion is definitely asserted that as a part of the conspiracy curtailment of production was involved.

May Grant Rehearing

"I cannot help but feel that when the court's attention is definitely called to its error of conclusion as to this all-important item the petition to rehear will be granted. Again, the Government in its original oral argument formally admitted that it would not be illegal for a group of operators to gather and disseminate

statistical information when the same was done solely for informative purposes. Due to this admission, Mr. Todd and myself were justified in concluding that the court would at least recognize our right to gather and disseminate statistics when same was not done as a means for carrying out some kind of an illegal compact. However, as the court's opinion stands it is difficult to determine whether we would be permitted to do this thing and if it be the law that this would be permitted then the injunction of the lower court should be modified, whereas the lower court's injunction is sustained in all respects.

"One reading this opinion, and who is a stranger to the record would unquestionably get impressions that are not justified by the record itself, and it is just possible that the true state of this record has escaped the Court. To illustrate: In outlining the activities of the Association the Court reviewed the various items as stated in the paper plan as originally conceived. But the opinion does not in any place call attention to the fact that many of these activities were never put in play. For instance, the original plan provided for a daily shipping report; also for the exchange of price lists; also inspection reports. Now, none of these activities were ever indulged, and yet one who reads this opinion and who is not familiar with the facts would get the impression that these matters were involved in the working out of this claimed conspiracy.

Group Meetings

"Again, there were group meetings held throughout the territory wherein the members of the plan had their operations. In reading the opinion one would get the impression that all the members of the plan had gathered in group meetings once a week, or in other words, that the plan was so adjusted that there were constant elbow touch between all the co-operators, whereas the truth is, and concerning which there is no dispute, that during the whole life of the plan the 300 odd members never did meet in one meeting. These group meetings were held in the various territories for the convenience of the members. Those who lived close to one meeting place attended that meeting and not the others, and less than 50 per cent of the members attended any group meeting. However, one reading this opinion would get an entirely different understanding of this phase. It is possible that the Court itself has been misled.

"It may be recalled that in my oral argument I definitely stated that there were two items in which we were vitally concerned, to wit: the sale and stock reports. I urged the Court that if in its judgment it was illegal for an Association to send out market letters that sought to interpret statistics, would it be legal to gather and disseminate statistics without market letters or any comment? I conceived that this was a practical suggestion and as a lawyer I know I was entirely within my province in making same. Unfortunately, however, the Court does not directly and definitely decide the matter. In other words, it is difficult to determine, in the light of this decision, what the Court's opinion would be if there was nothing involved but the gathering and assembling of statistics covering past transactions. This was indeed the very heart of our law suit. The market letters, the questionnaire, the group meetings were but casual and of no moment.

Definite Guidance Lacking

"It is indeed unfortunate that the court did not give definite guidance so that those industries that have no common markets would know the legal limitations, because if the court did hold that under no circumstance could industry keep itself informed by means of associated effort, then Congress would have to relieve the situation.

"The problem will be carefully reviewed in our application for a rehearing and the members can depend upon it that all will be done that is possible. You can well understand that this opinion came as a distinct shock to me. The more I read the opinion the greater is my disappointment."

Prices Finished Iron and Steel, f.o.b. Pittsburgh

Freight Rates

Freight rates from Pittsburgh on finished iron and steel products, in carload lots, to points named, per 100 lb., are as follows:

Philadelphia, domestic	\$0.35	Kansas City	\$0.815
Philadelphia, export	0.265	Kansas City (pipe)	0.77
Baltimore, domestic	0.335	St. Paul	0.665
Baltimore, export	0.255	Omaha	0.815
New York, domestic	0.38	Omaha (pipe)	0.77
New York, export	0.285	Denver	1.35
Boston, domestic	0.415	Denver (wire products)	1.415
Boston, export	0.285	Pacific Coast	1.665
Buffalo	0.295	Pacific Coast, ship plates	1.325
Cleveland	0.24	Birmingham	0.765
Detroit	0.325	Jacksonville, all rail	0.555
Cincinnati	0.325	Jacksonville, rail and water	0.46
Indianapolis	0.345	New Orleans	0.615
Chicago	0.38		
St. Louis	0.475		

The minimum carload to most of the foregoing points is 36,000 lb. To Denver the minimum loading is 40,000 lb., while to the Pacific Coast on all iron and steel products, except structural material, the minimum is 80,000 lb. On the latter item the rate applies to a minimum of 50,000 lb., and there is an extra charge of 9c. per 100 lb. on carloads of a minimum of 40,000 lb. On shipments of wrought iron and steel pipe to Kansas City, St. Paul, Omaha and Denver the minimum carload is 46,000 lb. On iron and steel items not noted above the rates vary somewhat and are given in detail in the regular railroad tariffs.

Rates from Atlantic Coast ports (i.e., New York, Philadelphia and Baltimore) to Pacific Coast ports of call on most steamship lines, via the Panama Canal, are as follows: Pig iron, 55c.; ship plates, 75c.; ingot and muck bars, structural steel, common wire products, including cut or wire nails, spikes and wire hoops, 75c.; sheets and tin plates, 60c. to 75c.; rods, wire, rope, cable and strands, \$1. wire fencing, netting and stretcher, 75c.; pipe, not over 8 in. in diameter, 75c.; over 8 in. in diameter, 2 1/2c. per in. or fraction thereof additional. All prices per 100 lb. in carload lots, minimum 40,000 lb.

Structural Material

I-beams, 3 to 15 in.; channels, 3 to 15 in.; angles, 3 to 6 in., on one or both legs, 1/2 in. thick and over, and tees, structural sizes, 1.50c. to 1.60c. Sheared plates, 1/4 in. and heavier, tank quality, 1.50c. to 1.60c.

Wire Products

Wire nails, \$2.50 base per keg; galvanized, 1 in. and longer, including large-head barbed roofing nails, taking an advance over this price of \$1.25 and shorter than 1 in., \$1.75; bright Bessemer and basic wire, \$2.25 per 100 lb.; annealed fence wire, Nos. 6 to 9, \$2.25; galvanized wire, \$2.75; galvanized barbed wire, \$3.15; galvanized fence staples, \$3.15; painted barbed wire, \$2.65; polished fence staples, \$2.65; cement-coated nails, per cent keg, \$2.00 to \$2.10; these prices being subject to the usual advances for the smaller trade, all f.o.b. Pittsburgh, freight added to point of delivery, terms 60 days, net, less 2 per cent off for cash in 10 days. Discounts on woven-wire fencing are 68 to 70 1/2 per cent off list for carload lots, 67 to 69 1/2 per cent for 1000-rod lots, and 66 to 68 1/2 per cent for small lots, f.o.b. Pittsburgh.

Bolts and Nuts

Machine bolts, small, rolled threads, 70, 10 and 5 to 70, 10 and 7 1/2 per cent off list
Machine bolts, small, cut threads, 70 and 5 to 70 and 10 per cent off list
Machine bolts, larger and longer, 65, 10 and 5 to 70 and 10 per cent off list
Carriage bolts, 3/4 in. x 6 in.;
Smaller and shorter rolled threads, 65, 10 and 10 per cent off list

Cut threads, 65 and 10 to 70 per cent off list
Longer and larger sizes, 65 and 10 to 70 per cent off list
Lag bolts, 70 and 10 to 70, 10 and 5 per cent off list
Plow bolts, Nos. 1, 2 and 3 heads, 60 and 10 per cent off list
Other style heads, 20 per cent extra

Machine bolts, c.p.c. and t. nuts, 3/4 in. x 4 in.;
Smaller and shorter, 65 and 5 per cent off list
Larger and longer sizes, 65 per cent off list
Hot pressed sq. or hex. blank nuts, \$5.50 off list
Hot pressed nuts, tapped, \$5.25 off list
C.p.c. and t. sq. or hex. blank nuts, \$5.25 off list
C.p.c. and t. sq. or hex. blank nuts, tapped, \$5.00 off list
Semi-finished hex. nuts:

1/4 in. to 9/16 in. inclusive, 80, 10 and 10 per cent off list
Small sizes S. A. R., 80, 10, 10 and 10 per cent off list
1/2 in. to 1 in. inclusive, U. S. S. and S. A. E.

70, 10, 10 and 10 per cent off list
Stove bolts in packages, 80, 10 and 5 per cent off list
Stove bolts in bulk, 80, 10 and 7 1/2 per cent off list
Tire bolts, 65, 10 and 10 per cent off list
Track bolts, carloads, 3.25c. to 3.50c. base
Track bolts, less than carloads, 4.25c. to 4.50c.

Upset Square and Hex. Head Cap Screws

1/2 in. and under, 80 and 10 per cent off list
9/16 in. to 1 in. inclusive, 80 and 10 per cent off list

Upset Set Screws

1/4 in. and under, 80, 10 and 5 to 85 per cent off list
9/16 in. to 1 in. inclusive, 80, 10 and 5 to 85 per cent off list

Milled Square and Hex. Cap Screws

All sizes, 75 and 10 per cent off list

Milled Set Screws

All sizes, 70, 10 and 10 per cent off list

Rivets

Large structural and ship rivets, \$2.25 to \$2.40 base
Large boiler rivets, 2.35 to 2.50 base
Small rivets, 70, 10 and 5 to 70, 10 and 10 per cent off list

Wire Rods

No. 5 common basic or Bessemer rods to domestic consumers, \$38; chain rods, \$38; screw stock rods, \$43; rivet and bolt rods and other rods of that character, \$38; high carbon rods, \$45 to \$50, depending on carbons.

Railroad Spikes and Track Bolts

Railroad spikes, 9/16-in. and larger, \$2.25 base per 100 lb. in lots of 200 kegs of 200 lb. each or more; spikes, 1/2-in., 3/4-in. and 7/16-in., \$2.40 base; 5/16-in., \$2.40 base. Boat and barge spikes, \$2.40 to \$2.50 base per 100 lb. in carload lots of 200 kegs or more, f.o.b. Pittsburgh. Track bolts, \$3.25 to \$3.50 base per 100 lb. Tie plates, \$2 per 100 lb. Angle bars, \$2.40 per 100 lb.

Terne Plates

Prices of terne plates are as follows: 8-lb. coating, 200 lb., \$9.30 per package; 8-lb. coating, 1 C., \$9.60; 15-lb. coating, 1 C., \$11.80; 20-lb. coating, 1 C., \$13; 25-lb. coating, 1 C., \$14.25; 30-lb. coating, 1 C., \$15.25; 35-lb. coating, 1 C., \$16.25; 40-lb. coating, 1 C., \$17.25 per package, all f.o.b. Pittsburgh, freight added to point of delivery.

Iron and Steel Bars

Steel bars, 1.50c. to 1.60c. from mill. Refined bar iron, 2c. to 2.10c.

Welded Pipe

The following discounts are to jobbers for carload lots on the Pittsburgh basing card:

Butt Weld			Iron		
Inches	Steel		Inches	Black	Galv.
1/4	54 1/2	28	1/4 to 3/4	+ 3 1/2	+ 22 1/2
1/4 to 3/4	60	33 1/2	1/2	36 1/2	18 1/2
1/2	65	50 1/2	3/4	42 1/2	27 1/2
3/4	69	56 1/2	1 to 1 1/2	44 1/2	29 1/2
1 to 3	71	58 1/2			

Lap Weld			Lap Weld		
2	64	51 1/2	2	39 1/2	25 1/2
2 1/2 to 6	68	55 1/2	2 1/2 to 6	42 1/2	29 1/2
7 to 8	65	51 1/2	7 to 12	40 1/2	27 1/2
9 to 12	64	50 1/2			

Butt Weld, extra strong, plain ends			Lap Weld, extra strong, plain ends		
1/4	50 1/2	33	1/4 to 3/4	+ 4 1/2	+ 37 1/2
1/4 to 3/4	56	38 1/2	1/2	37 1/2	23 1/2
1/2	62	50 1/2	3/4	42 1/2	28 1/2
3/4	67	55 1/2	1 to 1 1/2	44 1/2	30 1/2
1 to 1 1/2	69	57 1/2			
2 to 3	70	58 1/2			

2	62	50 1/2	2	40 1/2	27 1/2
2 1/2 to 4	66	54 1/2	2 1/2 to 4	43 1/2	31 1/2
4 1/2 to 6	65	53 1/2	4 1/2 to 6	42 1/2	30 1/2
7 to 8	61	47 1/2	7 to 8	35 1/2	23 1/2
9 to 12	55	41 1/2	9 to 12	30 1/2	18 1/2

To the large jobbing trade the above discounts are increased by one point, with supplementary discounts of 5 and 2 1/2 per cent.

Boiler Tubes

The following are the discounts for carload lots f.o.b. Pittsburgh:

Lap Welded Steel		Charcoal Iron	
1 1/2 in.	26 1/2	1 1/2 in.	5
2 to 2 1/4 in.	41	1 1/2 to 1 3/4 in.	15
2 1/2 to 3 in.	52	2 to 2 1/4 in.	25
3 1/2 to 13 in.	57	2 1/2 to 3 in.	30
		3 1/2 to 4 1/2 in.	32

Standard Commercial Seamless Boiler Tubes

New discounts have been adopted on standard commercial seamless boiler tubes, but manufacturers are not yet ready to announce them for publication, and for that reason we publish no discounts this week.

Sheets

Prices for mill shipments on sheets of standard gage in carloads, f.o.b. Pittsburgh, follow:

Blue Annealed		Box Annealed, One Pass Cold Rolled	
Cents per Lb.		Cents per Lb.	
Nos. 8 and heavier	2.20	Nos. 11 and 12	2.80
Nos. 9 and 10 (base)	2.25	Nos. 13 and 14	2.85
		Nos. 15 and 16	2.45
Cents per Lb.		Cents per Lb.	
Nos. 17 to 21	2.80	No. 28 (base)	3.00
Nos. 22 to 24	2.85	No. 29	3.10
Nos. 25 and 26	2.90	No. 30	3.20
No. 27	2.95		

Galvanized

Cents per Lb.		Cents per Lb.	
Nos. 10 and 11	3.00	Nos. 25 and 26	3.70
Nos. 12 to 14	3.10	No. 27	3.85
Nos. 15 and 16	3.25	No. 28 (base)	4.00
Nos. 17 to 21	3.40	No. 29	4.25
Nos. 22 to 24	3.55	No. 30	4.50

Tin-Mill Black Plate

Cents per Lb.		Cents per Lb.	
Nos. 15 and 16	2.80	No. 28 (base)	3.00
Nos. 17 to 21	2.85	No. 29	3.05
Nos. 22 to 24	2.90	No. 30	3.05
Nos. 25 to 27	2.95	Nos. 30 1/2 and 31	3.10

NON-FERROUS METALS

The Week's Prices

Cents Per Pound for Early Delivery							
Copper, New York			Lead		Zinc		
	Lake	Electro-lytic	Tin New York	New York	St. Louis	New York	St. Louis
Dec.							
21.....	13.87½	13.62½	33.00	4.70	4.37½	5.25	4.90
22.....	13.87½	13.62½	32.62½	4.70	4.37½	5.25	4.90
23.....	13.87½	13.62½	32.62½	4.70	4.37½	5.20	4.85
24.....	13.87½	13.62½	.....	4.70	4.37½	5.20	4.85
27.....	13.87½	13.62½	32.75	4.70	4.37½	5.17½	4.82½

New York

NEW YORK, Dec. 27.

As the year draws to a close practically all the markets are firm and the tone is optimistic. Buying of copper has slackened but prices are tending higher. The tin market is temporarily inactive but firm. A quiet demand pervades the lead market at steady prices. The zinc market is slightly easier, but the technical situation is satisfactory.

Copper.—While inquiries continue in good volume, buying has slackened temporarily, but the market maintains its strength both as to prices and sentiment. There are even indications of a possibility of a shortage developing in the not distant future, due to the heavy demand, both past and prospective, and to the extremely low operating rate of the mines. It will take some time for the mining of copper to develop and there is some fear that the rate may not equal the demand in the coming months. There has been no change in prices, electrolytic copper for prompt and early delivery being still quoted at a minimum of 13.87½c., delivered, or 13.62½c., refinery, with first quarter at 14c., delivered, or 13.75c., refinery. There are some producers who are out of the market even at these prices. Foreign demand continues excellent and the technical and statistical position of the market as a whole is reported as eminently satisfactory.

Tin.—The market for Straits tin has been extremely dull the past week and there has been practically no demand either from dealers or consumers. In fact some dealers have been offering the market down, but there is some question as to whether these have resulted in sales or whether those making the offers were really willing to sell. At any rate, no one appears eager to take up the offering. As a result of this situation quotations, while largely nominal, have been a little lower, with spot Straits quoted to-day at 32.75c., New York. The London market has been closed since Friday, including to-day, which is observed there as "boxing day," and the trend of the market on that side is impossible to ascertain. Arrivals thus far this month have been 3635 tons with 4765 tons reported afloat.

Lead.—Conditions are unchanged with demand steady and prices firm. Fair sized orders are reported for various lines of consumption and demand for January shipment has been better than usual at this time of the year. The leading interest continues to quote 4.70c., New York and St. Louis, while in the outside market the prevailing levels are 4.35c. to 4.40c., St. Louis, and 4.70c. to 4.75c., New York. Prospects of exports to England continue good.

Zinc.—Demand is very light, as is natural in the closing weeks of the year, and has resulted in offerings from one or two sources slightly under the market so that prime Western in limited amounts can be obtained as low as 4.82½c., St. Louis, or 5.17½c., New York. Interest in first quarter is of sufficient volume to warrant expectation of good business in the near future and there is even some prospect of exports to England. There has been a decided expansion of business in galvanized sheets in Great Britain, particularly for export, and there are indications that American zinc may be cheaper than some other for British makers of these

sheets. The technical situation of the market here is, however, satisfactory and pessimism does not prevail.

Antimony.—Wholesale lots for early delivery are quoted unchanged at 4.50c., New York, duty paid, with demand exceedingly light.

Aluminum.—The leading producer continues to quote virgin metal, 98 to 99 per cent pure, in wholesale lots for early delivery, at 19c., f.o.b. plant, but is probably meeting offerings of the same grade from importers at 17c. to 18c., New York, duty paid. Demand is very light.

Old Metals.—Business remains quiet but values are well sustained at the following quotations:

	Cents Per Lb.
Copper, heavy and crucible.....	13.25
Copper, heavy and wire.....	12.50
Copper, light and bottoms.....	10.00
Heavy machine composition.....	10.25
Brass, heavy.....	8.00
Brass, light.....	6.00
No. 1 red brass or composition turnings.....	8.25
No. 1 yellow rod brass turnings.....	6.25
Lead, heavy.....	4.25
Lead, test.....	3.25
Zinc.....	3.00

Chicago

Dec. 27.—Tin and spelter have declined slightly while the other metals remain unchanged in a quiet market. Among the old metals brass and some grades of copper have advanced. We quote in carload lots: Lake copper, 13.75c.; tin, 33.75c.; lead, 4.45c.; spelter, 4.82½c.; antimony, 6.50c., in less than carload lots. On old metals we quote: Copper wire, crucible shapes and copper clips, 10.75c.; copper bottoms, 8c.; red brass, 8.25c.; yellow brass, 5.75c.; lead pipe, 3.25c.; zinc, 2.37½c.; pewter, No. 1, 23c.; tin foil, 24c.; block tin, 26c.; all buying prices for less than carload lots.

St. Louis

Dec. 27.—Lead has been slightly easier at 4.30c. to 4.40c. car lots, while slab zinc was about steady at 4.85c. On old metals we quote: Light brass, 3.50c.; heavy red brass and light copper, 7c.; heavy yellow brass, 4c.; heavy copper and copper wire, 7.50c.; zinc, 2c.; pewter, 15c.; tin foil, 16c.; tea lead, 2c.; aluminum, 9c.

Industrial Health Measures in Cincinnati

"Industrial medicine is preventative medicine practised on the firing line" was the key statement of an article by Dr. Otto P. Geier, Cincinnati Milling Machine Co., Cincinnati, in the December issue of *Nation's Health*. The author is brother of Frederick A. Geier, president of that company. The article describes the Cincinnati Health Exposition held in that city recently. The exhibit contained booths representing the proper kind of shop surroundings and those containing the wrong kind; also many charts and posters. Machinists were at work in the good and the bad booths drawing attention to their work by the sparks from their emery wheels.

In describing industrial health conditions in Cincinnati the author says: "The collected data showed that almost invariably the sickness rate and absence because of sickness was materially reduced, some instances being cut in half; that lost time from infected wounds after installation of medical service, with its prompt and proper treatment, reduced infection cases to the negligible point. The effort to collect comparable statistics proved to the co-operating medical departments the necessity for standardizing their records and in the interest of determining what may reasonably be considered the irreducible minimum of record that will still furnish sufficient information for intelligent deductions as to monetary and other values of health work in industry.

"It was useful, for instance, to contrast the fact that while eight industries furnished 11,800 men, convenient clinical facilities for 250,000 visits in 1920, the out-patient department of the Cincinnati General Hospital, with its score or more of physicians and nurses, afforded but 10,000 patients clinical facilities for 30,000 visits. Even with free medical service the cost approximated \$20,000."

PERSONAL

Peter R. Foley, formerly general manager of sales Eastern Steel Co., and J. Harries Pritchard, at one time identified as operating superintendent of Republic



P. R. FOLEY

Iron & Steel Co., have taken over the Slatington Rolling Mills at Slatington, Pa., and will start operation about Feb. 1. The mill will be operated under the name of Foley Steel Co., with general offices at Slatington, Pa., and have its branch office in the Harrison Building, Philadelphia. It is the intention to manufacture merchant steel and iron bars of the following range of sizes: Rounds and squares, $\frac{3}{8}$ in. to 3 in.; flat bars, $\frac{3}{4}$ in. to 6 in. widths; reinforcing concrete bars, plain and deformed.

The company will also specialize on small steel special sections, low phosphorous muck bar for crucible steel mixtures, stay bolt iron, etc.

Mr. Foley has been connected with the iron and steel industry since boyhood and is widely known. He served 22 years with the pioneer bridge builders, Coffrode & Saylor, who operated the bridge works at Pottstown, Pa. (now owned by McClintic-Marshall Co.), also the Reading Rolling Mill Co., at Reading, Pa., rising with them from a minor position to treasurer of both companies. He was elected treasurer of the Eastern Steel Co. at its organization in 1902, served in that capacity until 1905, when he opened its sales office in Philadelphia, and subsequently, in 1915, was appointed general manager of sales, which office was recently abolished. He was in the service of the Eastern Steel Co. about twenty years.

Mr. Pritchard, the associate of Mr. Foley, descends from the early iron and steel men of the United States, his grandfather, John Pritchard, being a roller in the Pittsburgh mills back in the 40's and afterwards was one of the owners of the first rolling mill at Ironton, Ohio. Mr. Pritchard began his career in the Birmingham, Ala., district and was for many years superintendent of the Republic Iron & Steel Co. and the Tennessee Coal, Iron & Railroad Co.'s rolling mills.

James H. Hammond, for 24 years president Superior Steel Co., and for the past five years chairman of the board of directors Superior Steel Corporation, has resigned. Henry F. Devens, for many years associated with the Superior Steel Corporation, formerly vice-president and more recently as special agent, has severed that connection. Henry D. Sarge, secretary and assistant treasurer Superior Steel Corporation, has resigned from both positions and connection with the corporation. Frank R. Frost, assistant sales manager Superior Steel Corporation for the past few years, has severed his connection with the corporation. Messrs. Hammond, Devens and Frost have taken temporary offices at 565 Union Arcade Building.

Frank L. Campbell, formerly manager of sales of the roofing department of the Beaver Board Co., Buffalo, has resigned, and on Jan. 2, will accept the

position of general manager of sales of the United States Chain & Forging Co., Union Arcade, Pittsburgh. He succeeds Charles M. Power, who recently resigned.

B. A. Tozzer, who has been traveling in the Far East for the past 14 months, investigating the business outlook in respect to machine tools for the Niles-Bement-Pond Co., has returned to Cleveland and resumed his former position as manager of the Cleveland office of the Pratt & Whitney Co. and the Niles Tool Works Co. During his travels he visited India, Java, China, Burma, Siam, the Straits Settlement and other Far Eastern countries.

H. A. Kimber, formerly of the Quigley Furnace Specialties Co., is now in charge of the sales of the Quigley pulverized fuel department of the Hardinge Co., 120 Broadway, New York. This change was made owing to the acquirement by the Hardinge company of the pulverized fuel department of the Quigley company. L. W. Marso, who is in charge of the branch office of the Quigley company, at 427 Oliver Building, Pittsburgh, has now become associated with the Hardinge Co., 120 Broadway, New York, and will continue in the Pittsburgh office under the name of Hardinge Co., but will specialize in the handling of the Quigley pulverized fuel systems, which department has been acquired by the Hardinge Co. from the Quigley company. O. M. Rau, formerly consulting engineer to the Philadelphia Rapid Transit Co., has also joined the Hardinge Co., and will specialize in the handling of Quigley pulverized fuel systems as applied to boilers. W. O. Renkin has affiliated with the Hardinge Co. as managing engineer of the Quigley pulverized fuel department.

George C. Calvert, purchasing agent of the American Road Machinery Co., Inc., Kennett Square, Pa., was installed president of the Purchasing Agents' Association of Philadelphia at the annual meeting held at Kuglers on Dec. 8. This association is in a thriving condition, having a membership of 250, although it was only organized about six years ago.

A. H. Bauman has been elected vice-president and director of the Cleveland Duplex Machinery Co., Cleveland. He was formerly general foreman of the gun division, the American Brake Shoe Works, Erie, Pa. For the past three years he has been associated with the Cleveland Duplex Machinery Co. as sales engineer.

Arthur J. McMasters, 819 Bessemer Building, Pittsburgh, has been appointed sales representative in the Pittsburgh district for the Storms Drop Forging Co., East Springfield, Mass., and the Brown Bag Filling Machine Co., Fitchburg, Mass. In addition to the above, Mr. McMasters is also sales representative in the Pittsburgh district for the Bickford Switzer Co., Greenfield, Mass.; Alert Tool Co., Philadelphia; Gammons Holman Co., Manchester, Conn.; Welded Products Mfg. Co., Milwaukee; Rigid Tool Holder Co., Washington; Arnold Electric Tool Co., New London, Conn.; Superior Saw Mfg. Co., Long Island, N. Y.; Velco Mfg. Co., Greenfield, Mass.; Van Keuren Co., Boston, and the Geneva Society of New York and Switzerland.

B. H. Anibal, formerly chief engineer Cadillac Motor Car Co., Detroit, has been appointed chief engineer of the Peerless Motor Car Co., Cleveland.

J. E. Holveck has been appointed district sales representative for the rotary pump line of the Exeter Machine Works, Inc., West Pittston, Pa., in the Pittsburgh district. Until recently he was with Crawford & Cameron, Pittsburgh, and was at one time designing engineer for the Aldrich Pump Co., Allentown, Pa. Mr. Holveck is a hydraulic engineer with extensive experience in the design and sale of pumping machinery, and is the patentee of novel and interesting improvements applicable to high-pressure pump work.

William S. Dickson has been appointed assistant manager of the Crane Machinery Co., Buffalo, N. Y. For many years he was with the Cincinnati Planer Co. and later became sales engineer of the Acme Machine Tool Co., and general manager of the Greaves-Klughman Tool Co. During the past two years he has been connected with the Cleveland office of W. K. Stamets.



J. H. PRITCHARD

OBITUARY

THOMAS MURRAY, assistant secretary, assistant treasurer and director of the United States Steel Corporation, died Nov. 27, aged 54, after a long illness. Mr. Murray was born in Jersey City, Dec. 14, 1867, attended public school and high school in Jersey City and began work in a law office at the age of 14. He became connected with the Federal Steel Co. in May, 1894, and was appointed assistant secretary of the United States Steel Corporation upon its organization in April, 1901. On Nov. 11, 1919, he was appointed assistant treasurer. He had been a director for about eight years and was also a director of many of the subsidiary companies of the Steel Corporation. On June 23, 1897, he married Miss Mary C. Flynn of Jersey City, who survives. He was a member of the Railroad Club and of a number of social clubs. Judge Gary said of him Tuesday: "He was a man of high character, more than ordinary ability, trusted and beloved by all his associates in the Steel Corporation and its subsidiaries."



THOMAS MURRAY

NELSON S. BARTLETT, retired iron merchant, died at the home of his sister at 227 Commonwealth Avenue, Boston, Dec. 23. He was born in Boston, April 11, 1848. During his earliest business life, Mr. Bartlett was associated with the Hondlette, Ellis & Co., Boston, iron and steel merchants. When the affairs of that company wound up, he started in business for himself as an importer of Scotch and English pig iron, rails, beams, etc. Later, he formed a partnership with George H. Curtis, as N. S. Bartlett & Co., and employed John O. Henshaw, then secretary of the Boston Bridge Works, as salesman. Approximately four years later Mr. Henshaw was taken into the firm and a few years later Mr. Curtis retired from the partnership. At this time the firm sold Mary, Ohio, Scotch pig iron, made by the Mary furnace, Louisville, Ohio, in connection with Scotch irons. In addition, it sold Rebecca iron, made at Kittanning, Pa., by the Kittanning Iron & Steel Mfg. Co. The firm also acted as agents for other irons, notably Woodward and Crozier. The firm's office was at 126 State Street, Boston. In 1909, Mr. Bartlett retired from active business devoting his entire attention to the management of several estates. The firm was dissolved and the business absorbed by Hickman, Williams & Co. Mr. Bartlett was a member of Boston's oldest clubs.

DOUGLAS F. McKEY, secretary-treasurer Durant Mfg. Co. and American Filter Mfg. Co., 655-665 Buffum Street, Milwaukee, died Dec. 13 after a brief illness with pneumonia, at the age of 33 years.

FRANK J. TURK, Joseph Turk Mfg. Co., Bradley, Ill., bedsteads, died on Dec. 12.

ANTON MILL, SR., president A. Mill Engineering Co., Cincinnati, died at his home in that city on Dec. 20, at the age of 72 years. He had been in the engineering business for more than 20 years. Previous to organizing the company which bears his name, Mr. Mill had an interest in the old Bickford Machine Tool Co., Cincinnati.

CHARLES M. BEGOLE, president of Chevrolet Motor Co. and one of the founders of the Buick Motor Co., died at St. Petersburg, Fla., Dec. 22. Mr. Begole, a son of the late Josiah Begole, former Governor of Michigan, was 73 years old. His home was in Flint, Mich.

THOMAS FINDLEY, president Massey-Harris Co., To-

ronto, Ont., died at his home, 146 Warren Road, Toronto, Dec. 19. He had been in poor health for the past year, and had been forced to take to his bed five weeks ago. A year and a half ago he resigned to Thomas Bradshaw the duties of general manager of the Massey-Harris Co. He became associated with the Massey-Harris Co. in 1890, at that time holding the position of telegraph operator. In 1895 he became chief accountant, in 1902 assistant to the president, in 1907 assistant general manager, in 1909 a director, in 1912 vice-president and in 1917 president and general manager. He was 52 years old.

Car Loadings Decline

Revenue freight loadings for the week ended Dec. 10 showed 742,926 cars in use, a decrease for the week of 4528 cars, 95,027 cars less than the same week last year, and 12,014 cars below the showing of two years ago. Were it not for the heavy traffic in grain and grain products and seasonal increase in merchandise loadings, the showing as compared with previous years would be much worse. The main losses are attributed to the coal movement, which is showing heavy losses, despite the reduced temperatures for a large part of the country. The output of the mines is small and stocks at terminal markets, while not regarded as heavy, appear sufficient for the time being. Every Western road is storing cars of all kinds; even box cars on a few roads are in excess supply, in the face of the big movement of corn which is the largest at this time in years.

Exports Decline

WASHINGTON, Dec. 27.—American exports to Europe declined \$43,000,000 in November as compared with the previous month, according to an official summary of foreign trade issued to-day by the Department of Commerce. Imports from Europe increased in the same period about \$3,500,000.

Only to Africa and Oceania was the outgoing trade of the United States greater in November than in October, the increase in the case of Africa being \$700,000 and to Oceania \$3,400,000.

Initiative Lies With Europe

WASHINGTON, Dec. 27.—Any initiative in the matter of economic conferences must come from Europe, it was indicated to-day by American officials. The American view is that European nations have the primary responsibility for their own reconstruction and that the United States cannot advisedly propose remedies or institute international negotiations unless the nations most chiefly concerned have acted.

"Underground Loading Devices in Metal Mines" by C. Lorimer Colburn, mining engineer of the United States Bureau of Mines, is the subject of a short bulletin issued by the bureau, in which are given descriptions, operating methods and the performances of mechanical shovels now in use in metal mines of the United States. The machinery considered includes the following: Hunt rotary shovel, Myers-Whaley shoveling machines, Conweigh digger belt-loader and Conweigh shovel loader, Shoveloder, Armstrong shovel, Thew underground mining shovel, Marion shovel, Hoar underground shovel, Keystone excavator and various developments of scrapers and slushers.

C. F. Yocum, general foreman Buckeye Traction Ditcher Co., Findlay, Ohio, has been appointed superintendent to succeed L. A. Krupp, who resigned to accept the position of manager with the North Baltimore Tractor & Machine Co., North Baltimore, Ohio.

Percival Johnson, president Pulaski Iron Co., Philadelphia, was elected president of the Virginia Pig Iron Association at its monthly meeting on Dec. 20.

BOOK REVIEWS

Waste in Industry. By the Committee on Elimination of Waste in Industry of the Federated American Engineering Societies. Pages 409, 6 x 9 in. Published by the Federated Engineering Societies, Washington, and for sale by the McGraw-Hill Book Co., 370 Seventh Avenue, New York. Price, \$4.

This volume of over 400 pages presents the results of the first public service undertaken by the Federated American Engineering Societies. This service was a rapid, intensive study by Herbert Hoover and seventeen engineers appointed by him as the Committee on Elimination of Waste in Industry, of conditions making for inefficiency and lost production in a large number of representative plants in six typical branches of industry.

Waste, in the sense here used, is the complement of the efficiency ratio. If 100 per cent represents the maximum of productive capacity, and in a given plant but 70 per cent efficiency is attained, the lost 30 per cent represents the waste. In order to obtain a fair summary of the conditions, a standard questionnaire was first developed. This was classified under three heads. The first, organization, dealt principally with management and labor. The second, technical, dealt with the plant equipment, materials, and products, and the degree of accurate knowledge available to control these factors. The third, utilization, covered the operating practices with respect to financing, cost keeping and production control. The results are stated in "points" of waste, on a scale grading from excellent at zero through fair at 40, to bad at 80.

The summarized points of waste are for the building trades an average of 53; men's clothing trade, best plant, 27, and worst, 83; boot and shoe trade, best 12½, worst 71; printing shops, an average of 60; and textile trades, an average of 50. The showing in the metal trades is undoubtedly of the most interest to the readers of *THE IRON AGE*. The best of the shops studied showed only about 6 points of waste, and the highest figure was 56, with an average of 30.

The greatest cause of waste in industry appears to be fluctuation in the rate of work. This is seasonal, or due to changes in style or fashion, or to irregularity in receiving materials, or in working them through the departments, or to the various causes that make a labor turnover of 60 per cent remarkably good, and the condition of having to hire ten persons to keep one at work only too common. Overhead, interest and other charges are the same whether a machine works full time or only half time; and with the large proportion of idle machine time that exists in almost all shops, there is no more direct route to increased dividends than to find ways of keeping the machines at work.

The book contains also reports on general causes of waste in industrial production, such as unemployment, strikes, accidents and loss by ill-health of workers. Much useful information for the statistician and the student of economics is here available. But the practical manufacturer who takes up "Waste in Industry" in the expectation of finding a ready remedy for the waste within his own plant, is likely to be disappointed when he discovers that nowhere in the four hundred pages is there a chapter entitled "How to Reduce Waste in Industry." S. H. B.

Hendricks' Commercial Register of the United States.—Pages 2324, 8½ x 11½ in. Published by S. E. Hendricks Co., 70 Fifth Avenue, New York.

A conspicuous feature of the new issue of Hendricks' Commercial Register is the change in size to conform to 8½ x 11½-in. size. This gives a type page of 7 x 10 in., instead of 6 x 8 in., and allows 25 per cent more matter on each page than formerly. Under ordinary conditions this change in size would reduce

the number of pages 25 per cent, or from 2800 to 2100. Sufficient material has been added, however, to make the total number of pages in excess of 2300. The resulting reduction in the thickness makes the book easier to handle, notwithstanding that it contains more material than any previous edition. The text matter has been opened up, leaving a space between columns, which contributes to easier reading and allows space for check marks and short memoranda.

The lists given cover the electrical, engineering, machinery, building and other industries. The lists covering twist drills, fire doors and electric lamp sockets have been handled more comprehensively than usual.

Books Received

Mineral Industry During 1920. Vol. xxix. Edited by G. A. Roush. Pages xx + 907; 6¼ x 9¼ in.; numerous tables and illustrations. Published by the McGraw-Hill Book Co., 370 Seventh Avenue, New York. Price, \$10.

Coal Manual. By F. R. Wadleigh. Pages 200, 4¼ x 6 in. Published by *National Coal Mining News*, 834 Union Trust Building, Cincinnati, Ohio. Price, \$2.50.

A Course in Mechanical Drawing. By Louis Rouillon. Pages 92, 6½ x 7½ in.; fully illustrated. Published by the Norman W. Henley Publishing Co., 2 West Forty-fifth Street, New York. Price, \$1.50.

Short Trade Items

The Combustion Engineering Corporation, New York, has opened a new branch office at 806 First National Bank Building, Pittsburgh, in charge of W. C. Stripe, formerly manager of the Philadelphia office.

A new metal stamping company has just been formed under the name of The Winkler Mfg. Co., Inc., 248 Lafayette Street, New York. This company is in charge of Jack Winkler, formerly in charge of estimates of the Charles Fishers' Spring Co. Mr. Winkler has been specializing in combination dies for the past ten years, and is ready to estimate on metal stamping in all its branches. The Winkler Mfg. Co. also owns some patents, which it is manufacturing, among which are a sanitary tooth brush holder and a ticket dispensing machine.

The Wilson Welder & Metals Co., has moved its general offices and Bush Terminal factory to 132 King Street, New York, telephone Spring 7994. It has installed improved special equipment to handle certified plastic arc welding metals more efficiently, including a fully-equipped demonstration room where is displayed the Wilson plastic arc system, the one that was used to repair the intentionally damaged interned German ships.

Sidney Norwood, who for a great many years has been selling in Michigan the product of the Interstate Iron & Steel Co., Griffin Mfg. Co. and Massillon Rolling Mill Co., is going into business for himself as a manufacturers' agent and will handle, among other lines, the account of the Elliott-Blair Steel Co., New Castle, Pa., in the state of Michigan. His office is at 912 Kresge Building, Detroit.

The Boston office of the Cutler-Hammer Mfg. Co., Milwaukee, has been moved from the Columbian Life Building to rooms 403 and 404 Harvey Building, Chauncy Street. C. W. Yerger is manager.

The York Modern Corporation, Unadilla, N. Y., incorporated with a capital of \$30,000, will manufacture road building machinery. It will rent a factory for the first year.

The Lebanon Steel Foundry, Lebanon, Pa., has purchased the plant of the Riveters Chain & Engineering Co. at Lebanon, which will be incorporated under the name of the Lebanon Drop Forge Co. The plant is complete in every respect and while the new owners have plans for enlarging it and adding to the equipment, they will not do so at the present time.

The Keller Pneumatic Tool Co., Grand Haven, Mich., has changed its name to William H. Keller, Inc.

A. Lewinsohn & Sons, 61 Broadway, New York, are having plans prepared and will soon take bids for the erection of a two-story automobile service and repair building, 50 x 60 ft., at Broadway and 185th Street, estimated to cost \$90,000. John De Hart, 1041 Fox Street, is architect and engineer.

Machinery Markets and News of the Works

HOLIDAY PERIOD ACTIVE

Delaware & Hudson Has New Inquiry for Seven Machines

American Woolen Co. Purchased 18 Tools—New England Machinery Market Is Especially Active

The holiday period is proving to be less dull than in many years. It is reported from New England that sales the past week have been three times as great in volume as any other one week this month; furthermore, that December has been a better month than November and that August was decidedly the turning point of the year.

The Delaware & Hudson Railroad, Albany, N. Y., has put out an inquiry for seven tools. Purchases expected after Jan. 1 include those by the Rock Island, the Santa Fe and the Delaware, Lackawanna & Western railroads. The purchasing department of the last

railroad has passed on the 40 tools asked for and approval must now be secured from the finance board. The Rutland, Bangor & Aroostook and the Maine Central each have small lists under consideration, but appropriations for their purchases have not been made.

The American Woolen Co. has bought 18 machine tools for its Shawsheen machine shop, the order having been placed with two houses. One of the largest orders in the Middle West was that placed by the Beatty Machine & Mfg. Co., Hammond, Ind., which company has a contract to supply complete equipment for the Richmond Car Co., Richmond, Va. The Junior High School of South Bend, Ind., closed for seven South Bend lathes. The Phoenix Horse Shoe Co., Joliet, Ill., has purchased three good-sized tools for its Poughkeepsie, N. Y., plant, and contemplates a boring mill.

A few inquiries from France are being turned to Cincinnati builders, but the unfavorable exchange has made immediate business unlikely. A New Hampshire city is making up a list of shop equipment for a new school involving about \$30,000 worth of machinery.

New York

NEW YORK, Dec. 27.

The Delaware & Hudson Railroad, Albany, N. Y., has issued an inquiry for the following machines:

- One 60-in. planer.
- One 42-in. boring mill.
- One 30-in. lathe.
- One flanging press.
- One forcing press.
- One driving-wheel press.
- One double-head shaper, 26-in. x 12-ft.

It is expected that purchases will be made by the Delaware, Lackawanna & Western Railroad within a week or two weeks. The purchasing department has passed upon the quotations received on its list of about 40 tools, and if the finance board approves of the purchase the orders will go out shortly. Additional inquiries for a few tools have been sent out, including a lathe, frog and switch planer.

Holiday dullness pervades the machine-tool market, but improvement is looked for after Jan. 1.

The Bullard Machine Tool Co., Bridgeport, Conn., reports a decided improvement in its business during December. A considerable number of orders have been received, including one early in the month for eight multi-automatic machines.

The crane market is dull, but prospects for real activity in January and February are generally considered good. Second bids on the 34 gantry cranes for the New York city docks at Stapleton, S. I., were opened Dec. 21. The low bid was presented by the Wellman-Seaver-Morgan Co., which quoted \$276,268 or \$8,125 each against its former bid of \$339,873 or \$9,996.26 each. Hoyt & Patterson, previously the low bidder with a price of \$301,348 or \$8,862 each, quoted on the new opening \$280,228 or \$8,242 each. Only three other companies submitted bids: McMyler Interstate Co., \$317,934; the Niles-Bement-Pond Co., \$345,950, and the Dravo Contracting Co., which was high, \$350,710.

Among recent sales are: Cleveland Crane & Engineering Co., a 2-ton, 20-ft. span overhead traveling crane with hoist to the Laurel Lumber Co., Laurel, Del., and a 2-ton tramrail with 400-ft. travel to the John F. McGowan Marble Co., 23 East 107th Street, New York; Champion Engineering Co., a 5-ton, 32-ft. span overhead traveling crane to the Union Tool Co., Carnegie, Pa.; Shepard Electric Crane & Hoist Co., a 2-ton, 30-ft. span, single I-beam crane to the Burnham Boiler Works, Irvington, N. Y.; Linde & Griffith, Inc., Newark, N. J., has purchased a 30-ton, 50-ft. boom, second-hand Browning locomotive crane from Philip T. King, 30 Church Street, New York. The Booth Brothers & Hurricane Isle Granite Co., 208 Broadway, New York, recently in the market for a locomotive crane has purchased a 15-ton second-hand industrial for its Vermont quarry.

The Slatery Engineering & Construction Co., 10 East Forty-third Street, New York, has purchased property, 50 x 100 ft., on Inwood Avenue, for the erection of a new plant.

The J. L. Hammett Co., 55 Thirty-third Street, Brooklyn, manufacturer of school equipment, will soon take bids for a new four-story plant at Newark, N. J., estimated to cost \$100,000. Arthur C. Holden, 101 Park Avenue, New York, is architect.

Vocational departments will be installed in the high schools to be erected by the Board of Education, 500 Park Avenue, New York, on Second Avenue, between Sixty-seventh and Sixty-eighth streets, and at Amsterdam Avenue and 183d Street, respectively. The first noted will be five-stories, 128 x 136 ft., estimated to cost close to \$1,000,000; and the other, four-stories, 195 x 300 ft., to cost about \$250,000. Anning S. Prall is president of the board. C. B. J. Snyder, Room 2800 Municipal Building, is architect.

The G. Biel Co., Steinway and Jackson avenues, Long Island City, manufacturer of automobile equipment, has leased the brick factory on an adjoining site for extensions.

The American Smelting & Refining Co., 120 Broadway, New York, has preliminary plans under way for the erection of a large metallurgical experimental plant at El Paso, Tex., to be used for ore testing, etc.

The Brooklyn Edison Co., 360 Pearl Street, Brooklyn, will call for bids early in February for its electric generating plant at the foot of Sixty-sixth Street, estimated to cost about \$1,200,000. Plans are being prepared. G. L. Knight, company address, is engineer.

Albert Kellar, 1744 Garfield Street, Bronx, New York, will commence the erection of a one-story ice plant, 60 x 100 ft., at 409-15 East 108th Street, estimated to cost about \$30,000.

Sutliff, Inc., Maiden Lane, Kingston, N. Y., will take bids at once for a two-story automobile service and repair works, 60 x 100 ft., estimated to cost about \$42,000. W. Sutliff is president.

The Cornwall Industrial Corporation, Cornwall Landing, N. Y., has had plans prepared for a new one-story plant, 50 x 180 ft. E. L. Olson is superintendent.

Fire, Dec. 13, destroyed the forge shop and wagon works of Joseph J. LeCompte, 64-66 Hoosick Street, Troy, N. Y., with loss estimated at about \$16,000. It is planned to rebuild.

The New York Central Railroad Co., New York, will continue in the direct management of its car and locomotive shops at Elkhart, Ind., and will not lease the plant to private interests. The shops have been giving employment to about 500 men.

The Keystone Tire & Rubber Co., 1877 Broadway, New York, will operate the new plant of its subsidiary organization, the Gryphon Tire & Rubber Co., now in course of erection, for the manufacture of Keystone cord tires with a daily output of about 1000.

The Long Island Lighting Co., 50 Church Street, New York, operating at Northport, L. I. and vicinity, has made application to build a new electric power plant at Southold, L. I. E. L. Phillips is president.

The Transcontinental Oil Co., 576 Fifth Avenue, New York, with refineries at Tulsa, Okla., is planning for extensions and improvements in its plants, including new machinery and the purchase of new properties. Stockholders have approved a bond issue of \$10,000,000, and a portion of the fund will be used for this purpose.

Fire, Dec. 22, destroyed a portion of the five-story factory at 49-71 Clymer Street, Brooklyn, occupied by Charles Leffler & Co., machinists; the Kay Co., manufacturer of springs and other industrial interests with loss estimated at about \$25,000.

The Pennsylvania Motors Corporation, care of H. W. Scofield, 1719 North Broad Street, Philadelphia, will take bids until early in January for its one-story plant at Pleasantville, N. J., 50 x 300 ft., with power plant. It is estimated to cost close to \$125,000. C. Donehower, Pleasantville, is architect.

Christian Feigenspan & Co., 50 Freeman Street, Newark, N. J., have filed plans for a one-story ice plant at Bishop and State streets, Jersey City, N. J., estimated to cost \$25,000. It is preliminary to a large plant.

Electric motors and other equipment will be installed in the one-story plant, 100 x 150 ft., to be erected by S. Denier & Son, 15 Crosby Street, New York, at West New York, N. J., for the manufacture of mirrors, etc., estimated to cost about \$50,000.

Fire, Dec. 21, destroyed the plant of the Heidelberg Casket Co., Hudson Boulevard and Fifth Street, North Bergen, N. J., with loss estimated at \$100,000, including machinery.

A vocational department will be installed in the three-story high school to be erected by the Board of Education, Madison, N. J., estimated to cost \$500,000. Preliminary plans are being prepared by Guilbert & Betelle, 546 Broad Street, Newark.

Bids will soon be asked for the erection of a two-story high school, 150 x 370 ft., to include a vocational department, by the Board of Education, Elizabeth, N. J., estimated to cost about \$700,000, including equipment. C. Godfrey Poggi, 275 Morris Avenue, is architect.

A manual training department will be installed in the addition being erected at the high school, Perth Amboy, N. J., and which is expected to be ready for the installation of equipment early in the spring. It will cost in excess of \$150,000.

New England

Boston, Dec. 27.

The outstanding feature of the New England machine tool market the past week was the purchase of 18 tools by the American Woolen Co. for its Shawsheen machine shop. The order was given to two local houses, a 30 in. planer, keyseater, 1 1/2-in. bolt cutter, two 11-in. lathes, one 36-in. lathe, one universal tool grinder and a No. 2 universal milling machine going to one firm, and a 200-lb. hammer, 28-in. upright drill, sensitive drill, a 30-in. gear cutter, centering machine, wet tool grinder, 20-in. shaper, power hack saw, small speed and an 18-in. lathe going to the other. This purchase, together with others the past week, served to put the aggregate New England sales for December well above those for November and substantiate the belief that a turning point in the machine-tool market came in August. Sales each month since then have shown an increase over the preceding month.

With few exceptions, other sales concern single tools, but in the aggregate amount to approximately three times those for any previous week this month, and cover a wider assortment of equipment. They are about equally divided between new and used tools, and include a used 22-in. planer and a 20-in. x 8-ft. lathe to a Lakeport, N. H., interest; a used No. 3 Becker milling machine to a Riddford manufacturer; a used four-spindle drill to a Salmon Falls, N. H., shop; a new 15-in. x 6-ft. semi-quick change lathe to a Roxbury maker of bearings; a 9-in. x 4-ft. lathe to a greater Boston garage, this tool passing through the hands of two dealers; a used 26-in. planer to a Brockton concern; two profflers to a western Massachusetts textile machinery maker; a used sensitive drill to a Worcester, Mass., manufacturer; a new 10 1/2-ft. gap shear, weighing about 12 tons, to a Boston iron and steel company, and a set of gages, 80 blocks, costing close to \$1,000, to a Massachusetts firm.

With the possible exception of some cranes, the consensus of opinion is that little machine tool business will be closed the last week of 1921. The local trade, at least, is hopeful regarding the outlook for the early part of 1922. It is believed the prospect of railroad buying early next year warrants serious consideration. The Rutland, the Bangor & Aroostook and the Maine Central railroads each have under consideration small lists of equipment, but appropriations have not been made. The most promising railroad list is that of the Boston & Albany, which is in formation. The company has made up a fairly large list of tools it

desires to discard and is inquiring on machines for replacement. Up to date it has practically decided on 16 or 18, including a driving wheel lathe, 2500-lb. hammer, shapers, and 16-in., 18-in., 20-in. and 27-in. lathes, some of the latter to be used on brass fittings work. During 1921, the Boston & Albany was practically the only New England carrier whose purchases of machine tools amounted to anything. It has taken no definite steps regarding much needed equipment for 1922, but machine tool dealers are reasonably certain the company will be forced to take on some new machinery.

The replacement of quantity production machine tools is strongly favored by some large New England industrial plants. In addition, quite a volume of prospective business is under consideration by small manufacturers, both new and old. School business also should develop within the next three or four months. One New Hampshire city is making up a list of shop equipment it will need for a new school, involving \$30,000 of machinery, but the date for opening bids is yet remote.

No local sales of cranes are reported this week. For a small New Haven contract, namely, the placing of a new crane on the city dock, 12 firms submitted bids ranging from \$575 to \$1,100. Award was made to the New Haven Electric Co.

The Waltham Watch Co., Waltham, Mass., has secured a large order for speedometers, covering 1922 requirements, from the Packard automobile interests, for the new Little Six car. The watch company has covered on its die castings requirements for this order.

The Fire Chief Corporation, capitalized for \$100,000 has been organized by J. Franklin Wilkinson, Herbert W. Blake, C. L. Rice, William E. Lee and Marcus E. Osgood, all of Gardner, Mass., to manufacture toys and novelties. Manufacturing operations will first be carried on at the plant of the F. W. Lombard Chair Co., South Ashburnham, Mass.

The three-story factory of the Lully Column Co., Cambridge, Mass., was recently badly damaged by fire. The upper part of the plant was ruined, while the lower floors, housing \$30,000 to \$40,000 worth of machinery were damaged by water.

The American Metal Co., Railroad Avenue, Attleboro, Mass., will move its plant to Janesville, Wis. Several of the employees will go West with the company.

The Thompson-Copeland Co., Worcester, Mass., metal specialties, recently incorporated under Massachusetts laws, has leased manufacturing quarters at 28 Cherry Street. It will produce lock washers, cotter pins, stamped metal, special screws and several other lines as soon as special machinery can be built.

The Peck, Stow & Wilcox Co., Southington, Conn., hardware, is planning to add three units to its works, comprising a hardening and annealing unit, 67 x 180 ft., grinding, 54 x 155 ft., and a forge shop, 65 x 100 ft.

The Bidwell Co., 1293 Main Street, Hartford, Conn., will build a two-story and basement garage and service station 75 x 122 ft., at East Hartford, Conn., to cost approximately \$150,000.

W. J. Hyland, 153 Dwight Street, Springfield, Mass., plumbing contractor, will erect a two-story and basement manufacturing unit, 50 x 95 ft., at 128 Liberty Street.

The London Steam Turbine Co., Troy, N. Y., has incorporated under Massachusetts laws, having acquired the rights and property of the Steam Motors Co., Springfield, and will manufacture steam turbines and appliances. It has an authorized capital of 10,000 shares preferred stock, par \$50, and 25,000 shares common, no par. William J. A. London, 70 Grenada Terrace, Springfield, is president. Carlos DeLeon, 303 Main Street, Springfield, vice-president, and Arthur J. Skinner, 46 Longmeadow Street, Longmeadow, treasurer.

The Service Engineering Corporation, capitalized for \$50,000 preferred stock and 10,000 shares common, no par value, has been granted a Massachusetts charter to manufacture automobile accessories at 568 East First Street, South Boston. Arthur L. Lewis, Newton, is president; Carroll W. Prochaska, Norwalk, Conn., vice-president and Frederick J. Shepard, Jr., Auburndale, treasurer.

C. N. James, 139 Brookline Street, Cambridge, Mass., manufacturer of automobile wheels, has broken ground for a one-story brick addition, 100 x 122 ft., estimated to cost about \$50,000. The machinery will be electrically operated, with individual motor and belt drive. Contract has been arranged for a supply of commercial power.

The New England Tank & Tower Co., Main Street, West Everett, Mass., is planning to rebuild the portion of its works destroyed by fire, Dec. 15, with loss estimated at about \$25,000.

The Cumberland County Power & Light Co., Portland, Me., has tentative plans for a new steam-operated electric generating plant, for auxiliary service, estimated to cost close to \$1,000,000.

A vocational department will be installed in the new

high school to be erected by the Board of Education, Winsted, Conn., estimated to cost \$150,000. Coffin & Coffin, 522 Fifth Avenue, New York, are architects.

The Union Specialty Co., 138 Hurd Avenue, Bridgeport, Conn., has plans under way for a new two-story factory, 50 x 125 ft., estimated to cost about \$50,000.

The Clark Power Co., Lewiston, Me., will commence the immediate erection of a new hydroelectric generating plant at the Union Falls on the Saco River. It will have an initial capacity of 22,000-h.p., which will be increased later. The entire development is estimated to cost in excess of \$1,000,000.

A vocational department will be installed in the two-story and basement high school, 120 x 242 ft., to be erected at Greenfield, Mass., estimated to cost \$500,000. L. C. Patton, 597 Fifth Avenue, New York, is architect.

The Clarendon Garage Corporation, Boston, has leased the three-story building at 48-58 Warren Avenue, totaling about 12,500 sq. ft., for the establishment of an automobile repair shop and service works.

Electric motors and other equipment will be installed in the two-story addition to be erected by the Acushnet Saw Mill Co., River Road, New Bedford, Mass., 60 x 80 ft., estimated to cost about \$35,000 with machinery. C. C. Smith is superintendent.

Ground will be broken at once by the Board of Education, Everett, Mass., for a three-story high school, 176 x 209 ft., to include a vocational department, estimated to cost about \$425,000.

Philadelphia

PHILADELPHIA, Dec. 27.

The Philadelphia Steam Heating & Engineering Co., Juniper and Cherry streets, Philadelphia, will take bids in about 60 days for a new two-story plant, 60 x 120 ft., at 3316-20 Lancaster Avenue, estimated to cost about \$60,000.

The Roth-Buick Co., Frankford Avenue, Philadelphia, has awarded contract to George W. Crossley, Bridge and Tacony streets, for a one-story and basement automobile service and repair building, at 4653-4659 Paul Street. Work will commence at once.

The United States Shipping Board, Washington, will soon commence dismantling a portion of the plant of the Merchant Shipbuilding Corporation, Bristol, Pa. Cranes and crane runways, yard equipment and other machinery will be placed on the market, it is said, at an early date. The Merchant company will continue to operate at the plant for some time to come.

The Middletown Ice Co., North Union Street, Middletown, Pa., is considering plans for a one-story addition to its ice manufacturing plant.

Electric motors and other power equipment will be installed in the three-story printing plant, 50 x 100 ft., to be erected by the Central Publishing Co., 329 Market Street, Harrisburg, Pa., at Thirteenth and Walnut streets, estimated to cost about \$150,000.

A one-story power plant will be constructed by the Taubel, Scott & Katzmiller Co., Shamokin, Pa., as its local textile mills. Plans have been completed.

The Vulweld Rubber Co., Pottstown, Pa., manufacturer of automobile tires, has acquired property on West High Street, 300 x 392 ft., for a new two-story plant, 60 x 260 ft., plans for which are being prepared. A one-story storage building will be built also.

Fire, Dec. 22, destroyed a portion of the power house of the Pennsylvania Power & Light Co., Allentown, Pa., at Danville, Pa., with loss estimated at about \$100,000, including equipment. It will be rebuilt.

Buffalo

BUFFALO, Dec. 27.

Freight handling, conveying machinery and other equipment will be installed in the five-story warehouse to be erected on the Niagara River, North Tonawanda, N. Y., at a cost of about \$250,000, by the McDermott Steel Co., North Tonawanda. The company has been organized recently with a capital of \$500,000 and is headed by T. J. McDermott, president; George Clinton, Jr., secretary, and H. M. Bone, treasurer.

A one-story automobile repair and service building, 40 x 140 ft., will be erected by the General Baking Co., 392 North Street, Rochester, N. Y. Gordon & Kaelber, Sibley Building, are architects.

Fire, Dec. 20, destroyed a portion of the plant of the Stanford-Crowell Co., 1001 West Seneca Street, Ithaca, N. Y., manufacturer of cardboard specialties, with loss estimated at close to \$100,000, including machinery.

The Electro Refractories Corporation, Ellicott Square, Buffalo, manufacturer of crucibles, etc., is completing foundation work and will soon commence the erection of the

superstructure for its new plant at East Hamburg, 50 x 300 ft., with machine shop extension, 30 x 75 ft. It will cost about \$200,000, and will replace works recently destroyed by fire. L. U. Milward is manager.

The Jamestown Metal Desk Co., Blackstone Avenue, Jamestown, N. Y., will soon break ground for a one-story addition, 80 x 100 ft., estimated to cost approximately \$40,000. Beck & Tinkham, Frick-McGee Building, are architects.

Fire, Dec. 14, destroyed the plant of the J. B. Carr Co., Fourteenth Street, Colonie, N. Y., manufacturer of heavy chains and other mechanical products, with loss estimated at \$40,000. Preliminary plans are said to be under way for rebuilding.

Chicago

CHICAGO, Dec. 27.

The Rock Island and the Santa Fe will not take action on their respective lists until January. The latter road has sent out an additional inquiry for a 48-in. x 48-in. x 12-ft. planer with two heads on the cross rail and one head on the side. It is reported that the Union Pacific is about to issue an extensive list, but this has not been confirmed. As the year closes the market is quiet, new inquiries being few and orders largely small and infrequent. One of the largest orders recently taken was booked by the Beatty Machine & Mfg. Co., Hammond, Ind. This company has the contract to supply complete equipment for the plant of the Richmond Car Co., Inc., Richmond, Va. Included are large plate shears and multiple, single, double and horizontal punches which will keep the Beatty plant running at capacity for three and one-half months. In addition, the Beatty company purchased to apply against the same order a 12-ft. Dreis & Krump bending brake, a large bulldozer, Bradley hammers, Landis bolt and pipe cutters, and a number of machine tools, including a Cleveland open-side planer, lathes, shapers and drill presses. A 1500-ton hydraulic press is yet to be bought as well as additional miscellaneous equipment which, however, has been practically all arranged for.

Among other orders recently reported is one from the Phoenix Horse Shoe Co., Joliet, Ill., for a 24-in. and a 30-in. engine lathe and a 32-in. shaper for its Poughkeepsie, N. Y., plant. The purchase of a boring mill is also contemplated. For the junior high school at South Bend, Ind., mentioned a week ago, the Board of Education is reported to have closed for seven South Bend engine lathes, but still has a number of other machines to buy. The H. W. Johns-Manville Co., Madison Avenue and Forty-first Street, New York, has revived the inquiry for its new Waukegan plant, which was published in this column on July 18. There are 15 items in the list.

The West Side Ice Co., 937 North Hoyne Avenue, Chicago, has let contract for a one-story plant, 49 x 220 ft., to cost \$35,000.

The Anderson Stove Co., recently incorporated, Anderson, Ind., will re-open the Frazer Stove Co. plant in North Anderson about Jan. 10. The entire output, it is stated, has been contracted for by Montgomery-Ward & Co., Chicago. Kitchen ranges of various models will be manufactured. Directors of the company include John S. Keefe, Indianapolis, owner of the plant property, Jacob Keller, Belvidere, Ill., an experienced stove maker, and Joseph McMinn, Louisville, Ky., who has also been identified with the stove industry.

The Cornell Belting Co., Chicago, recently incorporated, has leased a plant at 162 West Austin Avenue, for a period of years. The company will confine itself to the manufacture of leather belting and has bought several leather working machines. The officers are E. H. Cornell, president; H. I. Fritts, vice-president; H. C. Schroeder, treasurer, and E. B. McGrath, secretary.

The Western Fixture Mfg. Corporation, manufacturer of store fixtures, 3039 Elston Avenue, Chicago, is receiving bids on a one-story addition, 80 x 119 ft., to cost \$40,000.

The Dental Metal Products Co., A. D. Gray, manager, 623 South Wabash Avenue, Chicago, is taking bids on a two-story factory and warehouse, 42 x 71 and 28 x 42 ft., respectively, at 7512-7518 Greenwood Avenue, to cost \$30,000.

The Paramount Knitting Co., Henry Polk, president, 337 West Madison Street, Chicago, has had plans prepared by Lookwood, Greene & Co., 38 South Dearborn Street, for a three-story reinforced concrete factory, 50 x 80 ft., at Kankakee, Ill., to cost \$50,000.

The Auto Specialty Mfg. Co., St. Joseph, Mich., has had plans prepared by Davidson & Weiss, 53 West Jackson Boulevard, Chicago, for two one-story foundry additions, 80 x 325 and 80 x 162 ft., respectively, to cost \$100,000. Bids will be taken after the New Year.

B. Wendle, 4629 West Madison Street, Chicago, has let contract for a one-story blacksmith shop, 25 x 102 ft., to cost \$8,000.

The Elgin Watch Co., Charles H. Hubbard, president, 10 South Wabash Avenue, Chicago, has commenced work on

several four and five-story additions to its plant at Elgin, Ill., to cost \$500,000. Plans were completed fully two years ago.

The Bassick Mfg. Co., 361 West Superior Street, Chicago, manufacturer of lubricating devices, grease cups, etc., has preliminary plans for a new two-story and basement factory, 80 x 420 ft., on Addison Street. Stone & Webster, 38 South Dearborn Street, are architects and engineers.

C. A. Starr, 137 Park Place, Decatur, Ill., is planning for a one-story machine repair and automobile service works, 75 x 160 ft., estimated to cost \$42,000.

The Wyman-Gordon Co., 332 South Michigan Avenue, Chicago, manufacturer of forgings, has tentative plans for the construction of a new power plant at its works at Harvey, Ill., estimated to cost about \$100,000. Erection will be held in abeyance for a time.

The Common Council, Muscatine, Iowa, is planning for the construction of a municipal electric light and power plant, estimated to cost about \$250,000.

A vocational department will be installed in the two-story junior high school building, 150 x 150 ft., to be erected by the Board of Education, Minneapolis, Minn., estimated to cost close to \$500,000. E. H. Enger, City Hall, is architect.

The Diamond Calk Horseshoe Co., 4620 Grand Avenue, Duluth, Minn., is planning the erection of a two-story and basement building, 50 x 100 ft., estimated to cost about \$45,000. J. J. Wangenstein, Providence Building, is architect.

J. H. Baker and J. J. Clarke, Redford, Iowa, are organizing a new company to construct an ice manufacturing and cold storage plant estimated to cost about \$200,000, including equipment. Plans will be prepared soon.

A vocational department will be installed in the three-story and basement high school to be erected at Decorah, Iowa, to be 80 x 140 ft., and estimated to cost about \$150,000. Temple & Burrows, 208 Main Street, Davenport, are architects.

Cleveland

CLEVELAND, Dec. 27.

While machine tool business continues dull, there is a better feeling in the trade which expects more activity early next year. The lack of interest on the part of buyers of machinery has to some extent disappeared and a few small inquiries have come from companies which advise that they expect to buy new equipment, but will do nothing definite about purchases before January. Although there is usually a little business during the holiday period, dealers made a number of sales in single machines the past week. Among the inquiries is one from the Herbrand Co., Fremont, which is in the market for milling machines for production work and is expected to purchase several of these machines.

The Williamson Hydraulic Clutch Co., Mt. Vernon, Ohio, recently organized to bring out a new type of clutch, has contracted with the Landis Tool Co., Waynesboro, Pa., for the use and manufacture of the clutch on a royalty basis.

The Urbana Tool & Die Co., Urbana, Ohio, has secured a large contract from an automobile company which, it is announced, will necessitate the operation of its plant at full capacity night and day for two or three months.

Cincinnati

CINCINNATI, Dec. 27.

The pre-holiday week, usually the duller, is perhaps the exception this year in that the number of orders booked is on a par with the preceding weeks. The month of December will show a slight falling off, compared with November, but general conditions considered, manufacturers find much to encourage them. Inquiries for tools are coming from all parts of the country, and it is expected that after the first of the year, many will develop into orders. While most orders booked are for single machines, they are not confined to any one section and indicate that the gradual improvement is general. There has been little buying by the railroads and no action has been taken on any of the larger lists before the trade. It is expected that the Delaware, Lackawanna & Western Railroad and the Seaboard Air Line will close for equipment within the next week or two, and some action is also expected to be taken by the Rock Island. Industrial concerns in France are apparently picking up, as some inquiries were received from that country during the week. Export business, as a whole, however, is at a low ebb, and not much is expected from this source until exchange conditions are better.

The Illinois Car Co., Urbana, Ohio, has awarded contract to the Bellefontaine Bridge Co., for an erecting shop, 200 x 300 ft., of concrete, steel and glass. The company contemplates the erection of other buildings, but probably nothing

will be done until after the completion of the erecting shop.

The International Derrick & Equipment Co., Columbus, Ohio, recently acquired the plant of the Columbus Structural Steel Co., which it will rearrange for the fabrication of steel derricks for oil, gas and artesian well industries. It also plans the installation of galvanizing works. The company is capitalized at \$500,000 and is headed by Gordon Battelle and Harry M. Runkle.

The Held Tractor Co., Columbus, Ohio, manufacturer of tractors especially designed for use by truck gardeners, has purchased the building at 609-611 North Fourth Street, Columbus, and will make alterations preparatory to commencing operations on a larger scale. It has been operating in Columbus for over a year and increasing business makes larger quarters necessary.

Pittsburgh

PITTSBURGH, Dec. 26.

Due to the holiday season and inventory period, practically all pending inquiries are being held over until after the first of the new year. Several local dealers have some fair sized orders under negotiation, but do not expect to do anything definite until early next month. Railroads are buying very little and no important inquiries are out. Some time ago the Union Railroad of the Carnegie Steel Co., came into the market for a number of tools and later made some purchases, but it is still in the market for a heavy shaper, a heavy shear for cutting large channels and a radial drill. Orders for these tools are expected to be placed soon.

A local machinery house has definite inquiries for two monorail equipments for handling coal. These are nearly closed but the prospective buyers will not definitely place the contracts until next month. The local office of Manning, Maxwell & Moore has sold to the Sharpsburg Foundry Co., Sharpsburg, Pa., one 5-ton and one 10-ton Shaw electric crane, each 45-ft. span.

The Wheeling Steel Corporation has inquiries out for some heavy steel works equipment for its LaBelle Iron Works, Steubenville, Ohio. If this contract is placed the company will probably purchase a number of tools for the machine shops at the LaBelle works, or for a new machine shop that may be built.

The machinery market outlook for first quarter is regarded as fair, but it is not believed that any considerable amount of buying will set in until the second quarter. Prices of finished steel products are tending downward, and it will likely take all of the first quarter to stabilize the market. The railroads are not figuring in the market very largely.

The Elliott Co., Jeannette, Pa., has not yet closed on its inquiry for a 50-ton crane.

The Traver Engineering Co., Beaver Falls, Pa., has plans under way for the erection of a new one-story factory, 70 x 88 ft. Work will be commenced at an early date.

Fire, Dec. 21, destroyed the repair and service buildings of the Patton Automobile Co., Patton, near Johnstown, Pa., with loss estimated at close to \$40,000, exclusive of automobiles.

The Hecla Park Association, Bellefonte, Pa., is planning the construction of a new one-story electric light and power plant, estimated to cost about \$50,000. W. C. Rowe, Allegheny Street, is engineer.

The J. K. Davidson & Brother Sand Co., Pittsburgh, has awarded contract to the American Bridge Co., Ambridge, Pa., for the construction of twelve steel barges.

The Borough Council, Woodlawn, Pa., has preliminary plans under way for a two-story forge and blacksmith shop for municipal service, to be 50 x 75 ft. Carlisle & Sharer, 7119 Jenkins Arcade Building, Pittsburgh, are architects.

The Philadelphia Co., Pittsburgh, operating the Pittsburgh Railways, has tentative plans under way for extensions and improvements in car shops and car barns, additional track and line construction, power betterments, and for the purchase of about 200 new cars. Arrangements are being made to secure a fund of \$5,000,000, to be used in part for the work.

The Wharton Motors Co., Johnstown, Pa., is planning for the erection of a three-story factory to manufacture automobile equipment, estimated to cost about \$100,000. W. H. Lamborne is manager.

The United States Arsenal, Pittsburgh, Maj. Francis F. Jewett, commandant, is considering the establishment of an aviation station. Negotiations are under way with the Chamber of Commerce and the city regarding the land. The station will include a complete repair shop for general work and parts manufacture, hangars, etc., and will be under the direction of the United States Aero Service.

Struble & Riley, Turtle Creek, Pa., are having plans prepared for a two-story automobile service and repair building,

75 x 175 ft., estimated to cost about \$150,000, including equipment. S. C. Richards & Co., 430 Library Street, Brad-dock, Pa., are architects.

A vocational department will be installed in the two-story high school to be erected by the Board of Education, Terra Alta, W. Va., estimated to cost about \$125,000. Richard M. Bates, First National Bank Building, Huntington, W. Va., is architect.

The Babcock Coal & Coke Co., Fayetteville, W. Va., will install electric motors and other equipment at its No. 7 mine, Nuttall district, Cliff Top.

The Simons-Woodward Auto Co., Spencer, W. Va., is having plans prepared for a two-story and basement automobile service and repair building, 50 x 130 ft. Richard M. Bates, First National Bank Building, Huntington, W. Va., is architect.

A vocational department will be installed in the two-story and basement high school to be constructed at Sand Fork, W. Va., by the Board of Education of the Glenville District. J. A. Radcliffe, president, Linn, W. Va. It is estimated to cost in excess of \$75,000.

The Board of Education, Wayne, W. Va., will install a vocational department in its new high school, estimated to cost about \$250,000, plans for which will be prepared by Holmboe & Pogue, Clarksburg, W. Va., architects.

The Gulf States

BIRMINGHAM, Dec. 26.

The Greenwood Compress & Storage Co., Greenwood, Miss., is considering tentative plans for the rebuilding of its plant, recently destroyed by fire with loss reported in excess of \$500,000, including machinery, stock, etc. J. T. Allen & Co., Jackson, Miss., operate the property.

The Mo-Jo Filter Co., Rockdale, Tex., recently organized to manufacture filters and filtering equipment, has closed an agreement with the Chamber of Commerce for a site for its proposed plant. It will install equipment and begin operations at the earliest possible date. R. S. Moore is head.

The Nacogdoches Iron Works, Nacogdoches, Tex., recently organized, is arranging for the immediate establishment of a local plant and proposes to begin operations early in February. It is headed by A. W. Simmons, Athens, Tex., and H. D. Minick, Jacksonville, Tex.

The Hastings Machine Co., Hastings, Fla., recently organized as a subsidiary of the Big Brick Garage Co., is planning to establish a general machine and repair plant, with department to manufacture farming implements and other products.

The Edna Light, Ice & Water Co., Edna, Tex., is planning the installation of new electrical equipment at its power plant. It is also proposed to increase the capacity of the ice-manufacturing plant with additional machinery.

The Wortham Refining Co., Wortham, Tex., recently organized, has acquired property in the northern section of the city for a new oil refinery. Ground will be broken soon for the first unit, to have a capacity of about 400 bbl. per day. H. G. Lemedes is president, and Roger Seeley, secretary and treasurer.

The Alexandria Refining Co., Alexandria, La., has acquired a site at South Alexandria for its proposed new oil refinery and will proceed with erection at once. E. M. Talley is manager.

A vocational department will be installed in the new high school to be erected at Amarillo, Tex., estimated to cost about \$400,000. Parker & Rittenberry, Amarillo, are architects.

The Stacey Co., Dallas, Tex., manufacturer of cotton-cleaning machinery, is negotiating for a site for a new factory. It recently increased its capital to \$50,000 for expansion.

The Board of City Commissioners, Terrell, Tex., has perfected plans for the installation of new engines and other equipment at the municipal electric power plant.

The Southern Utilities Co., Palatka, Fla., will make extensions and improvements in its electric power plant at Tarpon Springs, Fla., to cost about \$25,000, exclusive of machinery. It is proposed to double the capacity. George A. Loudon is general manager.

The Magnolia Petroleum Co., Dallas, Tex., will build a tank farm at Mexia, Tex., to comprise ultimately 135 steel tanks, with aggregate capacity of 7,000,000 bbl. of oil. An initial unit of 18 steel tanks is now in course of construction.

The Amarillo Iron Foundry & Planing Mill, Amarillo, Tex., is considering rebuilding the portion of its plant recently destroyed by fire with loss of about \$25,000.

The Standard Gas & Electric Co., 208 South La Salle Street, Chicago, is considering the construction of an electric power plant in the vicinity of Mobile, Ala., estimated to cost in excess of \$400,000.

The De Land Electric Light, Power & Ice Co., De Land, Fla., has completed plans for extensions and improvements in its electric power plant to cost about \$75,000, and will commence work at once.

Milwaukee

MILWAUKEE, Dec. 26.

As usual, the machine tool trade the past week was very quiet, and no increase in activity is looked for this week, due to the general suspension of shop operations between holidays and taking of inventories. There has been a little inquiry which is expected to broaden, although the trade looks for no large materialization of purchases before Jan. 1. Prospects for 1922 are regarded as better than those of a year ago, as there has been a definite upturn in the metal-working industries which is being interrupted only by the holiday season.

The Forster Foundry Co., Menomonie, Wis., has been incorporated with a capital stock of \$10,000 by H. L. Forster, S. A. Forster and G. A. Forster, all of Menomonie, and will leave an idle foundry building and engage in the production of gray iron, brass, bronze and aluminum castings.

The High Speed Steel & Tool Co., Green Bay, Wis., has been granted a charter to manufacture specialties, principally tool steel, tools for high-speed metal-working machines, etc. For the present it will not establish a plant, but this is in prospect. The principals are John T. Phillips, president Diamond Lumber Co., S. W. Mahoney and F. T. Phillips, all of Green Bay.

Fairbanks, Morse & Co., Chicago, which recently completed a new gray iron foundry at its Eclipse works in Beloit, Wis., at a cost of nearly \$1,500,000, on Jan. 1 will transfer its marine engine works from Three Rivers, Mich., to Beloit to take advantage of the enlarged casting and machining facilities. The Eclipse works heretofore specialized in farm gas engines and other power units, pumps, etc., principally for agricultural purposes. George H. Ingersoll is general manager at Beloit.

The Manitowoc Church Furniture Co., Waukesha, Wis., which recently accepted plans for a steam generating plant addition, has deferred construction until spring and will not be in the market for new equipment before March 15 or April 1. Charles F. Schuetz is general manager.

The Cudahy Brothers Co., meat packer, Cudahy, Wis., awarded the general contract to the American Contracting Co., 198 Milwaukee Street, Milwaukee, for a one-story brick and concrete box and crating factory, 80 x 190 ft., to replace a shop recently destroyed by fire. New equipment will be required throughout. Edward F. Lawlor is general manager.

The Board of Education, Iola, Wis., has plans by Edward Tough, architect, Madison, Wis., for a two-story addition to the high school, for vocational training. The present building also will be remodeled. The work will cost about \$85,000. E. C. Wipf is secretary.

The Manitowoc-Bulek Co., Manitowoc, Wis., owned by Hamacheck & Bleser, will build a new garage to cost \$50,000 complete. It will be 50 x 168 ft., part two stories and basement, with a machine shop and service department, 50 x 75 ft. The architects are Smith & Reynolds, local.

The Sparta, Wis., Board of Education has engaged Parkinson & Dockendorff, architects, La Crosse, Wis., to design a new high school and vocational training institute, for which purpose an appropriation of \$200,000 is available. Dr. S. D. Beebe is president of the board.

The Pabst Corporation, 917 Chestnut Street, Milwaukee, formerly the Pabst Brewing Co., has reorganized its official personnel, with Frederick Pabst as president, to succeed Col. Gustave Pabst; Harry W. Marsh, formerly secretary, as vice-president and general manager; Hugo Kuechenmeister, treasurer, and Edward F. Loebel, secretary. Besides continuing the manufacture of malt syrups, cereals, etc., the new administration has plans for converting some of the unused capacity into metal-working industries, the first to be a machine shop for producing a patented design of valve rotator for internal combustion poppet-valve engines. A small experimental shop has been operated on this design for about 18 months. Details of other plans are withheld for the present.

The E. I. M. Tire & Rubber Co., Racine, Wis., is taking bids until Jan. 7 for a two-story brick and concrete addition, 80 x 144 ft., at Deane Boulevard and the Milwaukee road tracks. With equipment, the improvement will cost about \$65,000. O. W. Dunham is secretary.

The Phono-Lamp Mfg. Co., Beloit, Wis., has been incorporated with a capital stock of \$300,000 by interests identified with the American National Mfg. Co., St. Louis, manufacturer of combination talking machines and lighting fixtures, which recently acquired the brass foundry and machine shop of Slater & Tuck at Beloit. The incorporators are M. W. Wiegand, C. A. Riemer and E. R. Lucas.

Baltimore

BALTIMORE, Dec. 27.

The Union Shipbuilding Co., Fairfield, Baltimore, has revised plans under way for a two-story building, 70 x 200 ft., bids for which will be asked in about 60 days. F. C. Stauffen is manager.

Machinery to cost in excess of \$100,000 will be installed in the three-story coopeage plant to be erected by the Brooklyn Coopeage Co., 142 Kent Avenue, Brooklyn, N. Y., in the Locust Point section, Baltimore, adjoining the plant of the American Sugar Refining Co., now in course of construction.

The Fort Avenue Garage, 725 Fort Avenue, Baltimore, will build a one-story repair and service works addition, 70 x 135 ft. Plans have been drawn.

The Smokeless Coal Corporation, Pulaski, Va., recently organized, is planning for the installation of electrical and other equipment at its properties. G. H. Snider is manager.

The Hagerstown & Frederick Electric Railway Co., Hagerstown, Md., is planning to double the capacity of its power house on Grant Street, Frostburg, Md. Power will be furnished to the Consolidation Coal Co. mines, as well as the mining properties of the Piedmont & Georges Creek Coal Co., both of which will install electrical equipment, motors, etc., for operation.

The City Council, Hagerstown, Md., will call for bids early in the spring for its proposed municipal electric power plant, preliminary plans for which are under way. It will cost about \$300,000. C. E. Davis is clerk; A. B. Grubmeyer, 21 East Franklin Street, is engineer.

Fire, Dec. 13, destroyed four hangars, repair shop, tools, etc., at the aviation property of the War Department, Washington, at Langley Field, Newport News, Va., with loss estimated at about \$200,000.

The Economy Tractor Co., Greenville, S. C., recently organized with a capital of \$100,000 to manufacture motor-driven tractors and parts, has leased a building for a temporary plant. A new factory will be erected later. W. C. Cleveland is president, and J. P. Hughes, manager.

The Southern Power Co., Charlotte, N. C., is perfecting plans for the immediate construction of its new hydroelectric power plants at Mountain Island, N. C., and at Great Falls, S. C., both on the Catawba River. The first noted will have a capacity of 80,000 hp., and the other, 60,000 hp. Contracts for the buildings have been awarded to the Rhinehart & Dennis Co., Charlottesville, Va., and to Scott, Stewart, Jones & Co., Greenville, S. C. The plants are estimated to cost in excess of \$5,000,000.

A vocational department will be installed in the two-story and basement high school to be erected at West Hickory, N. C., estimated to cost about \$80,000. Benton & Benton, Wilson, N. C., are architects.

P. L. McCull, Cedartown, Ga., is organizing a company to establish a plant to manufacture cones, tubes and similar mechanical equipment for textile mills. A site will be selected at an early date.

William J. Eisenhardt, 108 West Lombard Street, Baltimore, operating a plant for the manufacture of plated metal products, has awarded contract to E. Eyring & Sons, 3501 Faith Avenue, for an addition, 26 x 120 ft., for general manufacture, estimated to cost about \$25,000.

Fire, Dec. 18, destroyed the building of the Paul E. Blanford Co., Norfolk, Va., marine equipment, etc., with loss estimated at about \$150,000.

The Williamson Mfg. Co., Homeland Avenue and York Road, Baltimore, manufacturer of automobile equipment, is planning for enlargements and the installation of new equipment. Plans are also under consideration for the establishment of new works in another location. John S. Williamson is president.

The Wilmington Sugar Refinery Co., Wilmington, Del., will soon break ground for the first eight buildings, to form its local plant, estimated to cost in excess of \$2,500,000, including machinery, mechanical conveyors, machine repair works, etc.

F. B. Hatch, Albany, Ga., is organizing a company to construct a hydroelectric power plant at Banks Mill Pond.

The Triangle Motor Co., 3 New York Avenue, N. E., Washington, has completed plans and will commence the immediate erection of a two-story repair and service building, 66 x 100 ft., at 19 New York Avenue, N. E., estimated to cost about \$35,000.

The Georgia Fullers Earth Co., Lumpkin, Ga., is planning for the installation of a mechanical conveying system at its property. Other field and operating machinery will also be installed. D. W. Bailey is head.

A vocational department will be installed in the new

high school to be erected by the Board of Education, Raleigh, N. C., estimated to cost about \$500,000, bonds for which are now being arranged. C. Gadsden Sayre, Raleigh, is architect.

The W. H. Winborne Co., Conway, S. C., is planning the erection of a two-story plant, 80 x 105 ft., to manufacture ceilings, moldings, etc. Work will commence at an early date. W. H. Winborne is president.

The Board of Commissioners, Pilot Mountain, N. C., has approved a bond issue of \$40,000 for the construction of a municipal electric light and power plant. P. E. Simmons is secretary.

Indiana

INDIANAPOLIS, Dec. 27.

The Wayne Oil & Tank Co., 58 West New York Avenue, Indianapolis, is considering the erection of an addition to cost about \$150,000, including machinery.

The Board of Education, Fort Wayne, Ind., has had plans prepared for a two-story and basement vocational shop at the central high school, estimated to cost about \$200,000. A portion of the structure will be reserved for a gymnasium. Bids will be asked in the spring. Charles R. Weatherhogg, 405 Citizens' Trust Building, is architect. Byron Summers is president of the board.

The Lock Joint Tube Co., Mishawaka, Ind., manufacturer of metal tubing and other products, has plans under way for a new one-story factory, 45 x 90 ft., estimated to cost about \$30,000.

The Kemp Machine Works, Muncie, Ind., will devote production in the future to pistons, piston rings, tools and kindred specialties, changing over from engine manufacture for marine and aeroplane service, as heretofore conducted.

The Common Council, Linton, Ind., has preliminary plans in preparation for a municipal electric light and power plant. The Shrouds-Stoner Co., Tribune Building, Terre Haute, Ind., is architect.

The American Coating Mills, Elkhart, Ind., manufacturer of coated paper products, will erect a five-story building, 100 x 125 ft., estimated to cost about \$250,000.

The Model Machine Works, Frankfort, Ind., heretofore operated by Perry Goble, has been acquired by J. M. Neher, who will take immediate possession. Operations will be continued as heretofore.

The Central South

ST. LOUIS, Dec. 26.

The E. K. Campbell Heating Co., Kansas City, Mo., manufacturer of heating equipment, furnaces, etc., is planning the erection of a new one-story factory, 75 x 130 ft. Carl Boll & Brother, Kansas City, are architects.

Fire, Dec. 15, destroyed the plant of the Pine Bluff Spoke Co., Pine Bluff, Ark., with loss estimated at about \$50,000, including machinery. It is planned to rebuild.

The City Council, Woodward, Okla., is perfecting plans for a municipal electric light and power plant, estimated to cost about \$100,000. Bonds will be provided.

The Caddo River Power & Irrigation Co., Little Rock, Ark., recently organized with a capital of \$1,000,000, has been granted permission to construct a hydroelectric power plant near Arkadelphia, on the Caddo River, estimated to cost close to \$800,000. H. L. Rammel is president, and H. C. Couch, secretary.

A. Y. Burrows, Knoxville, Tenn., and Jefferson Kinsel, Clearfield, Tenn., are organizing a company with capital of \$500,000 to build a plant in the vicinity of Knoxville, to manufacture torpedoes, etc., for aerial service.

A vocational department will be installed in the junior high school to be erected at Cherryvale, Kan., estimated to cost about \$100,000. J. H. Folt & Co., 800 Grand Avenue, Kansas City, Mo., are architects.

The Thomas Fruit Co., Joplin, Mo., has acquired an existing building and will remodel the structure for a new cold storage plant, estimated to cost about \$75,000, including equipment. Charles A. Moore, 646 Plymouth Building, Minneapolis, Minn., is engineer. Abner Thomas is president.

The Russellville Compress Co., Russellville, Ark., recently organized, has taken title to about 12 acres of land as a site for new works, estimated to cost approximately \$50,000, including equipment. Plans are being prepared. A. N. Falls is secretary.

The Seymour Packing Co., Topeka, Kan., has awarded a contract to F. M. Spencer & Son, Mulvane Building, for the erection of a three-story addition, 50 x 150 ft., to be equipped as a cold storage plant, estimated to cost close to \$100,000. The Tait-Nordmeyer Engineering Co., St. Louis, is engineer.

A one-story power house will be erected at the plant of the United Casket Co., 3022 West Chestnut Street, Louis-

vile, in connection with the construction of an extension, 100 x 450 ft.

The Jenner-Woody Motor Co., Louisville, has tentative plans for new works at Twelfth Street and Broadway, estimated to cost about \$100,000. John W. Jenner is president and general manager. Lealie V. Abbott, Thierman Apartments, is architect.

The Common Council, Columbia, Mo., will commence the immediate construction of a new municipal electric light and power plant, estimated to cost about \$100,000. Plans have been completed.

The Osage Power Co., Lamar, Mo., is perfecting plans for its proposed hydroelectric generating plant on the Osage River, near Bagnell, Mo., with initial capacity of 40,000-hp. R. Williams, company address, is consulting engineer.

A vocational department will be installed in the two-story and basement high school to be erected at Bowling Green, Ky., estimated to cost about \$100,000. Bids will be asked early in 1922. L. D. Hanes is president of the board.

The Joseph Forshaw Stove & Heating Co., 111 North Twelfth Street, St. Louis, is clearing the site for a new seven-story and basement building, 50 x 100 ft., contract for which has been awarded to the James Godfrey Co., Wainwright Building. It is estimated to cost about \$75,000.

The Board of Education, Wichita, Kan., is arranging for a bond issue of \$1,000,000 for the erection of a new high school, including vocational department. Lorentz, Schmidt & Co., 121 North Market Street, are architects.

Detroit

DETROIT, Dec. 27.

The Michigan Chandelier Co., 1745 Brush Street, Detroit, manufacturer of brass and other lighting fixtures, has tentative plans under way for the erection of a three-story factory on Chene Street, 20 x 110 ft., estimated to cost \$75,000, including equipment. The Building Service Bureau, 1336 Brush Street, is architect.

Fire, Dec. 23, destroyed the power plant of the Consumers' Power Co., near Big Rapids, Mich., with loss estimated at \$350,000, including equipment. It is planned to rebuild. Offices of the company are at Grand Rapids, Mich.

The Dry-Kold Refrigerator Co., Niles, Mich., manufacturer of electrically operated refrigerators, has construction under way on an addition to its plant.

The Crodius Steam Pressed Brick Co., Pontiac, Mich., has tentative plans for the erection of a new factory on Sanderson Street. It is proposed to call for bids in the spring. C. J. Crawford is president.

The West Michigan Steel Foundry Co., Muskegon, Mich., is considering rebuilding its plant, almost completely destroyed by fire, Dec. 14, with loss reported at \$150,000.

A one-story power house, 38 x 60 ft., will be constructed at the plant of the Belle Isle & East Side Creamery Co., Detroit. Williams Brothers, 1111 Kresge Building, architects, have completed plans.

The Union Bag & Paper Co., Sheboygan, Mich., will make extensions and improvements in its plant, including the remodeling of the present mill, 60 x 100 ft., estimated to cost about \$100,000. G. S. Witham is general superintendent.

Daniel J. Ryan, formerly sales manager of the Detroit Nickel Plating & Mfg. Co., Detroit, has organized the General Electro-Plating & Mfg. Co., 465 York Street, with a capital stock of \$10,000, to do a general jobbing business and to manufacture brass, bronze and aluminum castings. The officers are Daniel J. Ryan, president and sales manager; James Kane, vice-president, and William Wallace, formerly connected with the Studebaker Corporation, secretary-treasurer. The company is in the market for foundry equipment and polishing lathes.

Dividend disbursement by industrial, commercial and banking interests at Youngstown, Ohio, largely representing fourth quarter payments, will approximate \$1,500,000. In most cases the dividends are payable Jan. 2. In disbursing \$575,000 on its common and preferred stocks, the Youngstown Sheet & Tube Co. will lead in the distribution, followed by the Trumbull Steel Co., which will pay a total of about \$285,000 on both issues. The Sheet & Tube Company common payment is at the rate of 50c. per share, while the Trumbull Company will disburse 15c. per share on common. The Standard Textile Products Co. will pay \$140,000 in dividends. Other dividend distributors at Youngstown will be the Brier Hill Steel Co., Newton Steel Co., Falcon Steel Co. and General Fireproofing Co.

The assets of the Federal Corporation, Westfield, Mass., have been sold by the trustee of the property to Richard J. Burton, Brookline, Mass. The real estate is not involved in the deal, since the property was taken over by the First National Bank, Boston, to satisfy its mortgage. The company manufactured spark plugs, rim tools, lamps, electric sockets and other accessories.

IRON AND INDUSTRIAL STOCKS

Values in General Have Shrunk During the Past Week or Ten Days

Values of securities in general have shrunk since last reports. The aggressive buying power which raised prices so substantially through November and early December is not in evidence. On the other hand, the pressure to sell stocks and bonds is not severe, and for the moment can be traced to higher money rates. People who heretofore borrowed money to buy securities are the chief sellers of securities to-day. There is comparatively little liquidating by real investors, because it is felt the high money rates are temporary and that following the seasonable lull in commercial buying will come a gradual improvement in business. Security investors, as a rule, do not look for a business boom, however, but rather the long pull to prosperity. The liquidation of frozen credits is progressing favorably and should end within the next few months. Prices for staple commodities in a great many instances have been thoroughly liquidated. It only remains for a buying power to develop, and a buying power in a country with as much money as is contained in the United States cannot lie dormant indefinitely. Which explains why the real investor is not anxious to sell stocks and bonds. There are, of course, people who recently have sold stocks because they were uneasy over developments in certain industries, but this does not apply to iron and steel stocks. It is true that holders of some iron and steel stocks are uneasy due to curtailed plant operations with resultant negative earnings, but these conditions in a very large measure are offset by consolidations of properties possibilities, attractive from the economic as well as the conversion viewpoint.

The range of prices on active iron and industrial stocks from Monday of last week to Monday of this week was as follows:

Allis-Chalm. com. 37½-39½	Lackawanna Steel. 43½-46½
Allis-Chalm. pf. 87½-89	Midvale Steel. 26-28½
Am. Can com. 32½-35½	Nat.-Acme. 10-12½
Am. Can pf. 93½-94½	Nat. E. & S. com. 35½-38½
Am. C. & F. com. 142½-144½	N. Y. Air Brake. —-57½
Am. C. & F. pf. —-113½	Nova Scotia Steel. 23-24
Am. Loco. com. 98½-104	Press. Steel com. 63-66
Am. Loco. pf. —-114½	Press. Steel pf. 91½-93
Am. Radiator com. —-88½	Ry. Stl. Spg. com. 89½-91½
Am. Steel P. com. 31½-33½	Replogle Steel. 24-26½
Bald. Loco. com. 94½-97½	Republic com. 50-53½
Bald. Loco. pf. —-104	Republic pf. 82½-84½
Beth. Steel com. 52-53	Sloss com. —-38
Beth. Stl. Cl. R. 55½-57	Sloss pf. —-73
Chic. Pneu. Tool. 58½-62	Un. Alloy Steel. 25½-25½
Colorado Fuel. 24½-26½	U. S. Pipe com. 16½-17½
Cruc. Steel com. 64½-67½	U. S. Pipe pf. —-52½
Cruc. Steel pf. 86½-87	U. S. Steel com. 82½-84½
General Electric. 136½-140½	U. S. Steel pf. 113½-115
Gt. No. Ore Cart. 31½-32	Vanadium Steel. 31-32½
Gulf States Steel. 46½-47	Westingh'se Elec. 49½-51
Int. Har. com. 82½-83½	

Purchase of Haskell & Barker Car Co. Approved

At a special meeting at Chicago on Dec. 20, stockholders of the Pullman Co. voted to approve the purchase of the property and assets of the Haskell & Barker Car Co. and to increase the capital stock of the Pullman Co. from \$120,000,000, consisting of 1,200,000 shares at \$100 par to \$135,000,000 consisting of 1,350,000 shares at \$100 par each. Terms upon which the Pullman Co. will take over the Haskell & Barker interests are as follows: The Pullman Co. is to assume all debts and obligations of the Haskell & Barker Car Co. It will then issue to the directors of the other concern, 165,000 shares of Pullman stock. The Haskell & Barker Car Co. will have the right to declare and pay the stockholders out of its assets, before the purchase by the Pullman Co., an extra dividend of \$1.25 per share upon present outstanding capital stock, amounting to \$275,000. The stockholders of the Pullman Co. consent that the 150,000 shares of new stock of that company authorized by amendment to the charter, may be issued and delivered to directors of the Haskell & Barker Car Co., as part of the 165,000 shares called for by the terms of the purchase. Three new directors of the Pullman Co. were elected by the Pullman Co. stockholders: Edward F. Carry, president Haskell & Barker Car Co., Inc.; John R. Morrow and Arthur O. Choate, both of New York.

The report that the Lima Locomotive Co., Lima, Ohio, will be added to the consolidated car company, has not been confirmed up to date.

The Elwood Foundry Co., Elwood, Ind., has been declared a voluntary bankrupt in the federal court at Indianapolis. Liabilities amount to about \$12,000 and the assets, including real estate, to a trifle more than that sum.

Current Metal Prices

On Small Lots, Delivered from Merchants' Stocks, New York City

The quotations given below are for small lots, as sold from stores in New York City by merchants carrying stocks.

As there are many consumers whose requirements are not sufficiently heavy to warrant their placing orders with manufacturers for shipment in carload lots from mills, these prices are given for their convenience.

On a number of articles the base price only is given, it being impossible to name every size.

The wholesale prices at which large lots are sold by manufacturers for direct shipment from mills are given in the market reports appearing in a preceding part of THE IRON AGE under the general heading of "Iron and Steel Markets" and "Non-ferrous Metals."

Iron and Soft Steel Bars and Shapes

Bars:	Per Lb.
Refined bars, base price.....	2.68c.
Swedish bars, base price.....	10.00c.
Soft steel bars, base price.....	2.68c.
Hoops, base price.....	3.53c.
Bands, base price.....	3.28c.
Beams and channels, angles and tees	
3 in. x ¼ in. and larger, base.....	2.78c.
Channels, angles and tees under 3 in. x	
¼ in., base.....	2.68c.
Merchant Steel	Per Lb.
Tire, 1½ x ½ in. and larger.....	2.65c.
(Smooth finish, 1 to 2½ x ¼ in. and larger) ..	2.85c.
Toe calk, ½ x ¾ in. and larger.....	3.25c.
Cold-rolled strip, soft and quarter hard..	6.25c. to 7.25c.
Open-hearth spring steel.....	3.75c. to 6c.
Shafting and Screw Stock:	
Rounds.....	3.88c.
Squares, flats and hex.....	4.38c.
Standard cast steel, base price.....	12.00c.
Extra cast steel.....	17.00c.
Special cast steel.....	22.00c.

Tank Plates—Steel

¼ in. and heavier.....	2.78c.
------------------------	--------

Sheets

Blue Annealed

	Per Lb.
No. 10.....	3.28c. to 3.53c.
No. 12.....	3.33c. to 3.58c.
No. 14.....	3.38c. to 3.63c.
No. 16.....	3.48c. to 3.73c.

Box Annealed—Black

	Soft Steel C. R. One Pass Per Lb.	Blued Stove Pipe Sheet, Per Lb.
Nos. 18 to 20.....	3.80c.	.....
Nos. 22 and 24.....	3.85c.	4.10c.
No. 26.....	3.90c.	4.15c.
No. 28.....	4.00c.	4.25c.
No. 30.....	4.25c.	.....
No. 28 and lighter, 36 in. wide, 10c. higher.		

Galvanized

	Per Lb.
No. 14.....	3.95c. to 4.10c.
No. 16.....	4.10c. to 4.25c.
Nos. 18 and 20.....	4.25c. to 4.40c.
Nos. 22 and 24.....	4.40c. to 4.55c.
No. 26.....	4.55c. to 4.70c.
No. 27.....	4.70c. to 4.85c.
No. 28.....	4.85c. to 5.00c.
No. 30.....	5.35c. to 5.50c.
No. 28 and lighter, 36 in. wide, 20c. higher.	

Welded Pipe

Standard Steel

	Black	Galv.		Black	Galv.
½ in. Butt... —56	—40		¾ in. Butt... —30	—13	
¾ in. Butt... —61	—47		1½ in. Butt... —32	—15	
1-3 in. Butt... —63	—49		2-in. Lap.... —27	—10	
3½-6 in. Lap. —60	—46		2½-6 in. Lap. —30	—15	
7-8 in. Lap... —56	—34		7-12 in. Lap.. —23	—7	
9-12 in. Lap.. —55	—33				

Steel Wire

BASED PRICE ON NO. 9 GAGE AND COARSER Per Lb.

Bright basic.....	4.00c.
Annealed soft.....	4.00c.
Galvanized annealed.....	4.75c.
Coppered basic.....	4.50c.
Tinned soft Bessemer.....	6.00c.

*Regular extras for lighter gage.

Brass Sheet, Rod, Tube and Wire

BASE PRICE

High brass sheet.....	17¼c. to 17½c.
High brass wire.....	17¼c. to 17½c.
Brass rod.....	14¾c. to 15 c.
Brass tube, brazed.....	26 c. to 27½c.
Brass tube, seamless.....	18½c. to 19 c.
Copper tube, seamless.....	21¼c.

Copper Sheets

Sheet copper, hot rolled, 24 oz., 21½c. per lb. base.
Cold rolled, 14 oz. and heavier, 2c. per lb. advance over hot rolled.

Tin Plates

Bright Tin	Grade	Grade	Coke—14-20	Primes	Wasters
	"AAA"	"A"			
	Charcoal	Charcoal			
	14x20	14x20			
IC..	\$10.00	\$8.50	80 lb....	\$6.05	\$5.80
IX..	11.25	10.00	90 lb....	6.15	5.90
IXX..	13.00	11.50	100 lb....	6.25	6.00
IXXX..	14.75	13.25	IC....	6.40	6.15
IXXXX..	16.25	15.00	IX....	7.40	7.15
			IXX....	8.40	8.15
			IXXX....	9.40	9.15
			IXXXX....	10.40	10.15

Terne Plates

8-lb. Coating 14 x 20

100 lb.	\$7.00
IC	7.25
IX	7.50
Fire door stock	10.00

Tin

Straits, pig	35c.
Bar	40c. to 45c.

Copper

Lake ingot	16 c.
Electrolytic	15½c.
Casting	15¼c.

Spelter and Sheet Zinc

Western spelter	6½c. to 7c.
Sheet zinc, No. 9 base, casks	10½c. open 11c.

Lead and Solder*

American pig lead.....	5¾c. to 6¼c.
Bar lead.....	6¼c. to 7 c.
Solder, ½ and ⅔ guaranteed	27c.
No. 1 solder	25c.
Refined solder	21c.

*Prices of solder indicated by private brand vary according to composition.

Babbitt Metal

Best grade, per lb.....	80c.
Commercial grade, per lb.....	40c.
Grade D, per lb.....	35c.

Antimony

Asiatic	6½c. to 6¾c.
---------------	--------------

Aluminum

No. 1 aluminum (guaranteed over 99 per cent pure), in ingots for remelting, per lb.....	29c. to 31c.
---	--------------

Old Metals

Prices are firm but business is quiet. Dealers' buying prices are nominally as follows:

	Cents Per Lb.
Copper, heavy crucible.....	11.25
Copper, heavy wire	10.75
Copper, light and bottoms	8.25
Brass, heavy	5.50
Brass, light	4.50
Heavy machine composition.....	8.00
No. 1 yellow brass turnings	5.50
No. 1 red brass or composition turnings.....	7.00
Lead, heavy	3.75
Lead, tea	2.50
Zinc.....	2.50

THE IRON AGE

New York, January 5, 1922

ESTABLISHED 1855

VOL. 109, No. 1

Lowest Output in Relation to Capacity

Nineteen-Twenty-One a 38 Per Cent Year in Steel—Steadily Declining Prices, But High Costs Due Largely to High Freights and Restricted Operations

THE iron and steel industry entered 1921 well persuaded that the depression that came upon it three months before the end of 1920 would grow more acute in the new year. Yet it is truth to say that no prophecy made at the beginning of 1921 went so deep into depression as both prices and production went, as the result of the year's developments.

Prices declined steadily throughout the year, with an occasional eddy unrelated to the general trend, and the plotted curves for rolled steel are all at high point in January and at low point in December. The production curve is different. Its high point is in January, but its low point is in July, while December is about half way between the two.

Hopes of Rebound Dashed

Just as in the second half of 1919 and the greater part of 1920 most manufacturers believed that the war reckoning had been dodged, because it did not come as soon as they expected, so in the early months of the present depression there was a belief that the demand for iron and steel dropped off so precipitously in the fall of 1920 that some rebound was inevitable. The spring of 1921 was the time generally set for renewed buying, and the theory was that as restriction in output, particularly in pig iron, had been drastic, there might be some stiffening in prices along with the revival in demand. All such hopes were disappointed.

At the beginning of April it was said in THE IRON AGE's market summary: "Production [of

pig iron] to-day is the smallest on record in proportion to the country's capacity." The same statement could have been made in succession at the beginning of May, June, July and August. But in August the turn came and for four months there was a succession of increases in output. Steel ingot production likewise was at low point in July.

1921 in Iron and Steel

A YEAR of severe depression, of steadily declining prices, of unemployment and successive wage reductions for workmen, and of heavy losses for iron and steel companies.

Output was on a smaller scale, in relation to capacity, than in any other year in the history of the industry.

Pig iron production was about 16,400,000 tons, 44 per cent of the 36,925,000 tons of 1920. We must go back 13 years, or to the 15,936,000 tons of 1908 (the year after the last panic), to find so small a pig iron year.

Steel works produced about 19,250,000 tons of ingots, against 40,881,000 tons in 1920. In terms of the country's ingot capacity, 1921 will rate as a 38 per cent year.

The decline in prices was from an average of 3.082c. per lb. on Jan. 1, for the seven leading forms of finished steel, to 2.062c. per lb. on Dec. 31. At the beginning of the year the average of these seven products stood at 85 per cent, and at the close of the year at only 24 per cent, above the 1913 average.

Using Up Stocks to the Utmost

The one thing in the record of 1921 as a steel year that stands out above all else, and that was continually a marvel, was the way in which consumers got along without going to the mills. There was much more steel in the country, in the hands of jobbers, manufacturing consumers and others than had been thought. The country never got along before on a 38 per cent operation of its steel capacity and it would not have done so last year but for using up to the last ton what was carried over from 1920. Thus the effort of consumers in all lines to reduce their steel inventory to the lowest point dominated mill operations. As prices steadily declined resort was had to every expedient to avoid drawing on the mills for fresh supplies. Railroads

shipped steel across the country from one repair shop that had fair stocks to another that had little. Jobbers in iron and steel traded with competing jobbers, shipping sizes and forms in which they were overstocked in exchange for sizes and forms of which they had little. Steel companies at times shipped from their warehouses at mill

prices rather than start up a mill for a meager rolling on which delivery was due.

Blast furnace yards were full of ore bought at the high prices of 1920. Throughout the year such stocks were a heavier and heavier incubus on the ore and pig iron markets. As illustrating the inclination of the whole trade, particularly in the early months of the year, to take the most hopeful view possible of the future, the estimate was common at the end of March, and it appears in our market summary of March 31, that "less than 40,000,000 tons of Lake Superior ore will be shipped this season," seeing that fully 31,000,000 tons was then in furnace yards and on docks. "Less than 40,000,000 tons" was quite correct! But there was no idea on March 31 that the season's movement down the lakes would turn out to be so little as 22,300,000 tons.

Consumers Turn Jobbers

An unprecedented thing was added to all the other influences at work to restrict demand for steel. Along in the second quarter of the year large manufacturing consumers turned jobbers, selling off bars, plates, structural shapes, or whatever they had on hand, at less than warehouse prices. Many of the Steel Corporation's contracts of 1920, taken at much below prevailing prices, were written down as firm orders and the buyers took the deliveries when due. In some cases they could not use the steel, but generally the reselling was prompted by the belief that it could be replaced later at lower prices.

Steel Corporation and "Independent" Prices

The low prices maintained by the Steel Corporation in 1919 and 1920, ranging from \$10 to \$30 per ton below those of independent steel companies in different products, extended their influence into 1921—but not for long. The year opened with the Steel Corporation operating at 85 to 90 per cent of capacity. Independent companies, which for many months in 1920 had sought prompt rather than contract business, had little work ahead and early in January ran at less than half the Steel Corporation's rate. Later in that month independent mills operated at but 20 to 30 per cent of capacity. Some followed the plan of shutting down certain mills altogether, then after two weeks or so starting up to take care of orders that had come in.

The difference in the position of the Steel Corporation and the independents early in the year will appear from the fact that in December, 1920, the latter curtailed pig iron production by blowing out 19 furnaces, whereas the Steel Corporation had three more furnaces at work on Jan. 1 than on Dec. 1. In January the independents blew out nine more furnaces while the corporation blew in one. In February, however, the Steel Corporation was made to feel the effects of the universal contraction, its list of active blast furnaces suffering a net loss of 15 in the month.

At the beginning of the year the Steel Corporation was still adhering to the so-called Industrial Board prices of March 21, 1919. But only a few weeks had passed before the independents went lower. In the first week of February the Midvale Steel & Ordnance Co. announced that it would quote prices low enough to bring business to its mills, some of which had been shut down since early December. Cuts of \$5 per ton below the Steel Corporation schedules came promptly, the products chiefly affected being plates, shapes and bars. The decline went on for several weeks, the Steel Corporation meanwhile maintaining the prices to which it had adhered for about two years.

By April 1 plates had declined from 2.65c. on Jan. 1 to 2c., beams from 2.45c. to 2c. and bars from 2.35c. to 2c. On April 12 the Steel Corporation announced that

it had decided to make substantial reductions, putting bars at 2.10c. and plates and shapes at 2.20c. Billets were reduced from \$38.50 to \$37, wire rods from \$52 to \$48 and tin plates from \$7 to \$6.25 per box. At the same time independent companies, which had been selling below these prices, advanced their quotations to those announced by the Steel Corporation. It was apparent in May that these prices were not holding, some plate mills having made a 2c. price, while bars were sold at 1.90c. Pittsburgh. These price cuts did not increase the volume of business, there being no evidence of a stabilizing influence.

On July 5 the Bethlehem Steel Co. announced reductions amounting to \$4 per ton for bars, plates, shapes, billets, skelp, sheet bars and blue annealed sheets, \$5 for black and galvanized sheets, and \$10 for tin plate. On some products this announcement merely recorded what the market already had done. In mid-July aggressive competition between the Steel Corporation and independent steel producers developed in the Chicago market, Pittsburgh basing having gone by the board in that district.

Through the remainder of the year prices kept on declining. One small counter current was started by an advance of \$2 to \$3 per ton in wire products, made by the Steel Corporation, effective Sept. 10. The real effect of this advance was to bring a large amount of business on its books at prices previously prevailing, which were \$2.75 per keg for wire nails and \$2.50 per 100 lb. for plain wire. While considerable business was done later at the advanced prices of \$2.90 for nails and \$2.60 for plain wire, it turned out that these prices were not really enforced. Later in the year there was considerable cutting in wire products and on Dec. 21 the Steel Corporation announced formal reductions to \$2.50 for wire nails and \$2.25 for plain wire.

There was a jog in the pig iron price line, most noticeable in the Eastern market. Low point was reached in all pig iron markets in August, and in some a slight turn upward came in September, lasting through October. In November prices began falling away again and the decline continued through the year.

Uneconomical Operation

Throughout the year steel companies were constantly at work to get costs down. Naturally wages were reduced, as will be referred to later. But economies in operation were enforced, such as were not possible in the strain for output which marked most of the months of 1920. Crews were recast, and in some instances mill foremen were given such general orders as, Use five men to do the work formerly done by six. Fuel economy was studied anew, in view of the war wages paid at coal mines and the high freight on coal. New economies were found in the use of refractories, lubricants and all other supplies, on which costs had run up beyond all precedent. Per capita output was increased in some classes of operations. At blast furnaces accumulated flue-dust piles were made available by sintering, replacing in some cases considerable percentages of high priced ore in blast furnace mixtures.

But every effort at economy, even that secured by the easiest and least desirable route of wage cuts, met eventual defeat at the hands of High Unit Overhead. All that steel producers had learned of the incomparable value of large tonnages as a divisor into fixed charges had to be forgotten. Small runs, spasmodic starting and stopping of mills, and at all times fractional operation of producing capacity were insuperably baffling. Cases are known in which, rather than start up a mill to make a scheduled delivery, the producer bought the material from a competing company. The latter got the benefit of a longer run, which helped

its cost, while steel company No. 1 was able to buy at less than it would have cost it to start its mill.

Sources of Demand

The railroads are credited with consuming each year a large percentage of the country's steel output. They did not consume much last year, as is told below, but it is to be said in passing that the railroad consumption of steel is always exaggerated in the general thinking. It is doubtful if it has gone above 25 per cent in any year in the past 20, apart, possibly, from 1906 and 1907, and commonly it is not above 20 per cent.

Throughout the year it was the constant comment in market reports that in the heavy products—rails, plates, shapes and bars—demand was indifferent. The lighter products did better—wire, sheets and tin plates. On the whole, there was a good business, particularly in the second half, in wrought pipe. The new oil fields of Texas and the revival in the petroleum market after a period of flatness brought out some good contracts for line pipe.

What saved the day for plate mills, in the small demand from shipyards and car works, was the unusual amount of tank work called for by the oil fields, particularly the Mexia field of Texas. In the second half of the year tank works in the West and Middle West were unusually busy on this account.

New construction, commonly called an index of activity in steel, was held back by excessive labor cost. There was a good deal more house building throughout the country than was commonly credited. This is established by the fact that foundries making heating furnace castings ran at a much better rate than others and that radiator companies really had a good year. Manufacturers of sanitary equipment and builders' hardware fared well also. A good deal was done in the erection of school houses and other public buildings, but not much in business structures, and very little in bridges. The bookings of the fabricating companies averaged for the year about one-third of their capacity.

Agricultural implement warehouses were pretty well stocked with machinery throughout the year, and manufacturers in these lines did little. No large buying of steel from that quarter is to be looked for until the farmer gets on his feet, and that will not be until after the next harvest. The automobile demand was about what was expected of it—considerably less than half that of 1920.

Replenishment demand, after months in which the country had been swept bare of steel in all forms, caused the larger operation of steel works and rolling mills that dates from the early fall of last year.

Meager Demand from Railroads

Railroad buying in 1921 was most disappointing. From early in the year until its end steel producers held to two main hopes, neither of which was realized. One was that the Government's settlement of the railroad claims for losses during the period of control would give them means with which to buy equipment and do track work, thus helping the steel mills in their time of need. The other was that freight rates would be put down and the steel trade relieved in part of the heavy burden of transportation charges nearly double those of pre-war time.

The special hardship of the 40 per cent rate increase of August, 1920, on the raw material of steel making was put before the carriers time and again. Many of them conceded the force of the argument that there is no parallel in other industries for the hauling, often for long distances, of five tons of raw material for the making of one ton of finished steel product. But the railroad presidents were so engrossed with issues growing out of their relations with the labor unions that they could not take the plight of the steel industry into their thinking. Nor could they be made

to see how far any increased buying of steel that might result from lower freight rates on its raw materials would go in improving their own business.

From time to time predictions of betterment in the steel trade were put out, on the promise of legislation, favored by the administration at Washington, for the funding of \$500,000,000 of railroad indebtedness to the Government for property expenditures in the period of control. But this legislation never came through. Various settlements were made on war-time claims of the railroads against the Government, and following these there were belated payments of railroad obligations to the steel mills. Substantial relief to the railroads came in a 12½ per cent wage reduction on July 1 and in changes in shop rules made by the Railroad Labor Board in December, working savings of many millions of dollars per year.

Out of all the expectations of railroad buying entertained at the opening of the year the actual outcome was far below that of 1920. And 1920 was a year in which the railroads directly and indirectly, consumed not more than 15 per cent of the country's steel output. New cars ordered were only a fraction of the 84,000 placed in 1920, being only about 20,000, and locomotives ordered for domestic use were fewer than 250. The repair of 40,000 cars helped in a measure to make up to the mills what they missed in steel for new cars.

Production

The output of iron and steel in 1921 was the smallest since 1908, which was the year following the panic of November, 1907. Pig iron production last year we estimate at 16,400,000 tons and steel ingot production at 19,250,000 tons. Counting ingot capacity at 50,500,000 tons 1921 was thus a 38 per cent year. The output of steel ingots and steel castings together was probably not far from 19,850,000 tons. Comparison with the five preceding years is made in the table below:

	Pig Iron Gross Tons	Steel Ingots and Castings Gross Tons
1916	33,434,797	42,773,680
1917	38,621,216	45,060,607
1918	39,054,644	44,462,432
1919	31,015,364	34,671,232
1920	36,925,987	42,132,934
1921	16,400,000*	19,850,000*

*Estimated

The variations in pig iron production appear in the following statement of the number and daily capacity of the furnaces in blast at the beginning of each month:

	No. in Blast	Daily Capacity Gross Tons		No. in Blast	Daily Capacity Gross Tons
Jan. 1...	201	76,540	July 1....	76	32,195
Feb. 1....	188	70,500	Aug. 1....	69	29,175
March 1..	153	61,850	Sept. 1....	70	30,170
April 1... 102		41,530	Oct. 1.....	82	35,650
May 1.... 96		39,105	Nov. 1.....	96	43,500
June 1... 90		37,085	Dec. 1.....	120	51,665

In the low month of the year, July, 864,555 tons of pig iron was made. Not in 17½ years had any month yielded so low a total. In December, 1903, the country produced 846,695 tons.

The Year's Iron and Steel Exports

Starting in under the momentum of the 1920 movement which made the January total 547,394 tons, the export of iron and steel from the United States tapered down rapidly until in August, with 75,827 tons, a figure was reached lower than for any month since January, 1909. An encouraging but slow growth after August, month by month, brought the figure to 122,290 tons for November, which is 28.2 per cent of the November, 1920, movement. Up to Nov. 30 the total was 2,075,674 tons, or 47.15 per cent of the 4,402,056 tons for the first eleven months of 1920.

In only two items did the shipments last year exceed those of 1920 these being welded pipe and fittings,

(Continued on page 53)

Manganese Steel Made in Electric Furnace

Melting Practice for Castings Discussed—Use of Manganese Steel Scrap—Deoxidizing with Manganese Ore—The Heat Treatment

BY LARRY J. BARTON*

THE electric furnace has again shown its superiority over other steel-making methods. This time it is in the field of manganese steel. Up to a few years ago all of the American production of this metal was by means of the converter, the ferromanganese being added molten in the ladle. One company has made extensive trials with the electric furnace, over the last three years. Its results have been so gratifying that they have decided to replace all the

the present time, when about 100,000 tons is the yearly capacity. This product is being shipped in quantity to all parts of the world, from the gold mines of Alaska to the great dredgers of South America. The great work of the Panama Canal was only made possible by the use of this metal.

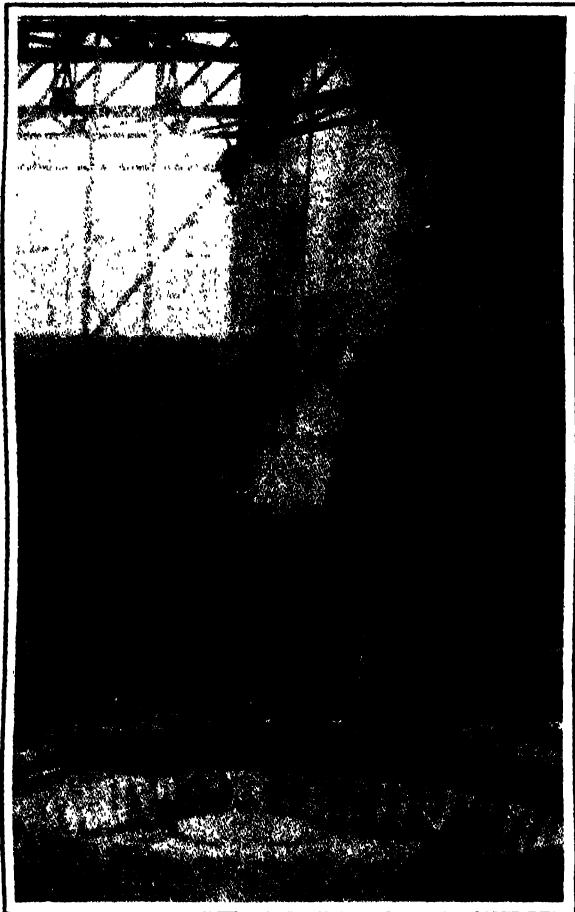
Manganese steel is a steel of many uses. Being one possessing great wearing qualities and toughness, it finds unlimited use where abnormal strength is required. Dredge pins and buckets, rolling mill pinions, crusher parts, crane wheels, sheaves, tractor links, railroad frogs and switches, are some of its more important uses.

Physical Properties

Manganese steel, when heat treated, has the following properties as the result of a large number of tests:

Tensile strength, lb. per sq. in.....	100,000 to 110,000
Elastic limit, lb. per sq. in.....	50,000 to 55,000
Elongation in 2 in., per cent.....	30 to 35
Reduction in area, per cent.....	35 to 40
Brinell hardness	180 to 200
Scleroscope	40 to 50

Manganese steel is practically non-magnetic, and for this reason finds great use as a protecting plate on electric magnets. Most of the steel parts on the



Tapping a Heat of Manganese Steel from an Electric Furnace in the Plant of the Southern Pacific Co.

converters with electric furnaces. Manganese steel, made in the converter, was considered very good steel, but electric steel is so superior in every way, that it might be considered a "super-manganese steel." The following paper is intended to cover this subject in detail.

Production and Uses

Manganese steel was first brought to the attention of the steel world by the researches of Sir Robert Hadfield, in England, about the year 1887. Its first introduction into the United States was in 1892 in the form of manganese steel castings. Since that time there has been a gradual increase in the tonnage until

*Metallurgist Southern Pacific Co., Sacramento, Cal.

Table of Tests of Manganese Steel of Varying Compositions or Forged Steel Containing 0.83 to 19.0 Per Cent Manganese*

No of Sample	Composition, Per Cent			Natural		Quenched in Water		Annealed	
	Carbon, Per Cent	Silicon, Per Cent	Manganese, Per Cent	Ultimate Strength, Lb per Sq. In.	Elongation in 8 In., Per Cent	Ultimate Strength, Lb. per Sq. In.	Elongation in 8 In., Per Cent	Ultimate Strength, Lb per Sq. In.	Elongation in 8 In., Per Cent
1	0.20	0.03	0.83	73,920	31	.....	.....	.....	.....
2	0.40	0.15	2.30	125,440	6	.....	.....	.....	.....
3	0.40	0.09	3.89	85,120	1	.....	.....	.....	.....
4	0.52	0.37	6.95	56,000	2	51,520	2	47,040	2
5	0.47	0.44	7.22	60,480	2	56,000	2	60,480	5
6	0.61	0.30	9.37	73,920	5	87,360	15	85,120	16
7	0.85	0.28	10.60	76,160	4	89,600	17	91,840	17
8	1.10	0.16	12.60	87,360	2	120,960	27	82,880	11
9	0.92	0.48	12.81	87,360	5	136,640	37	107,520	20
10	0.85	0.28	14.01	80,640	2	150,080	44	107,520	14
11	1.10	0.32	14.48	87,360	1	141,120	37	109,760	5
12	1.24	0.16	15.06	109,760	2	136,640	31	105,280	2
13	1.54	0.16	18.40	114,240	1	118,720	10	87,360	1
14	1.83	0.26	18.55	96,320	1	123,200	5	.....	.....
15	1.60	0.26	19.10	116,480	1	132,160	4	91,840	1

*Hadfield, *Journal Iron and Steel Institute*, vol. II, 1888, p. 70.

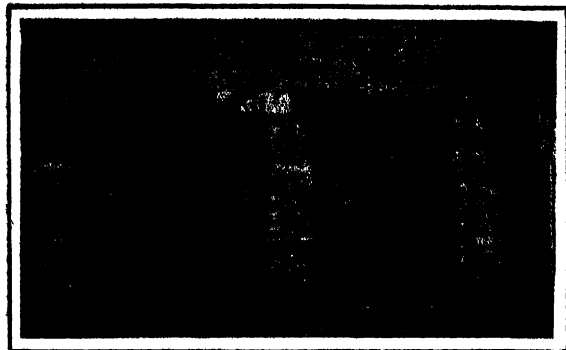
famous North Pole "non magnetic" ship were made of manganese steel.

Its shrinkage is about 5/16 in. as against 1/4 in. for soft steel. This makes it a much more difficult metal to cast from the standpoint of the mold. Manganese steel when solidifying is prone to crack and check, and for this reason all corners or sharp edges are avoided wherever possible. Many castings must be shaken out while red hot and the cores broken in to overcome this trouble. Due to its great solidity

the shrink heads on castings must be larger than on carbon steel castings, and the gating must be very carefully done to avoid tearing during the cooling period.

Its Manufacture

The steel being described was made in a standard 3-ton Heroult furnace. This furnace was lined in the ordinary way, basic bottom, basic brick to above the



Part of a Battery of Heat-Treating Furnaces for Manganese Steel Castings

slag line, with silica brick from there up and a silica brick roof. Due to the heavy reducing conditions and the large amount of lime necessary in the slags, the life of the linings and roof are much less than on carbon steel. This has been overcome to a great extent by the use of what are known as "metalkase" brick. These are a metal lined magnesite brick which do not spall and give superior service when lined directly to the roof.

Manganese steel generally runs from 11 to 13 per cent manganese, with carbon 1.10 to 1.30 per cent. The main point in its successful manufacture is to keep the carbon always below this proportion, and if possible lower. Disregarding the remelting of manganese steel scrap, which will be taken up later, there are several methods of furnace practice available.

1. The metal can be melted under an oxidizing slag, the slag removed, a second slag added, and cleared under a heavy reducing atmosphere, as if carbon steel were being made. When the slag is white and powdering, the ferromanganese can be added in lots of several hundred pounds at a time and the bath brought to the proper temperature and tapped.

2. The heat can be run as above, adding the manganese after slagging off, before the final slag.

3. The heat can be melted, the manganese added and the steel finished under the first slag.

In the first two methods all the manganese in the

charge is wasted, flowing from the furnace in the first slag. This is saved by the third method. Then, too, there is a considerable saving of slag-making material by using the last method. The only objection to this method is the fact that if you melt down high in carbon you are faced with an off analysis. By carefully watching the charge and melting, this is a point which very seldom happens, and then only when having electrode breakage. Under the circumstances the last method has been adopted as the standard practice.

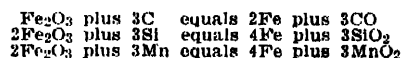
Melting Practice

The charge is either shoveled or thrown by hand into the furnace, depending on its character, care being taken that the scrap is so arranged that it forms as compact a mass as possible. This is an important point, especially in a shop where heavy penalties are imposed by the power company on high peak loads. The more compact the charge, the easier the melting down and the quicker the time for a steady load to be obtained. The lime, generally about 2 per-cent of the charge, can either be added with the charge or as the bath is melting down. During the melting the rust and scale on the scrap reacts on the carbon, man-



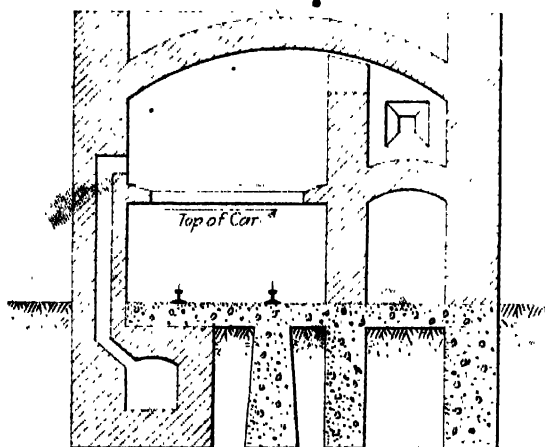
Quenching Tank for Treating Manganese Steel Castings

gane and silicon, cutting them down according to the reactions:

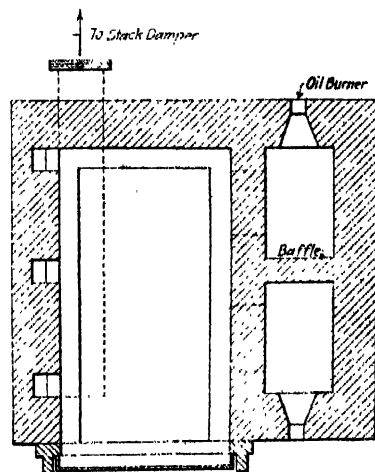


When using ordinary soft steel scrap containing carbon, 0.20 to 0.30; manganese, 0.30 to 0.50, and silicon, 0.05 to 0.20 per cent, the bath will melt down without any further additions of ore or scale to about carbon, 0.03 to 0.08; manganese, 0.05 to 0.10, and silicon, 0.01 to 0.03 per cent.

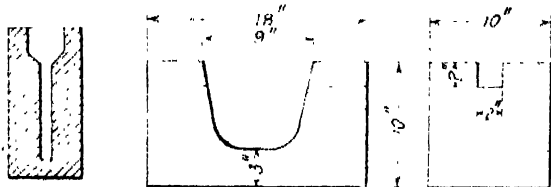
If a heat of low phosphorous is desired it will of course be necessary to draw off the first slag. As the phosphorous limit of around 0.06 to 0.08 per cent in manganese steel is easy to meet, it will not be necessary



End Section (Left) and Sectional Plan (Right) of Heat-Treating Furnace for Manganese Steel

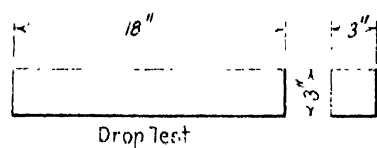


to do this except in unusual cases. When the charge is all melted, any pieces of metal on the side walls are knocked into the bath and a preliminary test for

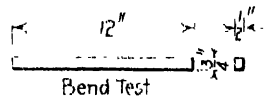


Mold (Left) for Test Bars and Bending Block (Right) for Bending Manganese Steel Bars

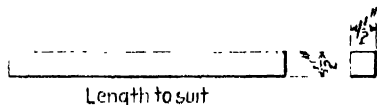
carbon taken. This can be either a fracture test by eye or can be a quick analysis by the chemist. As it is so easy to tell by a fracture test, the chemist is very seldom used for this preliminary. If your carbon is as low as desired it is time to go ahead. If not, scale or



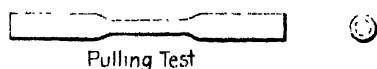
Drop Test



Bend Test



Length to suit



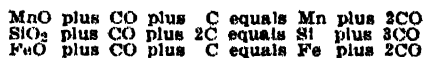
Pulling Test

Test Bars for the Various Tensile, Bending and Drop Tests on Manganese Steel

ore must be added, the bath boiled and the carbon burned out until the test shows the carbon is low enough. The required amount of ferromanganese having been weighed out to give the desired analysis, it is added at the rate of 100 lb. per min., each lot being added through alternate sides of the furnace.

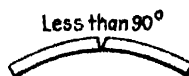
The slag is now given a dusting of coke dust or some other reducing agent and the final period begins. The slag slowly begins to turn from a black to a brown, then greenish gray, and is finally white, powdering to a fine powder in the air. This is not always the case, however, as the slag may hang up and remain a green or a blue throughout the heat. The best indication is the metal test, disregarding your slag entirely. This test is taken in a sand mold, made of two cores pasted together, poured on end. While still red hot

this test is quenched in water and broken on a block. If the bend is good the metal is ready to pour. If not, the bath must be held under further reduction and deoxidation takes place, according to the reactions:



the metals being reduced back into the bath and the oxygen going off as a gas.

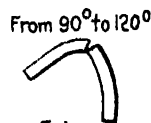
Under the influence of this heavy reducing atmos-



Poor



Good



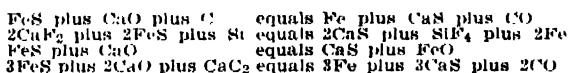
Fair



Excellent

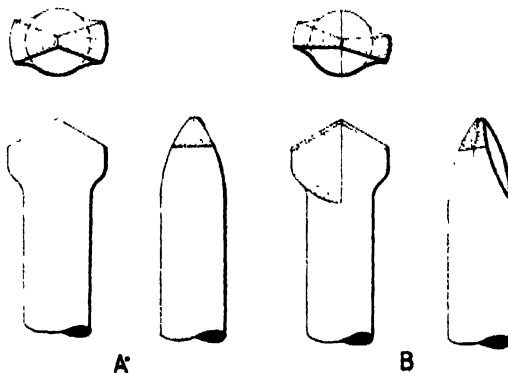
Method Used in the Recording of Heats by Means of Bending Treated Test Bars

phere, together with the large amount of lime in the slag, nearly all of the sulphur is eliminated from the metal. This may take place in several ways:



Testing the Temperature

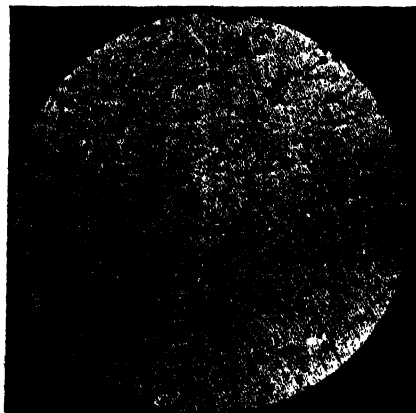
Assuming the metal test is now satisfactory the



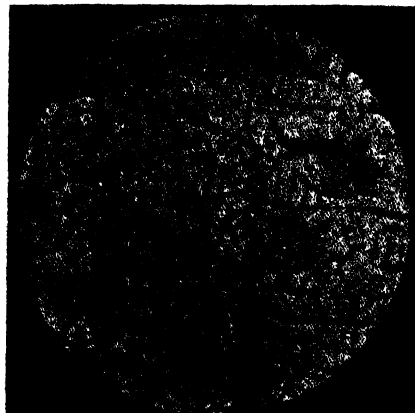
Special Tool for Drilling Manganese Steel Samples

steel is examined as to temperature. This can be ascertained in several ways:

1. By means of the rod test. A soft steel rod is immersed into the bath for a pre-



Photomicrographs of Manganese Steel Castings; Etched with Nitric Acid in Alcohol and Magnified 125 Dia. The one at the left is the metal as cast and the other (right) is the steel after treatment. The composition was Mn., 11.89; C., 1.28; Si., 0.24; P., 0.04, and S., 0.02 per cent



determined number of seconds and the effect of the heat noticed by the way the end of the bar is eaten away. If cut off clean the metal is hot; if cut pointed the metal is medium, and if not cut at all or sculled the metal is cold.

2. By means of pouring over the lip of a small test spoon and noticing how clean the spoon pours, together with the appearance of the metal to the eye.

3. By means of drawing a spoon full of metal and taking the number of seconds necessary for the top of the metal to skin over.

The last method is the one now in use and the required number of seconds is close to 60. This test is reliable only when there is over 0.50 per cent silicon in the metal and as soon as the spoon is taken from the furnace small pinches of ground silicon are added to give this condition. While this test varies according to the initial heat of the spoon before filling with metal, in the hands of the same operator it proves very reliable.

When the steel is hot enough it is tapped, the ferro-silicon being added in small pieces to the ladle. Tea pot ladles are used and give very good service.

Analysis of Slags

The following shows the analysis of a few slags, recording the difference as the heat progresses:

	1 P.M. Dark Brown	2 P.M. Brown	2:10 P.M. Light Brown	2:45 P.M. White Powder
	Per Cent			
Silica	28.02	34.70	33.60	33.60
Iron oxide	20.70	16.00	10.00	9.40
Aluminum oxide	48.38	49.49	56.45	58.42
Lime	7.02	4.45	3.75	1.59
Manganese oxide				

Some slag losses on different heats are as follows:

Manganese in Steel, Per Cent	Manganese in Slag, Per Cent
10.53	6.45
11.11	6.67
11.92	2.79
11.26	3.91

These were all on heats where the slag was difficult to clear and where the metal test alone was used to show condition of metal.

Logs of the Heats

Some of the actual heat logs were as follows:

Charge	Lb.	Steel Analysis, Per Cent
Heads and gates (carbon steel)	800	Mn 11.62
Punchings	3,000	C 1.26
Turnings	650	P 0.055
Total	4,450	Si 0.45
Time of heat, 4 hr. 55 min.		
Kwh. used, 3500		
Time		
10:20	Power on. Low amperage, voltage 104 to 106	
10:35	Power off to lower electrodes	
10:45	Power on. Amperage 4500	
11:10	3 shovels lime, 60 lb.	
1:20	Amperage reduced to 3500; 60 lb. lime added	
1:40	All melted	
2:05	First metal test, carbon 0.12 per cent. Slag dark brown	
2:15	25 lb. of ground electrodes added	
2:18	Changed to low voltage, 83	
2:25	Slag white	
2:30	High voltage, 106	
2:32	100 lb. ferromanganese on hearth at each door	
2:40	First 100 lb. in No. 1 door; second 100 lb. heating	
2:44	First 100 lb. in No. 2 door; second 100 lb. heating	
	Amperage increased to 4500	
2:48 to		
3:08	Manganese added 100 lb. at a time from alternate doors	
3:15	Tapped	
	Weight of metal, 5100 lb.	
	Weight of slag, 310 lb.	

Heat No. --	Lb.	Steel Analysis, Per Cent
Charge		
Heads and gates	500	Mn 11.02
Punchings	4,100	C 1.33
Turnings	500	P 0.046
Total	5,100	Si 0.56
Time of melting, 6 hr.		
Kwh. used, 3900		
9:30	Power on. 3000 amperes; voltage, 100 to 102	
9:45	75 lb. lime added; 4500 amperes	
11:15	15 lb. lime	
1:00	60 lb. lime	

1:30	First metal test for carbon, 0.30 to 0.35 per cent on fracture; slag, black
1:40	Hole in roof
1:50	60 lb. mill scale; 2500 amperes
2:05	Carbon, 0.35 per cent by analysis
2:10	45 lb. mill scale
2:15	Carbon, 0.35 per cent
2:20	30 lb. mill scale
2:30	Slagged off
2:35	100 lb. lime
Up to	
3:10	Manganese added
3:20	10 lb. ground electrodes
3:30	Tapped

Weight of metal, 5655 lb.
Weight of slag, 350 lb.

Analyses of the carbon electrodes used was as follows:

	No. 1, Per Cent	No. 2, Per Cent
Moisture, etc.	1.19	None
P.C.	98.00	99.17
Ash	0.81	0.83
SiO ₂	0.49	0.12
Fe ₂ O ₃	0.12	0.26
Al ₂ O ₃	None	0.08
CaO	None	0.17
MgO	None	0.13
S	0.20	None

Remelting of Manganese Steel Scrap

This is the one great point where the electric furnace shows its superiority over the older processes. Under the old system this scrap was remelted in an air furnace, very similar to an open-hearth, with the exception that there are no regenerative chambers. These furnaces were also used to melt the ferromanganese. Large losses of manganese occurred, with the resulting raise in the proportional carbon content, giving great trouble in keeping the carbon low in the final metal. With the electric furnace this is largely eliminated. The scrap consisting of old heads and gates, defective castings, etc., is melted the same as ordinary carbon steel scrap under a heavy lime slag. Then towards the finish of the heat all this manganese in the slag is reduced back into the bath.

The best success is obtained when the charges are rattled and cleaned from all adhering sand and scale. This lowers the oxidizing condition of the melting down period, tending to lessen the manganese slag contents. When the bath is melted, a sample is taken for the chemist to analyze for carbon and manganese. From this analysis the resulting charge of ferromanganese is calculated. These tests cannot be taken by fracture as the high manganese content of from 6 to 10 per cent changes the grain to such a point that any estimate is unreliable.

Some Heats of Manganese Steel Scrap

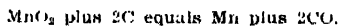
Manganese scrap, per cent	50.0	70.0	80.0	70.0	50.0
Condition	Rusty	Rusty	Rusty	Rattled	Rattled
How charged	Center	Top	Top	Center	Center
Current on	8:45 a.m.	9:35 a.m.	3:35 p.m.	3:35 p.m.	1:15 p.m.
Contact	9:15	10:05	6:05	At once	At once
Melted	11:10	1:15	7:35	6:15	3:45
Tapped	12:15	2:20	9:00	8:05	6:15
Total time	3:30	4:45	5:25	4:30	5:00
First charge:					
Mn ore	None	12.00	6.35	4.55	2.45
Scale	10:55	11:05	6.45	6:05	3:45
CaF ₂	11:20	12:50	6:55	5:35	3:55
Lime	9:55	11:05	7:00	...	3:05
Sand	11:15	1:05	7:25	6:35	4:25
Coke	11:15	12:55	7:35	6:35	4:25
FeSi	....	2:05	8:55	7:00	4:35
Total Lb.:					
Mn ore	None	60	60	170	150
Scale	60	30	30	95	80
CaF ₂	20	15	25	40	40
Lime	85	145	190	215	250
Sand	15	30	25	25	15
Coke	85	155	85	110	120
FeSi	30	25	25	50	45
Fe-Mn	630	332	324	395	610
Final slag	....	....	Light green	Light green	Bluish green
Final temp., sec					
	60	40	60	40	45
Mn, per cent, theoretical	13.43	13.29	14.14	13.22	13.25
Mn, per cent, actual	13.23	11.86	12.14	12.55	12.50
C, per cent, theoretical	1.30	1.25	1.33	1.29	1.29
Side walls:					
Before	OK	Thin	Thin	OK	OK

After Bottom: Before After Metal	OK Hole	Thin OK OK	Thin OK OK	Cut OK OK	Cut OK OK
tapped, lb.	6,430	5,655	6,010	6,200	6,400
Kwh. total	2,500	2,500	2,500	3,000	3,000
Kwh. per ton	812	887	838	968	938
Time per ton	1:05	1:40	1:50	1:25	1:35

The above data were collected during the experimental period on remelting manganese scrap and the results are not as good as future practice developed, especially upon such points as time and power. Since that time many heats of 100 per cent returned scrap have been melted with no difficulty. This process is the greatest event in the history of manganese steel making, as it allows for the remelting of shop scrap and old worn out castings with no loss of the manganese alloy.

Manganese Ore as a Deoxidizer

When ore or mill scale is used to cut the carbon it is a known fact that the manganese is also oxidized and goes into the slag as MnO. It was therefore decided to try manganese ore in place of the mill scale. Theoretically this would cut the carbon and yet leave a high residual manganese in the steel, according to the reaction



This was tried with a heavy blue black manganese ore analyzing 50 per cent metallic manganese.

Manganese Ore versus Mill Scale

	Manganese Ore	Mill Scale
Number of heats taken for comparison	13	13
Average weight shop scrap in charge, lb.	1,421	1,290
Average weight total charge, lb.	7,225	6,827
Average weight total pour, lb.	7,028	6,661
Average melting loss, per cent	2.7	2.4
Manganese ore added per heat, lb.	36	
Average manganese in total charge, per cent	12.68	12.53
Average manganese in steel by analysis, per cent	11.61	12.11
Average manganese loss on total charge, per cent	8.45	3.35
Average carbon in steel by analysis, per cent	1.03	1.09
Average manganese-carbon ratio	11.29	11.10
Average preliminary carbon, per cent	0.27	0.19
Average carbon in charge, per cent	0.38	0.37
Average carbon oxidized from steel, per cent	0.11	0.18
Average kwh. per heat	3,154	3,384
Average kwh. per ton of charge	876	936

From these experiments it was found:

That the manganese losses were greater with the ore.

That the preliminary carbons and the final carbons were higher, due to the fact that not as much carbon was oxidized.

That it required less power when using manganese ore.

That the manganese-carbon ratio was better giving a final steel lower in carbon, even though higher at first.

That when the scrap was rattled and free of scale, the results were excellent.

The practice of cleaning the scrap and using manganese ore has now been adopted as standard practice. When used in this manner the ore is highly efficient.

Mn C	Ore Efficiency, Per Cent	Bend on Test Bar	Mn in Steel, Per Cent	C in Steel, Per Cent
10.30	97.4	Very good	13.88	1.35
11.20	73.5	Very good	11.72	1.05
11.30	90.5	Fair	11.72	1.14
10.50	91.0	No good	11.09	0.96
11.20	86.5	No good	10.76	0.90
10.85	64.5	No good	9.76	0.90
10.70	79.0	Good	11.24	1.05
11.65	101.0	Excellent	12.58	1.08
11.82	100.0	Excellent	12.08	1.02
11.85	90.0	Excellent	12.68	1.05
11.85	91.5	Excellent	11.97	1.01
10.15	96.5	Excellent	12.25	1.21
11.12	88.45		12.00	1.08

The following covers 86 heats, intermittent operation:

Average pour of metal, 6708 lb., or 3.354 tons.
Average charge, 6942 lb., or 3.471 tons.
Melting loss, 234 lb., 0.117 tons, or 2.55 per cent.
Time, 5 hr. 26 min.

Kwh. per ton of steel poured, 1002.

Kwh. per ton poured on first heat of day, 1055.

Kwh. per ton poured on second heat of day, 948.

Highest kwh. per ton of steel poured, 1385; lowest, 700.

Average manganese lost from total charge, 2.16 per cent.

Average manganese lost from ferromanganese, 1.28 per cent.

Average manganese effective from alloy, 98.74 per cent.

Average manganese in charge, 11.80 per cent.

Average manganese in steel, 11.63 per cent.

Average preliminary carbon, 0.18 per cent.

Average preliminary carbon using shop scrap, 0.26 per cent.

Using no shop scrap, 0.10 per cent.

Average pick-up in carbon from 100 lb. ferromanganese, 0.096 per cent.

Average manganese-carbon ratio, 10.77.

Average heats from roof, 25.

Average heats from lining, 35.

Electrodes per ton of steel poured, 33.8 lb.

The thermal efficiency of the furnace is represented by the following formula:

Weight of steel in kilograms \times specific heat + latent heat of fusion

Kwh. used \times calories per kwh.

Using: Latent heat of fusion as 20; specific heat of steel as 470; specific heat of basic slag as 600; slag equals 1/10 of steel by weight; and 1 kwh. equals 860 cal. we found:

Thermal efficiency of furnace, per cent	53.0
Total heat utilized in furnace, per cent	59.5
Total heat in steel, per cent	58.0
In slag, per cent	6.5
In cooling rings, per cent	2.55
Electrode holders, per cent	1.92
Transformers, per cent	1.23
Heat utilized in overcoming cold furnace plus radiation, per cent	34.70

Losses on the cooling rings, electrode holders and transformers were obtained as follows.

	Deg. C.
Water to transformer	19.8
To holder	22.6
From No. 1 holder	22.6
From No. 3 holder	27.3
Temperature of No. 2 could not be taken, drain pipe in the way	
From No. 1 ring	31.2
From No. 2 ring	32.7
From No. 3 ring	32.9

No. 1 ring.....1 liter water in 4 1/2 sec., or 14 kg. per min.
No. 2 ring.....1 liter water in 4 sec., or 15 kg. per min.
No. 3 ring.....1 liter water in 4 1/2 sec., or 14 kg. per min.

Total.....43 kg. per min.

Transformer:

(Temp. H₂O to holders -- temp. H₂O to transformers) \times total kilograms equals calories per min.
(22.5 -- 19.8) 43 equals 116 cal. per min

Holders:

(Temp. from holder -- temp. to holder) \times kg. equals cal. per min.

No. 1 (26.3 -- 22.5) 14 equals.....53 cal. per min.
No. 2 (averaged) equals.....60 cal. per min.
No. 3 (27.3 -- 22.5) 14 equals.....67 cal. per min.

Total.....180 cal. per min.

Rings:

(Temp. from rings -- temp. from holders) \times kg. equals cal. per min.

No. 1 ring (31.2 -- 26.3) 14 equals.....69 cal. per min.
No. 2 ring (32.7 -- 22.5) 15 equals.....93 cal. per min.
No. 3 ring (32.9 -- 27.3) 14 equals.....78 cal. per min.

Total.....240 cal. per min.

Transformer, $\frac{116 \times 60}{860} = 8$ kwh.

Holders, $\frac{180 \times 60}{860} = 12$ kwh

Rings, $\frac{240 \times 60}{860} = 16.6$ kwh.

Total.....36.6 kwh.

4000 amp. \times 104 volt \times 0.90 power fac. \times 1.73 = 650 kw.

Transformer loss, $\frac{8}{650} = 1.23$ per cent

Holder loss, $\frac{12.5}{650} = 1.93$ per cent

Ring loss, $\frac{16.6}{650} = 2.53$ per cent

Grand total.....5.70 per cent

Heat Treatment of Manganese Steel

Manganese steel in its raw or untreated condition, as taken from the mold, is as brittle as glass and is not suited for any purpose. The castings are cleaned and loaded on small brick topped cars. These are put into the annealing furnaces, which are so built that the top of the car becomes the bottom of the furnace. These furnaces are oil-fired with the flame jets so arranged that a very even and soft flame is obtained.

(Continued on page 109)

Brighter Prospects Indicated for 1922

What a Study of Production, Prices, Failures, Finance and Foreign Trade Shows—Activity Evident in Construction—Much Depends on Disarmament

BY NATHANIEL R. WHITNEY, PH.D.*

IN the early part of 1921, the author of this article published a résumé of the business situation in which the obstacles to business revival were outlined as (a) the unsound economic conditions in other parts of the world; (b) the uncertainty as to prices; (c) the excessive issue of paper currency in European countries; (d) the burden of national debts of the world; and (e) the scarcity of capital. It was said that, "the most significant fact upon which to fix attention in endeavoring to predict recovery is the rate of interest for long-time loans. As this rate declines business will improve." Evidence was presented that the situation was already showing signs of improvement and attention was called to the gradual accumulation of capital. It was predicted that, although improvement had begun, the process of recovery would be slow.

Much has happened since that time and the scarcely discernible signs of improvement have now become more clearly marked, but the writer still feels that progress toward recovery will be slow. Anyone who predicts an immediate or rapid return to normal is merely deceiving others and seeking to delude himself. The accumulation of capital, increase in output, decrease in costs of production, readjustment of prices for various commodities to a more normal relation, and elimination or rather reduction of economic and political friction throughout the world—all these require considerable time. It is futile to look for restored prosperity, however, until these requisites are to a considerable extent achieved. But this does not mean that conditions cannot get better—in fact, there is plenty of evidence that they are improving and that they will continue to improve. Progress toward normal is not likely to be continuous; there will be an advance, then a halt or downward trend in certain industries, followed by another advance, and so on, each complete movement carrying business activity to a constantly higher level.

The 1921 Depression in Figures

If we divide the business cycle into the customary four sections—prosperity, decline, depression, and recovery—it is clear that 1920 and the early part of 1921 were in the period of decline. The greater part of the past year was in the depression area, while during the last few weeks of the year the indications pointed to recovery. The year 1921 was one of decline in prices, wages, and profits; of reduction in business activity as shown by bank clearings; of reduced productivity in many lines—iron, steel, bituminous coal, lumber, cotton manufactures. It was a year of record-breaking unemployment and of business failures on a large scale. In short, it furnishes the usual evidence of a period of liquidation.

The index for wholesale commodity prices, which in December, 1920, stood at 189, by the end of July had got down to 148. Since that time a slight advance has been noted. Bank clearings for the year up to the end of the first week in December were about 20.5 per cent less than the clearings for the corresponding period of the year 1920. For the first ten months of 1920 and 1921, the index number for production of bituminous coal was 122.5 and 92.3 respectively; for

receipts of lumber at Chicago and St. Louis 82.5 and 74.3; for pig iron production 133.2 and 58.7; for steel ingot production 126.2 and 59.5; for cotton consumption 116.3 and 96.3. The cotton crop for 1921 was estimated to be the smallest since 1895. The production of copper ranged about 20 for 1921. The production of crude petroleum showed a different tendency since the index for 1920 was 191.5 and for 1921 was 207. It is to be understood that normal production in each case is represented by 100. Gross earnings of 184 railroads for the first nine months of the year were 7.83 per cent less in 1921 than for the same period in 1920.

A marked falling off in the value of our foreign trade occurred. For the eleven months ended November, exports for 1920 were \$7,508,000,000, and for 1921 \$4,191,000,000; imports for 1920 were \$5,012,000,000; and for 1921 \$2,272,000,000. The excess of exports over imports for 1920 was \$2,496,000,000, while for 1921 it was \$1,919,000,000. The decline in the physical volume of our trade has not been so marked as these figures would indicate for allowance must be made for changes in the price level.

Earnings of labor during the year have shown considerable reduction although the rate per hour for some groups of labor has not yielded much. The reduction in earnings was due to the elimination of overtime pay, to either a reduced number of working days or complete unemployment, and to reductions in the wage rate for many employees.

The Maladjustment in Prices

The complete story of changes in the price level would not be told unless attention were directed to the uneven decline for different groups of commodities. The following table illustrates these variations. The figures are those compiled by the Bureau of Labor Statistics and are based on the prices of commodities at wholesale. The first column gives the highest figure reached by each group (although it should be noted that these high points for the different commodities were not all reached at the same time); the second column gives the index number for the first of September, 1921.

	Highest	Sept. 1, 1921
Farm products	246	118
Metals	195	120
Food, etc.	287	152
Chemicals, etc.	222	161
Cloths and clothing	356	179
Fuel and lighting	284	182
Building materials	341	198
House furnishings	371	230
Miscellaneous	247	147

An examination of this table demonstrates that the producers of certain of these commodities are at a disadvantage when they purchase from some of the other groups. For example, at the date here given farm products were only 18 per cent while house furnishings were 130 per cent above normal. These are the extremes but it is clear from the figures that there is still maladjustment in the prices of many different commodities. So long as this situation prevails the producers whose commodities have declined most in price will be unwilling to purchase the commodities which are selling much above their normal level. It has been estimated that the farmer's dollar purchases fewer commodities now than it has at any time during

*Professor of finance, University of Cincinnati.

the past thirty years. The tremendous slump during the past year in the sales of the mail-order houses, a large part of whose business is obtained from the farmers, furnishes striking evidence of the fact that the uneven decline in the prices of the various groups of commodities is responsible for much business stagnation. Fortunately the position of the farmer seems more favorable for the future since the decline in the price of his produce cannot go much further.

Corner Probably Turned

The rapid and uneven decline in prices has played havoc not only with the farmers. The record for commercial failures during the year as reported by Dun is an extremely bad one. The following table is of interest in this connection. The failures for each November during the past few years were as follows:

	No of Failures	Liabilities of Failed Concerns
1918.....	570	\$13,815,166
1919.....	551	9,177,321
1920.....	1,050	30,758,130
1921.....	1,588	53,469,539

For the eleven months of each of these years the figures were as follows:

	No. of Failures	Liabilities of Failed Concerns
1918.....	9,299	\$150,770,496
1919.....	5,890	104,990,805
1920.....	7,366	236,250,260
1921.....	17,207	539,899,501

In spite of the difficulties through which we have been passing and in spite of the obstacles yet to be overcome, we are undoubtedly in a very much better position on the threshold of 1922 than we were at the beginning of 1921. We have endured the rigors of a serious industrial depression and while we cannot look for immediate restoration to great activity, nevertheless it seems probable that we have turned the corner and are on the way to betterment. However, before we can correctly interpret the signs along the way it is necessary to know the goal. We are seeking prosperity. It is essential therefore to know upon what foundations prosperity rests.

That the basis of prosperity is not correctly understood by the majority of persons has been shown by events of the past two or three years. Toward the close of 1919 and early in 1920, trained observers of business movements were forecasting the proximity of an industrial depression. These predictions were made in the midst of a period of extraordinary business activity. There was an insatiable demand for labor at the highest wages ever paid. Wage earners were spending these unprecedented incomes with a lavish hand. On all sides were persons who had made and who were still making huge profits from a great variety of industries—farming, manufacturing, selling, and speculating. In the face of these conditions there were observers who predicted that the end was near. On the contrary, many writers in the newspapers and financial journals, and most business men were very impatient with such pessimistic predictions. The outlook seemed rosy. A prominent financial journal said, "The year now beginning gives promise of being one of the most active industrially in the world's history."

Why So Many Misinterpret Conditions

It required only a few months to demonstrate conclusively which of these predictions was correct. What knowledge did the one group possess which the other group lacked or ignored? The facts were available to everyone; yet the great majority of persons accepted the erroneous point of view. How can this be explained? The answer is clear. The vast majority were deceived by surface conditions. Because business was active, labor fully employed, and retail selling going on in large volume, and because it was evident that the world needed large quantities of goods of all kinds, it was assumed that prosperity must necessarily

result. There was well-nigh universal failure to look beneath the surface and to inquire upon what foundation prosperity really rests.

Prosperity may be said to stand on three legs—(1) a large and expanding scale of human wants; (2) productive capacity to satisfy the bulk of these wants; and (3) the provision of facilities and resources to maintain and improve the situation.

The visible evidence of a state of prosperity consists of the steady employment of the majority of employable workers, a noticeable improvement in the general standard of living, and the accumulation of capital in large quantity. It is extremely difficult to evaluate and measure prosperity in specific terms; and this difficulty is not made less troublesome by the fact that so far as surface appearances are concerned a period of activity preceding an industrial depression is nearly identical with a period of prosperity. There are, for example, in both periods great demands for laborers, great activity in retail buying, and considerable launching of new enterprises. This similarity explains why many people form an incorrect judgment of the economic situation.

How to Tell Bogus Prosperity

Although the two periods look alike, the difference between them is fundamental. In a community which is really prosperous, the physical volume of production is increasing, and a considerable portion of the output of industry is embodied in the form of capital goods—raw materials, machinery, buildings, etc.—used for the purpose of aiding production thereafter. In a period of bogus prosperity production is either falling off absolutely or is not increasing at a rate as rapid as should be expected. Furthermore the character of production differs. Output consists to a greater extent of consumers' goods than of producers' goods or capital.

The final test of prosperity is capacity for self-perpetuation. The question is, in which direction are we headed? In a period of real prosperity we are not only enjoying a rising standard of living but are building a firm foundation for the maintenance and improvement of that standard. In a period of false prosperity we are devoting our energies to the gratification of immediate wants with little regard for the future. This leads to an undermining of industrial morale which affects both employers and employees, and the ultimate result of which is a falling off in the total volume of production. Since prosperity depends upon an ample supply of want-satisfying goods, anything that causes a decrease in the output of such goods undermines prosperity. Is there any evidence that the bases of prosperity as here defined are being prepared?

While it is the opinion of the writer that real improvement has occurred in the business situation, the evidence of improvement is to be found in underlying financial conditions rather than in superficial commercial conditions. But this is as it should be; there can be no real improvement in commercial conditions—in retail sales, activity of manufacturing, in employment of labor—until financial conditions are sound.

Distinguishing Credit from Capital

The fundamental requirement for a solid financial structure is an ample supply of capital. Capital should be sharply distinguished from credit. Credit is merely the device by means of which capital is rendered transferrable from those who do not wish to use it themselves to those who do desire to use it. Capital consists of accumulations of material goods or wealth; credit consists merely of commercial and banking instruments which furnish a temporary claim to such wealth. Capital is accumulated only by production and saving; credit may be manufactured within

certain limits by the banks. These limits, while flexible to a degree, are fixed by the supply of real capital, and the credit advanced by the banks must ultimately be liquidated out of capital.

The confusion between these two is responsible for many of the unsound proposals advanced for restoring business activity. It is responsible also for the many bitter attacks which have been made during the past two years upon the Federal reserve system. We seem to feel the need for a "personal devil" in financial as well as in spiritual affairs. It is known that the Federal reserve banks have the power to provide credit in large volume. It is not so well known that it is the duty of these banks to maintain a proper relationship between the supply of credit and the supply of real capital. It was only when credit was being used beyond the point where a safe relationship was maintained between credit and capital that the Federal Reserve Board called a halt. That it was necessary to put on the brakes when they did can scarcely be doubted by any careful and unprejudiced observer. It is incredible that anyone can seriously believe that there would have been no depression if the Federal reserve system had not been in existence. The lack of balance between credit and capital was bound to bring on a depression under any circumstances, and it would have been very much more serious in the absence of a regulative body such as the Federal Reserve Board to exercise financial common sense.

Interest Rates as the Clue

Since financial conditions are more fundamental and more significant than commercial conditions and since the supply of capital is the most important of the financial factors, the interest rate for real capital—that is, the rate charged for the use of long-time funds, as distinguished from the rate charged for short-term loans, which are based largely upon the supply of credit—indicating the relation between the supply and demand, is the most significant single clue to the business trend.

There is ample evidence that capital is becoming available in larger amount. The following table indicates the change in the interest yield of a few selected bonds between the beginning and the end of the year.

	Yield, Per Cent—	
	Mid-January, 1921	Mid-December, 1921
4th Liberty Loan 4½s (1938).....	5.34	4.36
New York City 4½s (1960).....	5.07	4.34
Dominion of Canada 5s (1931).....	6.52	5.13
United Kingdom 5½s (1937).....	7.01	5.79
Atchafalpa general 4s (1995).....	5.16	4.68
Northern Pacific 4s (1997).....	5.16	4.72
American Tel. & Tel. col. 5s (1946).....	6.46	5.40
Armour & Co. 1st 4½s (1939).....	6.48	5.20

These figures may be supplemented by other evidence. For example, new bond issues of states and municipalities for the first nine months of this year exceeded by about \$250,000,000 the issues for the corresponding period of 1920, and far exceeded such issues for many years preceding. A large issue of Pennsylvania State bonds was sold during November at a net interest cost of approximately 4.35 per cent. The recent New York State issue of \$55,000,000 was oversubscribed four times. Investment bankers in all parts of the country testify that their problem is not that of selling bonds, but rather of getting sufficient bonds to meet the requests of their customers.

Despite the depression, deposits in eleven savings banks in New York City are considerably higher now than they were at any time during 1920. Although the deposits in the postal savings banks have declined during the year, the December bulletin of the Postal

Savings Department calls attention to a slight but steady increase in deposits in the smaller post-offices throughout the country. The chief losses in deposits have occurred in the large cities and industrial centers. In considering the status of savings deposits, account must be taken of the fact that a considerable part of the savings which have been withdrawn from banks and the postal department have gone into the purchase of bonds and other securities selling at bargain prices.

With the increase in the supply of capital and the resultant strengthening of the banking position, there has come an easing of the credit strain. Loans of the Federal reserve banks, which reached their highest level in October, 1920, had declined more than one-half by the close of 1921. About the beginning of January, 1921, the reserve ratio against notes and deposits in the Federal reserve system started upward from 44 per cent and progressed steadily, reaching nearly 73 per cent during the week ending Dec. 3. This increase in reserve ratio was brought about by an increase in gold reserves from \$2,059,333,000 in the first week of January, 1921, to \$2,849,397,000 in the first week

of December; by a decrease in Federal reserve notes from \$3,344,686,000 to \$2,366,006,000; and by a decline in deposits from \$1,846,093,000 to \$1,728,497,000 during the same period. The discount rate in the reserve banks now averages about 5 per cent for all classes of paper, and in some of the Eastern districts a rate of 4 per cent is predicted for the near future.

Unsatisfactory Foreign Financial Situation

While domestic financial conditions are sound and are improving steadily, foreign financial affairs are still unsatisfactory. The committee appointed by the Chamber of Commerce of the United States to study economic conditions in Europe emphasized the fact that real recovery in the United States cannot be attained without great economic improvement in Europe. The committee enumerated as requisites for recovery in Europe, (1) appreciation of foreign exchanges; (2) growth of export trade; (3) reduction in governmental expenditures; and (4) strengthening of bank reserves.

As to the first of these, the present situation is unsatisfactory. The trend of practically all European exchanges has been downward since the Armistice—the general index for foreign exchange having declined from December, 1918, when it was slightly above par to September, 1921, when it was just a little above 50 per cent of par. This average was carried down mainly by the great decline in marks, although other monies declined heavily also. English exchange has shown improvement during the past year, being 71 points higher in the week ended Dec. 17 than it was during the first week in January. There has recently been a marked advance in sterling and slight improvement in French and German exchange. If this upward movement is maintained better financial conditions in Europe will be indicated. With improved financial conditions there will come increased demand for American commodities and a resulting stimulus to American business.

Healthy Trend in Foreign Exports and Banking

Recent reports on the trade of leading European nations call attention to the growth of their exports. Steady progress in exportation is being made by England, France and Germany. While the exports of none are equal to their pre-war exports the tendency is a healthy one.

Little advance has thus far been made by European

The four sections of a business cycle:

PROSPERITY
DECLINE
DEPRESSION
RECOVERY

The greater part of 1921 was in the depression area.

Indications of last few weeks of 1921 point to reaching recovery.

nations in reducing government expenditures. In the case of some nations the annual revenue of the government does not equal its expenditures. It is to be hoped that the Conference for Limitation of Armaments will reduce the danger of war and the need of war preparations so that government expenditures for all nations may be sharply curtailed.

As to the fourth requisite, there is evidence that the banking position is being strengthened in most countries. Germany and Russia are the outstanding exceptions to this improvement. The weakness in these countries is due to their reckless issues of inconvertible paper money. In Germany the quantity of paper marks has increased from 1,890,000,000 in 1914 to more than 86,000,000,000 at the end of September, 1921. The amount now probably exceeds 100,000,000,000 marks. Against these issues of notes there was held in the banks at latest report something over a billion marks in gold. This indicates a gold reserve against note issues of about 1 per cent—a reserve totally inadequate to maintain the value of the paper money.

Banking conditions in South and Central America and in Cuba, while still very unsatisfactory show improvement. In China, however, the banking situation is ominous. Runs on all the Chinese banks have been heavy, and the leading banks recently suspended payments to depositors and noteholders. A number of American banks have lost heavily through operations in various foreign countries and it is a noteworthy fact that a considerable proportion of the foreign branches established during the war and immediately following have been closed in some cases temporarily, but in many cases permanently. Financial conditions outside the United States are thus seen to be in general unsatisfactory but, except for a comparatively few localities, are improving.

Signs of Commercial Improvement

As was said earlier in this review improvement in commercial conditions is not thus far so clearly marked as in financial conditions. However there are a number of indications that the situation is mending and the improvement will soon be sufficiently noticeable to attract general attention. The number of business failures as recorded heretofore is curiously enough a hopeful sign, for it indicates that weak and inefficient businesses are being driven out of existence and that sound concerns can therefore make progress without being hampered by the existence of unsound competitors. Failures always become very frequent and the total of liabilities becomes very large toward the close of a period of depression. While the number of failures is likely to be large for some months to come, the tendency will undoubtedly be toward fewer collapses.

Rapidly declining prices have had an unsettling effect upon the market and have hampered production, but it is now possible to note improvement in this respect. Within the past few months greater stability has been shown in prices both in the United States and in Great Britain. This enables purchasers to stock up with goods in larger volume since there is less danger now of decline in price. This is only a temporary phase, however, for the prices of many commodities are certain to work lower. Unemployment which has been very serious is, according to reports of the Department of Commerce, decreasing. During October, 44 out of 65 selected cities showed a net increase of persons employed of 1.01 per cent over September.

Reports from the retail trade also indicate improvement. While the total value of sales in dollars is smaller than last year because of price decline, the actual amount of goods sold has apparently held up fairly well and has recently shown a tendency to

increase. Sears-Roebuck sales gained 17.3 per cent in October over September. Montgomery Ward & Co. showed a 21 per cent gain. The sales from Woolworth stores during the first ten months exceeded those of 1920 by 3.18 per cent, while the sales of the Kresge Co. exceeded 1920 by 8.6 per cent. Reports collected by the Federal Reserve Board from 872 department stores showed a decline in value of sales of 6.2 per cent in October, 1921, as compared with October, 1920, but this figure for October shows an improvement over the September business; and in volume of sales October, 1921, exceeded October, 1920, by nearly 20 per cent.

Construction Activity in 1922

The best prospect for improvement is found in the tremendous amount of construction in all lines, which only awaits a favorable opportunity to begin. It has been estimated by Walker D. Hines, formerly director general of railroads, that the railroads must spend more than a billion dollars a year for some years to come if the transportation facilities are to be kept equal to our needs. The great demand for tax-free municipal securities has stimulated the issue of such bonds to an unprecedented extent. Hence states, cities, and minor civil divisions have obtained funds with which they are planning to carry on public works, such as road construction, erection of public buildings, and similar projects. This will create a demand for structural materials and labor, which added to the private demand for housing and investment property will work considerable improvement in conditions during 1922. Architects in the various cities of the country agree that plans and estimates in their hands for the construction of dwellings and other properties in the near future will give a considerable stimulus to business. Building material dealers report large inquiries for building projects to be undertaken in the spring.

The movement toward increased construction made headway even during 1921. Despite the decline in prices as compared with 1920, the figures for new building in October, 1921, were 25 per cent greater than for October, 1920. The value of construction during the first ten months of 1921 was nearly equal to all of the construction for the whole year of 1920. The increase in the supply of capital has made funds available also for corporations. This will undoubtedly stimulate construction work by railroads and other public utilities. From all these points of view, therefore, it seems reasonable to expect that 1922 will show a tremendous increase in construction activity. This will in turn be reflected in improvement in all other lines of industrial activity.

Importance of Disarmament Conference

Finally, attention should be called to the possible betterment which would be inaugurated by a successful termination of the Disarmament Conference. It has been estimated that the head of every family of five in the United States is paying nearly \$100 per year in taxes solely for war debts and in preparation for future wars. The people of other nations are hit even harder. While a cut of \$200,000,000 in American naval expenditures would of itself have only a slight effect on the individual's tax bill, a corresponding reduction by England and Japan, to say nothing of the reduction in military expenditures by all the nations of the world, which may result from the conference, will have a tremendous influence in setting free large sums of capital now devoted to war preparation for use in private commercial enterprises.

There is universal complaint in this country that heavy taxation is hampering business revival. The obvious place to begin reduction in taxes is in the war budget. It has been estimated that the cost of maintaining the Navy Department, the War Depart-

ment, the Veteran's Bureau, paying pensions, and meeting interest on the public debt, will for 1923 be a little less than three billion dollars or 83 per cent of the total national budget. Any plan which makes possible the reduction of these expenditures immediately and

which looks toward still greater reductions in the future cannot help but have a remarkably stimulating effect upon economic activity. A favorable outcome of the conference may be counted on to hasten business revival.

Enameling Cast Iron and Steel Materials

Methods and Apparatus Used—Care Needed in Preparing Surfaces for Treatment—Burning on the Enamel

BY F. L. PRENTISS

ONE of the indirect results of the World War was the development in this country of the manufacture of cast iron enameled apparatus with high acid-resisting qualities, for use particularly in the chemical and pharmaceutical industries. Equipment of this type; formerly largely imported from France and Germany, is now being made by several American manufacturers. Cast iron enamel lined products used in these two industries include such equipment as shallow dishes for evaporating purposes, open and closed top kettles, both jacketed and unjacketed, stills for vacuum and pressure work, digesters and condensers, equipment used primarily in industries where the various processes cannot be carried on in contact with metal containers.

One of the pioneers in this industry is the Elyria Enameled Products Co., Elyria, Ohio, which established a plant several years ago under the name of the Enameled Pipe & Engineering Co. to enamel pipe used in mining and other industries requiring pipe with an acid resisting coating. Later the company, under its present name, turned its attention to the manufacture of various lines of enameled steel equipment used in the dairy industry, including ice cream making processes, in the manufacture of edible foods and oils in the preparation of canned foods, and apparatus used in the chemical and pharmaceutical industries. The demand for enameled lined steel equipment has grown rapidly the past few years, particularly from the milk handling industry. The company added a cast iron enameled ware department during the war time period.

In general, the steel apparatus is provided in much larger units than the cast iron utensils, and is used in such fields as the dairy industry, which does not require containers with the higher acid resisting qualities necessary for the more severe chemical conditions met in the chemical industries. Consequently, the cast iron apparatus is enameled with an entirely different formula from that used in enameling steel equipment.

Enamels prepared according to two formulas are used for steel, one for the dairy industries and the other for ware calling for more severe organic acid-resisting qualities. Cast iron enameled ware is being produced with high acid-resisting enamel, for use with mineral acids; but it is stated that the application of this mineral-acid-resisting enamel on steel is not practical.

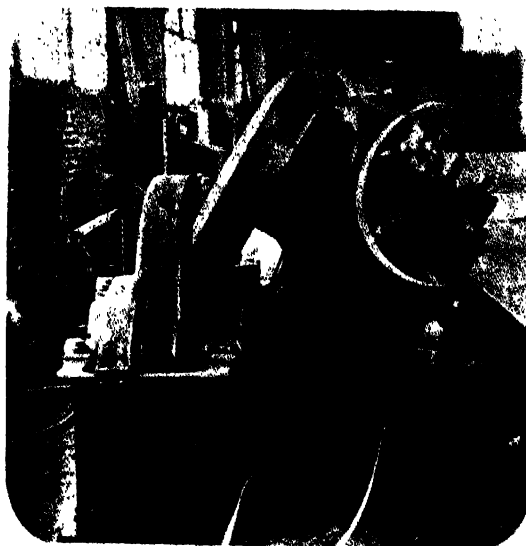
The plant of the Elyria Enameled Products Co. has two separate manufacturing departments for the two lines of products. In addition, there is an assembly department where the finished parts are put together after the necessary machine operations. The shop in which the steel apparatus is fabricated, known as the tank shop, is equipped with two 5-ton electric traveling

cranes. The assembly department has a 7½-ton crane operated on a runway 36 ft. above the floor, and providing sufficient head room for assembling jackets on large tanks.

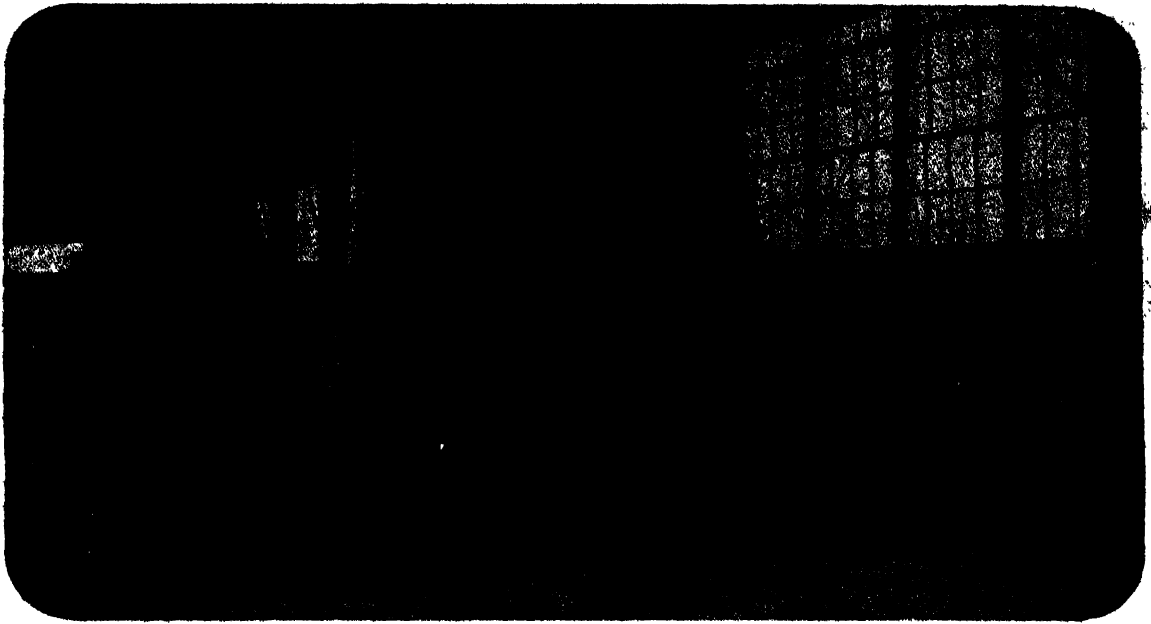
Enameled steel equipment is made of basic open-hearth steel, complying with boiler steel specifications, but not running over 0.15 per cent. in carbon, as difficulty is found in enameling steel higher in carbon, for blisters are likely to occur in the enameling. Various pressed steel shapes of thickness lighter than ¼ in. are fabricated outside the plant. Most lighter stock ranges from 16 to 24 gage.

For apparatus made in the shop, ¼ in., 5/16 in. and ¾ in. stock is used. The apparatus consists generally of cylindrical units with closed or open tops, and with various openings. After the stock is sheared, a cylinder is formed to the desired diameter on a Cleveland bending roll with a capacity for stock 1 in. thick and 13 ft. long. The longitudinal seam in the tank is made by oxy-acetylene welding; and the bottom, as well as the top, if it is a closed tank, is similarly welded on. Arc welding is used to a certain extent. The plant has 24 gas welding stations each using a No. 8 oxy-acetylene welding torch.

Seamless steel enameled tanks are made as large as 132 in. long and 120 in. in diameter, tanks of this size being used with apparatus made for the manufacture of condensed milk. In making the tanks, it is necessary that the surface to be enameled be smooth and clean. After the tank is assembled and the necessary openings are provided, the welds are ground down with portable electric grinders, and then the entire surface is sand blasted. Gas pockets and laminations in the steel, certain types of segregations and dirt on the surface, are the principal sources of trouble in enameling, resulting in blisters. Small imperfections found during enameling can be covered with additional coats of enamel, but it is impractical to try to cover up serious defects. Instead, all the enamel already on is sand blasted off and the piece is re-enameled. Sand blasting large units



Trimming, with a Bevel Shear, the Plate from Which a Tank Is to Be Made



Shaping the Plate to Its Cylindrical Form on a Bending Roll

requires one of the largest sand blast equipments ever built. This consists of four adjoining sand blast rooms, 15 ft. high and 20 ft. deep; two are 15 ft. wide and two 10 ft. wide. The sand blast plant, which was designed to meet special requirements, was supplied by the J. W. Paxson Co.

After sand blasting, the tanks are ready for the

equipment is usually confined to drying the interiors of units with closed tops. The drying equipment consists of small portable Buffalo Forge Co. blowers placed on pipe frame racks about 4 ft. high, mounted on casters. A movable table, that is raised and lowered by means of a cable and wheel above the rack, provides a base for the blower, which permits setting the blower at the proper elevation to discharge into the opening in the tank, standing on the shop floor.

For burning the enamel, direct fire furnaces are used, the practice differing from that followed by makers of enamel d kitchen ware, who generally use furnaces of a muffle type. Three furnaces are installed, one with doors 6 ft. square, one with doors 9 ft. square and a third with doors 14 ft. square, the largest furnace being 18 ft. deep.

The two larger furnaces are designed for firing with gas or fuel oil, but the latter is now used, the oil being vaporized in the burner. The small furnace is gas fired. The furnaces have double doors, which are hydraulically operated, their operation being similar to doors of open-hearth furnaces. Blast for the two large furnaces is supplied by General Electric centrifugal blowers - 3-lb. pressure, the larger supplying 3800 cu. ft. of

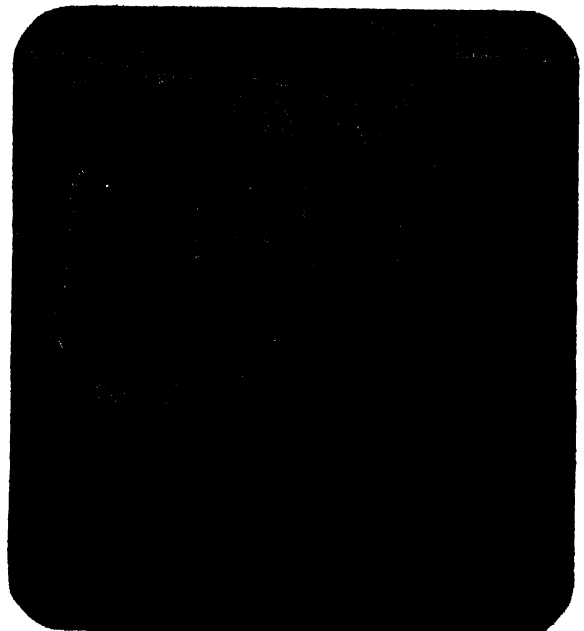


Welding the Seam on a Large Tank

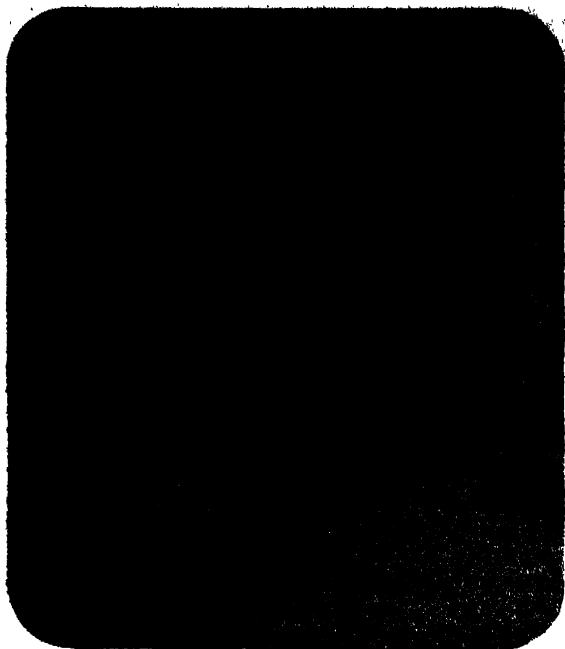
enamel, which is applied to the surface in various ways. In plants making kitchen ware, the ware is dipped in enamel, but as this ware is not made in the Elyria plant, the dipping process is not followed. In enameling long pipe, the pieces are placed in an inclined position and the enamel is poured through while the pipe is rotated.

Enamel is applied to steel apparatus of large dimensions by the spraying process, by means of deVilbiss & Paasche air atomizers. In enameling a large closed top tank the operator of the spraying device works from the inside, getting into the tank through a manhole. Usually about four coats of enamel are applied, each coat being burned on in a furnace after it is dried.

Portable blowers circulating a cold blast are used for drying the enamel, but the use of mechanical drying



Grinding Off the Burr After Welding



Sand-Blasting a Tank in One of the Sand-Blast Rooms, Prior to Enameling

free air per minute, and the smaller 2500 cu. ft. The furnace equipment was supplied by the General Combustion Co.; furnace temperatures are taken with Brown recording pyrometers.

The two larger furnaces are charged with special Morgan type charging machines, having all the movements of a standard open-hearth charging machine, except the circular and turning over movement of the charger. These machines are electrically operated from a pulpit. In operation, a special burning rack is preheated, and then withdrawn from the furnace on the charger and the piece placed upon it. The furnace temperature for burning ranges from 1800 to 2000 deg. F., depending on the size of the piece. After the final coat of enamel is fired, the part goes to the assembly department.

Methods followed in the enameling of cast iron differ somewhat from those used in enameling steel. The utensils made in the cast iron enameling department are mostly kettles and stills, which are made up to sizes requiring castings 1500 lb. in weight. These utensils are made of special iron of a dense structure.

The castings, on going from the foundry, are first ground, then pickled, and then burned out in a furnace;

then, after sand blasting, they are ready for enameling. The enamel is burned on cast iron in two coal-fired, muffle type furnaces. Two charging machines are provided for charging these furnaces, one electrically operated and one hand operated.

In enameling a cast iron shape, a ground coat is applied with spraying apparatus. After drying, the work goes to the furnace, and is brought close to a bright red heat. From this point the enameling process departs from that in enameling steel. Instead of spraying liquid enamel on after the part has become cool, as in the case of steel, the enamel is applied in the form of fine dry powder, which is sprinkled on the part while hot



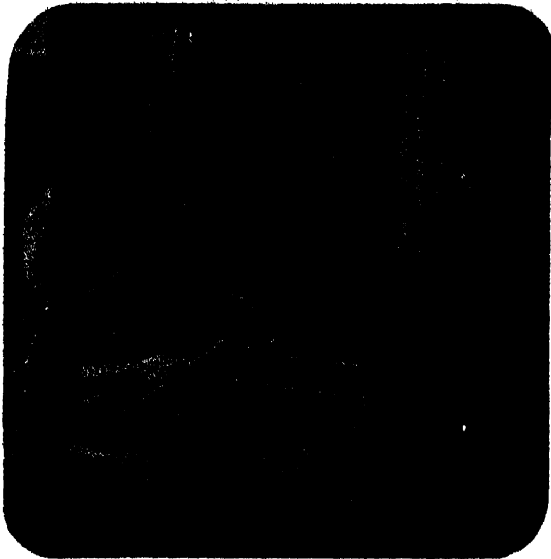
Spraying Enamel Upon the Inside of a Tank

by means of a device known as a "dredge," which consists of a sieve and air-operated vibrator.

During the enameling operation the part rests on a turntable in front of the furnace. By means of the turntable the ware is rotated, tipped to any angle, or, if desired, turned completely over, so that all parts to be enameled can be reached. The turntable is equipped with two motors, one for revolving in a horizontal plane



Method of Charging a Tank into the Burning Furnace After Enameling; the Charging Machine Is Similar to an Open-Hearth Charging Machine



Applying Dry Powder Enamel to a Hot Cast Iron Tank Head After the First Coat of Enamel Has Been Burned On. The piece is handled on a power-operated turntable by which it can be turned to any position so that the enamel can be applied to the entire surface

and the other for raising it on its vertical axis. Other movements are accomplished with compressed air. Beneath the turntable is a hydraulic plunger, which, after the enamel is applied, raises the piece up to a point where it can be picked up by the charging machine and again placed in the furnace.

The operations of burning and enameling continue until the desired thickness of enamel is produced. The work is kept in the furnace from 10 to 30 min., or long enough to bring it to a sufficient temperature to fuse the enamel down to a fairly uniform coat. After the final coat the work is given a longer firing than for the other coats, and the finished part comes from the furnace with a smooth surface and high gloss. All enameling of both steel and cast iron is done in blue, although any other color could be used by mixing the desired pigment into the enamel.

The plant has well equipped laboratories, the laboratory organization including ceramic engineering, chemical engineering, metallurgical engineering and analytical departments. The ceramic engineering department

has supervision over the preparation as well as the processing of the enamel in the factory, and specifies the proper enamel to be used to meet certain conditions. The chemical engineering department functions with the sales department in specifying the proper equipment to meet conditions of a given inquiry, and in developing new uses for enameled ware. The metallurgical department deals with the metallurgical problems, including selection of steel, cast iron, etc. Adjoining the ceramic laboratory is a furnace room, containing a complete experimental enameling plant. The laboratory of pyrometric equipment consists of a Leeds & Northrup potentiometer and optical pyrometer, a Thwing radiation pyrometer and a Brown portable pyrometer. This equipment is used in checking factory pyrometer equipment, as well as in experimental work.

Electric Developments in 1921

Under the above heading the General Electric Co. has made a comprehensive report of new designs of apparatus and methods of use of apparatus brought out during the past twelve months, with particular reference to the products of that company. The great bulk of the development reported has been along purely electrical lines, and largely for power plant use. Many improvements are reported, however, in motors and motor control for industrial use.

In electric arc furnaces, two new brass furnaces have been brought out during the year, one of 1500-lb. capacity and the other of 50-lb. Both are worked on the muffled arc principle, and either will melt practically any metal requiring a pouring temperature not exceeding 2370 deg. Fahr.

Particularly adapted for use in the larger non-ferrous metal foundries, the 1500-lb. unit is for three-phase operation, with a power consumption of not over 270 kwhr. per ton. The power factor is 95 per cent or better, and the metal losses are reported very low, being less than 1½ per cent for yellow brass and less than ¾ per cent for red brass. The 50-lb. unit should find a large field in small jobbing foundries, manufacturing plants, laboratories, etc. Its main characteristics are the same as for the larger furnace, except that it is single phase, and its power consumption is from 35 to 40 kwhr. per 100 lbs.

The National Association of Building Trades Employers will hold its annual convention Jan. 12, 13 and 14 in Cleveland.



Steel Tanks Under Hydraulic Test After Partial or Complete Assembly

The Operation of Basic Electric Furnaces

How to Avoid Delays in Each of the Eight Major Operations of Making Steel in Furnaces Having Movable Electrodes

BY M. W. CARUTHERS*

IN the operation of an electric arc furnace for the manufacture of steel, delays occur which are of much the same general character as those encountered in the open-hearth and Bessemer process, although differing where different methods are required for their manipulation. There are two kinds of delays: Avoidable, or those within the control of the manufacturer, and the unavoidable delays, or those of which the steel maker has no control, such as interrupted power service, crane breakdowns and numerous others of which no further mention is necessary. Both kinds of delays are an absolute loss to the steel maker in that they are enemies of production and will be treated as such in this paper.

The avoidable delays may be classified as those occurring in the eight major operations of an electric arc furnace: Charging, melting-down, slag formation, refining, decarbonizing, recarburizing, addition of ferro-alloys and breakage of electrodes.

Charging

There are two types of electric furnaces, with reference to charging, which are being used for steel making. One type has a stationary roof and the charge is thrown in through the doors on the sides of the furnace, while the other type is so designed that the roof can be raised to allow the charge to be placed in the furnace by an overhead crane.

The majority of the stationary roof type furnaces are charged by hand because the door openings are not large enough to permit a charging box of an economical size to be used by a charging machine. A review of the melt sheets will show that many minutes are consumed in hand charging that could be utilized for melting down if mechanical charging were possible or if a raisable roof type furnace were used. As mentioned above, the raisable roof type furnace is well adapted for crane charging and the time consumed in charging will be cut to a minimum providing sufficient crane service is available to take care of the pouring of the heat and the handling of the charging boxes without delaying the execution of either. The charging boxes should have collapsible bottoms so that they could be operated on somewhat the same principle as a clam-shell bucket and they could then be lowered into the furnace and the charge released with the least possible time-loss and damage to the furnace lining and bottom.

However, it is possible to remove the roof from a stationary roof type furnace, which is the one in most common use, but this requires a crane, which means that the roof must be lowered to the floor to liberate the crane so that it can pick up the charging boxes. This constant handling of the roof would shorten its life considerably, and, no doubt, would counteract the advantage to be gained by roof charging. Assuming then that hand charging through the doors is the method most commonly used, a system with regard to charging of the scrap should be followed that will bring the most

efficient melting down conditions. The importance of systematic charging can be easily determined by noting the shorter period of time required for melting down under this condition.

Heavy Scrap First

Heavy scrap, such as scrap ingots, crop ends, butts, cogging scrap, heavy gates and risers should be charged first on the bottom of the furnace and as nearly in the path of the electrodes as possible. This arrangement will retard the movement of the electrodes down through the charge until enough scrap has been melted to form a pool of molten metal on the bottom. Ladle skulls should be charged next, care being taken that they are not exposed where the electrodes will touch them when the charge is all in the furnace, for in most cases they are poor conductors, due to uneven surfaces and adhering refractory materials. The lightest scrap should be charged last and should be thrown into the furnace so that the center is kept full. If this precaution is not taken it will be impossible, at times, to get all of the charge in at one time and further charging will be necessary. Considerable time is usually lost with the additional charging operation, and the above-mentioned process, if followed, will be found to be advantageous. If there is any great amount of light scrap, difficulty will sometimes be encountered in getting a good contact, which may be overcome by placing a piece of heavy melting scrap directly under each electrode.

Care of the Bottom

It will be appropriate to mention a few rules that should be followed in the care of the bottom of the furnace. Attend to any bottom trouble promptly after the heat has been tapped while the steel in the hole is still in the molten state.

When the furnace bottom is in good order, drain it as free as possible from molten steel before charging. If there is molten steel pocketed that will not drain out, mix it thoroughly with refractory material such as dolomite, magnesite, or any of the preparations that have been found to be satisfactory for bottom repairs, by means of a rabble bar, and pull as much of the conglomerate mass out of the furnace as can be pulled out. This measure of precaution will be rewarded by fewer shut downs, necessitated by the burning in of a new bottom or the cintering in of a patch in the old one.

Melting Down

Delays in melting down can be partly eliminated if the furnace operators do not start to "push-down" until there is sufficient molten metal in the bath to envelope any remaining unmelted scrap that is pushed in. Most furnace helpers are anxious to have the heat melted as quickly as possible, especially when they are being paid on the tonnage basis and they think that, by pushing down as early as they can, they are speeding up the tapping of the heat. The reverse of this is true, for if there is not enough molten metal in the bath, the unmelted scrap will "freeze" the surface of the steel that has melted. This not only means that

*Engineer Westinghouse Electric & Mfg. Co., Pittsburgh.

more time is consumed in getting the bath molten again, but also that the refining of the heat will be delayed.

Excessive Power Demand

The power demand of an electric furnace is always greater at the melting down period than at any other time during the heat, and if the electrodes are allowed to surge with long reactionary rebounds, the greatest demand on power is being established. Hand control, for a period of from 10 to 15 min. after "power-on" has been used as a precaution against the conditions causing a peak load, but this experiment is not the solution, as the personal equation is the most important factor to be considered, and if the furnace operator has been working a heat for an hour and a half or two hours at 4 or 5 o'clock on a summer morning, it is the natural temptation to "throw it on" automatic control and go outside to get "cooled off." A peak may be established before the operator comes back to the furnace again, and that little rest which the furnaceman is really entitled to may cost his employer considerably more than it was worth to either.

An electrical device is being installed on furnaces now that greatly lessens the danger of excessive power demands being established. This equipment, known as the automatic current regulator for electric arc furnaces with movable electrodes eliminates "hunting" by shortening the distance through which the electrodes travel, thus furnishing a more constant power and resulting in a shorter period for melting down.

Slag Formation

The selection of melting scrap, used even for the making of real high quality steel in the electric furnace, can be so carried out that it is unnecessary to slag off at any time during the heat. It should be remembered, though, that scrap containing alloys should not be stocked with straight carbon scrap unless the alloy is of such a character and of such a small quantity that it will be lost by oxidation during the melting of the heat.

A good oxidizing slag which, when it has served its purpose, may be changed over to a reducing slag by the addition of lime, fluorspar and coke breeze, may be made by adding about 120 lb. of lime to the charge when it has been melting down for 15 min. This amount is based on a 6-ton charge. Other quantities for other size charges should be used in proportion.

The oxidizing or first slag has thus had an opportunity to partially do its work before the heat has been entirely melted and the addition of a small quantity of fluorspar will very often thin the slag sufficiently to make it thoroughly efficient. Although the constituents of the oxidizing or black slag are fairly stable, they can be changed to form the reducing or white slag by the addition of lime, coke breeze and fluorspar in the proportions of 11, 4 and 5 in the order mentioned. These are standard amounts for a 6-ton charge and, although additional quantities may be necessary to form and hold a good reducing slag for a predetermined period of time according to the nature of the heat, they will be found reliable in most cases.

Refining

The stirring of the heat while under the reducing slag may be carried to excess if the necessary care is not taken to avoid the mixing of the slag and the steel. It should be remembered that a slag is formed on a heat of steel for the purpose of refining the steel by its absorption of gases and impurities in the bath, but if the stirring is too violent or performed too often, small particles of slag are liable to be forced into the bath and entrapped, thereby losing their usefulness on the surface of the bath and also resulting in slag enclosures in the finished product.

Stirring of the steel should be confined to gentle agitation of the bath so that small pockets of gases will unite and minute particles of slag and other impurities will combine. This increase in the volume of both causes them to be forced to the surface. Stirring of the slag should be a replacement or turning-over process, so carried out that a fresh surface contact of an oxidizing or reducing nature will be kept on the bath until refinement of the steel has taken place.

It has been generally conceded that a heat of first quality steel should be kept under the reducing slag for at least an hour, but this time limit is controlled by different melting conditions. Steel containing alloys of high segregating powers should be kept under the reducing slag for a sufficient length of time to insure a homogeneous mixture in the bath. A preliminary check analysis of the alloys in question will satisfy the operator when this condition exists.

Decarbonizing

Decarbonizing of a heat of high quality steel by an oxide of iron is injurious to the steel, even when carried on under ideal melting conditions. There are times, however, when existing conditions demand a quick reduction of carbon in order to save a heat, and in such cases it may be treated with iron ore, mill scale, cinder, or some other oxidizing agent, to get the desired carbon content, although the heat thus treated should not be considered a first quality heat of steel, and an analysis of the finished product will show that the oxygen, hydrogen and nitrogen contents are higher than if other means of reducing the carbon had been used.

Decarburizing a heat of electric furnace steel should be brought about by the use of a low carbon steel, melting (muck) bar, Swedish iron or Norway iron. Its addition to the heat will, in no way, lessen the quality of the steel unless highly oxidized material is used, and the time consumed by this method, to get the desired carbon content, is considerably shorter than by the oreing-down process.

Furnace capacity should not be overlooked when considering the use of scrap, however, as it takes considerably more scrap than an oxidizing agent to reduce a heat the same number of points of carbon. The evolving gases, when an oxide has been used, have a scouring effect on the side walls and roof of the furnace, and the adoption of this practice for decarbonizing will shorten the life of the refractories considerably.

Recarburizing

Little can be said of the means of saving time in the recarburizing of a heat, as most methods commonly used are fairly efficient, although some have advantages over others.

The use of pig iron, or preferably washed metal, is considered the most desirable way of raising the carbon when the capacity of the furnace will permit, since it has two advantages: The carbon is raised to the desired point or limit and the tonnage is increased by the metal addition. This method is more expensive from a raw material standpoint and for that reason the introduction of carbon in some other form is very often used and found reasonably satisfactory, especially when the charge is too high in the furnace to allow of any additional metal. Coke breeze is often used by shoveling it into the furnace and heating it into the bath, but the uncertainty of the results to be obtained from it causes the furnace operator to hesitate using it, when he desires to raise the carbon more than 0.20 to 0.25 per cent.

Use of Old Electrode Couplings

The use of scrap electrode couplings has been found to produce very good results. They may be thrown into the bath and allowed to float around until the

operator, by actual experience, thinks that sufficient carbon has been absorbed by the bath. They may be used over and over again and their use is recommended in many cases, as the couplings are of very little commercial value as scrap and their use in this way can be considered as a double saving.

The lowering of the electrodes into the bath is a practice also being used very widely to introduce carbon into a heat, but the amounts of carbon obtained vary so widely with different heats that the practice should be used with precaution. It has been the writer's experience to have as much carbon absorbed from the electrodes in 10 min. by one heat as was absorbed in 55 min. by another heat, the electrodes extending the same distance into the bath in each heat and both heats were under a white slag the same length of time.

Addition of Ferroalloys

The factors to be considered in the addition of ferroalloys are the time and manner of their addition by which maximum efficiency will be obtained.

Nickel should be added to any charge as soon as the heat is entirely melted, as its stableness is so pronounced that no loss will be experienced from oxidation and ample time will be given for its dissemination.

Ferrosilicon, being the least expensive of the commonly used alloys, may be added to the heat as soon as the white slag has been formed. It has been found good practice to divide the amount to be added into two equal parts when the desired silicon content in the finished product is to be 0.55 per cent or less, adding one part after the white slag has been formed and the other about 10 min. before tapping time. When the desired silicon content is to be greater than 0.55 per cent the division of the ferrosilicon should be so proportioned that the greater amount is added first, the amount increasing in proportion with an increase in the desired silicon content in the finished product.

Introducing Chromium and Vanadium

Ferrochromium, although not as free from oxidation as nickel, is fairly stable, and its addition in quantities up to 200 lb. for a 6-ton charge is considered safe in most cases when the heat has been under a white "falling" slag for half an hour. It may be added earlier if the finished product is to finish over 2 per cent chromium. The addition of a great quantity of finely divided chromium should be avoided, as some of it will be taken up by the slag and, if not detected by the usual green tint of a slag containing chromium, will not be recovered.

Ferromanganese oxidizes slowly and may be added in appreciable quantities as soon as a good white slag has been formed.

Ferrovandium, a very active alloy, should be added from 15 to 20 min. before tapping, and to get the greatest efficiency from its use, it should be inclosed in a perishable metal container of some sort and forced down into the center of the bath. This can be done by wiring the receptacle to the end of a stirring rod and forcing it down into the bath quickly. A heat should be under a white slag for at least 45 min. before adding ferrovandium.

The same practice should be followed in adding ferrotungsten to a heat of steel as is used in adding ferrovandium, with the exception that ferrotungsten can be added from 5 to 10 min. earlier than ferrovandium on account of their relative activities.

Breakage of Electrodes

Electrode breakage, like the improper addition of ferroalloys, is a double loss to the steel manufacturer. The broken electrodes are of small monetary scrap value, and production is held up while new electrodes

are being put into place. There are electrode breakages, of course, which are unavoidable, but if proper care is exercised when new electrodes are put into place the number of these delays will be greatly reduced. When an electrode is put into place it should be tightened until the efforts of two men will not cause it to tighten down any further. This is important for two reasons: First, if an electrode is not screwed down tightly, it will form an escape for electric current and cause a "hot-spot" to form, and second, the hot-spot will weaken the joint sufficiently to reduce its resistance to shock to such an extent that breakage will occur at that point. The joint compound used when placing a new electrode into place should be plastic enough to fill the obvious crevices and firm enough to prevent its being forced out of the joint when the electrodes are tightened together and the amount used on each joint should not exceed from 5 to 10 lb. for a 17-in. electrode, with an amount varying in proportion for other sizes of electrodes.

Another cause for electrode breakage is when the surging of the electrodes causes them to work out of alignment. This happens when the cast shoulder, fitting around the bus-bar, is jarred around on the bus-bar enough to shift the electrode out of plumb and in striking a cold charge, particularly of heavy stock, it hits a glancing blow which will weaken the electrode and in time will break it off. Breakages resulting from this cause happen as a rule only during the melting down period, and will rarely occur if a reasonably light melting scrap is used, but will happen fairly regularly when the charge is made up of mostly heavy scrap.

General Remarks

The excessive demands made on the electric furnace, until a short time ago, caused by erroneous information having been circulated by furnace salesmen, make it all the more important that each operation of the furnace be studied thoroughly with the point in view of obtaining standard operating data. Such information will help to place the electric furnace on the firm basis that it should be and will help to dispel the thoughts that are injurious to the industry from the minds of those not using electric furnaces at this time, but who may consider their purchase in the future.

The electric furnace, although not fulfilling all the requirements that were expected of it at first, compares favorably with other melting mediums used for the making of steel. It is now being used to produce all kinds of steel, and is rapidly coming into prominence for use in the foundry and for the making of high-grade tool steels. It is well adapted for melting of small amounts of ferroalloys and the recent installation of two furnaces of 35 tons capacity is proof that the tonnage from electric furnaces will steadily increase. This will be especially true if the power rates on electric current are reduced, with a consequent lowering of operating costs, since the kilowatt hours per ton of steel produced are reduced as the furnace capacity is increased.

It is reasonable to believe that, with the impending scarcity of natural gas and the increased rates for the now limited supply of same, the electric furnace will make more rapid strides to the front than it has made so far.

The War Department is to use the standards adopted by the American Engineering Standards Committee by order of the Secretary of War, who directs that the supply branches utilize the specifications through a technical committee which now exists.

A. H. P. Leuf, receiver for the General Utilities Co., 1326-30 Ogden Street, Philadelphia, has arranged for the sale of the property of the company, including machine tools and other equipment.

IMPOWERED DRIVE TRAFFIC

I am Steel.

Buried I lie until called to be servant to man. . . . Borne to a city of industry, fires make me flow into many forms and busy shops transform me for a world of work. . . I am cast, rolled, cut into a myriad tools and devices, each gifted with the soul of a craft. . . .

As forge, with heart of fire, I defy cold, melt, transmute, refine. . . I am Vulcan. . . As motor, alive with breath of flame, I give nature's force to man. I am Titan. . . Empowered I drive traffic over land, sea, and air, turn the wheels of industry in field, mine, and factory. . . .

My tools cut vast timbers into useful shapes, bind structures to shelter mankind. . . With me men plow and plant, garner and grind to feed a race, and women cut and sew to clothe the world. . . . As magnet I guide commerce on trackless seas. . . I become pen and press -- through me man's thoughts pass to the world and posterity. . . .

I am hammer and anvil of the race, and forgings. . . I arm states with ship, tank and gun; raze far cities, overturn dynasties, bring new eras. . . I become bridge, train, vessel, skyscraper. . . I am forged into factories, spun into railroads, woven into cities. . . .

. . . I make man strong of arm, --

I AM FORGED INTO FACTORIES, SPUN

Hercules; swift-of-foot--Atalanta;
and miracle worker--Aladdin. I scoop
out harbors, span rivers, unite oceans,
move mountains and toss them into
the sea. . . .

... My arms--tireless, strong, skilled,
beyond dreaming--set men free. . .

... My power to serve is boundless,
for in me pulsates cosmic energy. . .

... In soldier hands I carve the road
to freedom, with the surgeon I cut
the way to health, with the work-
er I build civilizations. . .

... Wise artisans endow me with
creative power in automatic machines
in which age-old crafts made per-
fect become immortal. . .

... I take man's puny crafts one by one,
make them all vast enterprises. . .

... I am steel!

... Man is my master.

... I am his master servant.

... I await his command to create
new eras.

Henry David Hubbard.

WASHINGTON, D.C., Nov. 5, 1922

The Iron Age
JANUARY 5, 1923

INTO RAILROADS WOVEN INTO CITIES

How the Government Is Helping Business

Great Progress Made by Secretary Hoover and His Assistants in Improving Service—Commodity Divisions Created—Important Work of Bureaus

BY L. W. MOFFETT

NEVER in the history of the Republic has industry been in greater need of a guiding hand than at the dawn of 1922. Great processes of economic readjustments are spread throughout the universe. There is a vast ebb and flow of the tide of finance, industry, commerce, agriculture and politics. Much remains to be done to complete liquidation and deflation and to quiet political and social unrest. The United States is more nearly free from these disturbances than any other great nation, but necessarily is unable to escape their consequences. Trade cannot be conducted normally where great areas of the world are still in the throes of an abnormal situation, and industry of this country has expanded to such a degree that it must increase its export business constantly. This is true of all the big industries, and assuredly includes iron and steel.

Tendency Toward Stabilization

But perturbed as conditions are, the tendency toward stabilization is progressively encouraging. No satisfactory attempt can be made to indicate what the new year may develop as to recuperation, yet students who have surveyed the situation are confident that prospects have grown considerably brighter. At the same time, it offers a challenge to the ingenuity of those constituting the fabric of business and all of its elements. The keynote to a solution is co-operation. Business, however, requires a chart to point the way to the new era which is approaching. Fortunately, aid is at the disposal of business in the strong hands of the Government and it is desirable that it realize this much more fully than it has in the past, for it has only partially recognized the fact. It is perhaps true that there has been closer association between business and the Government during the past year than at any previous peace-time period. The Government, fully aware of the necessity of giving aid and advice, is showing an exceptional readiness to bring about normal conditions and to assist every branch of business to launch out in greater proportions, both in the domestic and export field. With possibly a relatively unimportant exception here and there, this gratifying inclination is evident, from President Harding down throughout the Government.

The Department of Commerce

Partly because of its function, the Department of Commerce has been and is the outstanding branch of the Government to give aid to business. That department is charged, as Secretary of Commerce Herbert Hoover has said, under act of Congress and by virtue of the desire of the Federal Government, to be generally helpful with the stimulation of the distribution of commodities. The greatest reason, however, for the new and closer relations between the department and industry, for they are decidedly closer than ever, lies in the personality heading the department. Possessed of a remarkable native ability which has been developed through a vast experience acquired under varying conditions at many points of the world, Secretary Hoover—a name known in millions of households throughout the world—has vitalized the department until it has taken on entirely new and greater proportions. His mind has many sides. It reflects the systematization of the engineer, the grasp of a big industrial leader, the poise and imagination of a successful financier, and has the solicitude of a practical humanitarian. Indeed, he has been described as a combination of all of these. Back of it all is a ceaseless energy.

This picture indicates what may have been expected of him as head of the department. It explains why that department has been so widely advertised in the United States and abroad. Mr. Hoover has been and is doing things for American industry. He has a ready ear for representatives in all lines of activities in the country. His many conferences are made up of people who constitute the woof and warp of the nation. Among them are representatives of labor, manufacturing, engineering, trade associations, agriculture, transportation, the daily and trade press, finance, etc. Still, Mr. Hoover is just starting. He does not consider that the organization he heads is yet a "real Department of Commerce," for he says in his annual report that it is not.

Relation to Industry

What, then, is the relation of the Department of Commerce to industry, under its stimulated and growing activities, which Mr. Hoover thinks will not reach their highest efficiency until there is a "thorough reorganization and entire regrouping of the Federal functions bearing upon these functions." By this he meant the giving of service to the producers, manufacturers and distributors of commodities, the ability to provide economic interpretation of importance to the American public generally, and to stimulate American trade and the merchant marine.

Too little interpretation has been applied to the phrase "keep the Government out of business," in the opinion of Mr. Hoover. "There are many lines of business that need the co-operation and assistance of the Government," he has said.

Answers as to the relation mentioned are given best in the statements that have been made by Secretary Hoover, and accompanying expressions by the heads of the three branches of the department most closely associated with industry. These are the Bureaus of Foreign and Domestic Commerce, Standards and Census, of which the respective directors are Dr. Julius Klein, Dr. S. W. Stratton and William M. Stuart, each well qualified for his position.

It will be helpful to summarize the work of the department and these bureaus. The efforts of the department itself have been devoted to reorganization of expenditures, and those bureaus concerned with industry and trade, that they may become of more effective service to the community, as explained by Mr. Hoover.

Appropriations for Next Year

The total appropriations asked for all bureaus of the department and approved by Director of the Budget Charles G. Dawes, for the fiscal year 1923, actually amount to \$19,939,970, as against the higher estimates previously made. The decrease was possible despite an enlarged program by reason of a reduction of about \$1,000,000 in the expenses of the Bureau of the Census and savings in other directions. The results of the bureaus concerning industry and trade are in part indicated by the increase in volume of demand upon the department for helpful action or information. These demands have reached a rate of approximately 1600 each work day, or over 500,000 a year. This gives a vivid idea of what the department means to industry. Much better results are contemplated.

The most striking improvement in the Bureau of Foreign and Domestic Commerce consists of the creation of 14 new commodity divisions. This development was made possible by an appropriation of approximately \$250,000, which became available on July 1. Some of the money represents new funds and the re-



W. N. STEUART
Director Bureau of
the Census

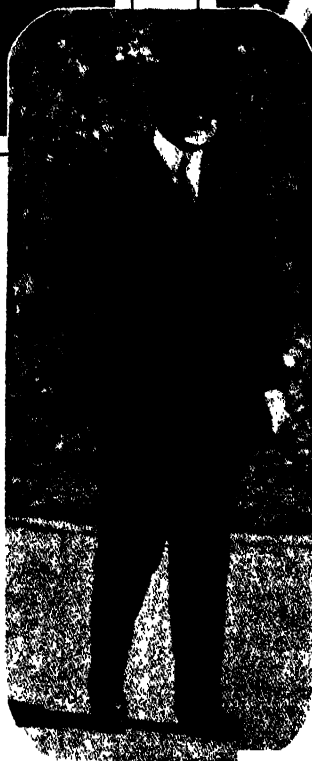
DR. J. KLEIN,
Director Bureau Foreign
and Domestic Commerce



LUTHER BECKER,
Chief Iron and Steel
Division



DR. S. W. STRATTON,
Director Bureau of
Standards



HERBERT HOOVER,
Secretary of Commerce

mainder money transferred from other activities.

The commodity divisions were created in order that the bureau could be equipped to furnish better service to basic American industries. Before the establishing of these special divisions the bureau had practically no industrial experts connected with its Washington office. The great majority of its personnel, both at home and abroad, consisted of men of more general economic training and experience.

The units of the bureau's organization which concentrate on the geographical phase of export business have also been enlarged and expanded. In place of the old former single European Division, which covered all of Europe, also Africa and Canada, two new divisions have been established, covering Eastern and Western Europe respectively. With the establishment of these two new divisions, the bureau now possesses five geographical divisions as follows:

Eastern European Division, Western European Division, Far Eastern Division, Latin American Division, Near East Division.

Geographical Divisions

The geographical divisions supervise and attend to the preparation of reports and replies from interested American business men from the geographical point of view. This work will often supplement the more specialized commodity service performed in a like manner by the commodity divisions. The commodity and geographical divisions work in the closest harmony in furnishing maximum service to American business from both angles.

Two new divisions of a different character from either commodity or geographical divisions have also been established. They are: Commercial Laws and Transportation.

The Division of Commercial Laws collects and compiles information with regard to the laws of foreign countries which affect the transaction of American business within the borders of such countries. At the present moment, this division is planning a world-wide survey of the commercial laws of foreign countries on a scale conservatively estimated to be far greater than has ever been attempted by a Government agency. With the help of the commercial attachés, trade commissioners and consular officers, this division will shortly can-

vass the world for information on which to base numerous special booklets.

The Division of Transportation will study problems connected with the movement of freight, both by land and by sea, in an effort to be of assistance to American exporters in solving difficult problems of this kind, and in expediting the movement of American goods to foreign ports.

In line with the general reorganization mentioned, the old familiar daily *Commerce Reports*, known for years to practically every exporting firm in this country and in many foreign lands, has also felt the force of the tidal wave of better service. *Commerce Reports* is now published weekly instead of daily. The new *Commerce Reports* is conveniently arranged and classified by subjects with commodity sections to correspond with the bureau's new commodity divisions. It contains special sections devoted to the work of the Division of Commercial Laws and the Division of Transportation. Each issue

also contains a section devoted to each geographical division. The new weekly, in addition, contains at least one page of "Foreign Trade Opportunities," indicating specific openings to sell American goods. It also refers to available lists of foreign dealers, importers, and other prospective buyers of American merchandise.

Assistant Directors

To take care of the greatly increased administrative work connected with the expansion of the bureau's services, Congress has provided for four assistant directors in place of the two employed heretofore.

In connection with the older units of the bureau's organization, the Research Division plans to improve both the scope and character of the very necessary research work which it performed. There is also the bureau's Foreign Tariff Division. It is planned to improve the services rendered by this division in the supplying of technical and often complicated information regarding foreign tariffs, consular regulations, patent and trade-mark matters, rules governing commercial travelers and their samples in foreign countries, etc.

Commercial Intelligence

Another comparatively new section in the bureau's organization is the Division of Commercial Intelligence. This division is charged with the responsibility of pre-

paring trade lists. The new lists represent a vast improvement over the lists formerly furnished by the bureau. The new lists go about as far as a Government office can go in furnishing details regarding foreign firms. They will show the relative size in each community of each firm listed. They will also indicate the character of the business of each firm.

The bureau has asked in the appropriations sought to continue the 14 commodity divisions already organized and to establish 16 additional ones. These 16 which are proposed would deal with non-ferrous metals,

effect certain reforms, is to ask business what the Government can do to help it in its problems.

Of the commodity divisions set up those of most interest to the iron and steel and machinery trades relate to those lines. The practical experience of Mr. Becker, chief of the Iron and Steel Division, and of Mr. Rastall, chief of the Heavy Machinery Division, has been reviewed by THE IRON AGE so that its readers are acquainted with their past work. The operation of their divisions also has been described previously, but supplemental comment by Mr. Becker reflects further the result of work being done by the iron and steel division and efforts under way.

Mr. Becker's Work

Mr. Becker feels much encouraged over the ready response his division has met with from the various factors in the iron and steel industry engaged in foreign trade. Some of the trade associations and organizations affiliated with the industry have voluntarily established contact with the division, with the desire of co-operating with it to the fullest extent.

"The Iron and Steel Division is young and has only started in its endeavor to be of service to the interested manufacturers and exporters, and has laid plans, which for their successful execution will require the advice and suggestions of manufacturers and exporters who have had long years of experience in the problems encountered in foreign trade, and the support of every branch of the industry," said Mr. Becker.

"The plan and scope of the Iron and Steel Division embrace the following:

"It is proposed to render assistance to the American manufacturers and exporters of iron and steel in not only protecting and maintaining their share of the world's trade, but in finding new fields and opportunities to provide an outlet for the increased capacity of the steel mills as a result of the war; to bring the exporters in direct contact with foreign markets and buyers; and to act as a clearing house for foreign trade information.

"Questionnaires have been prepared by the division for these field men, in which the kind of information desired for the American exporters is outlined in concise but comprehensive form. A list of the commodities covered by the division accompanies the questionnaire, as well as complete specifications of many of them to guide the investigator who may have little knowledge of the marketing of steel products. Suggestions are also made as to where to look for reliable and accurate information. It is desired to secure complete and accurate information, leaving no room for conjecture on the part of the division when interpreting the mass of statistics received. Special investigations will be undertaken in certain sections of the world by men particularly fitted for work of this character. The reports coming to the division from these men will be of special value to the exporters of steel, because they will depict the situation, with respect to a definite trade or industrial center, in complete, accurate and up-to-date form. Foreign periodicals received by the bureau from every part of the world and in a great variety of languages form another source of information for the division.

"Information is being received in the division in increasing quantities, and the problem is to determine how best to utilize it for the best interests of those it is intended to serve. The bureau's weekly *Commerce Reports* is one of the several channels used to disseminate information; another very important medium used is the trade and daily press. Information relating to some definite foreign project or business, in which a certain branch of the industry only is interested, is distributed directly by letter to those firms particularly concerned; confidential and reserve information is sent out in a special circular to those American firms recorded on the bureau's exporters' index. Material not used for distribution is placed on file, where it is available for use in providing answers to the many inquiries being received from those interested or engaged in foreign trade. Co-operation with other divisions of the bureau enables the Iron and Steel Division greatly to supplement its service to the American exporters of iron and steel."

Vitalized Department of Commerce in Brief

Reversing the usual Government order, the department is reorganized on a basis of asking business its needs and then devising practical plans of service.

Efficiency and economy relating to all lines, raw materials, skill in manufacture, labor, and capital underlie the principle for maintaining home markets and developing foreign trade to take care of expanded production.

Restoration and continuance of prosperity is sought by stabilization of industry by wiping out removable fluctuations with their peaks and valleys of trade conditions.

Elimination of waste and sensible policy of standardization instituted, calling for proper methods of production.

Commodity divisions supplemented by others in transportation, commercial law, set up in Bureau of Foreign and Domestic Commerce, with specialists in charge of supplying industry with facts and studies of intimate and vital character. Co-operation with business interests has been extremely close with resulting benefit both to them and the department, co-ordination of interest of all being effected and interdependence of one branch of endeavor on others being developed.

It is also the purpose to develop collective efficiency of American business men, which Mr. Hoover thinks is not so high as their individual efficiency.

Through co-operation with trade associations, trade papers and other sources, the Bureau of the Census publishes vital statistics monthly under the supervision of Dr. F. M. Surface, giving a picture of business conditions and market trend and affording interpretation of future conditions.

The Department of Commerce itself publishes "Commerce Reports" weekly, material being assembled from all parts of the world and grouped according to commodities and other subjects of importance to business.

The splendid service of the Bureau of Standards is receiving increased recognition by industry in consequence of which its work is being broadened.

hardware and tools, petroleum, vegetable oils and lead stuffs, meat and dairy products, canned goods, cotton and cotton goods, wool and woolen goods, dyes and drugs, heavy chemicals, paints and varnishes and tanning materials, glass and earthenware, paper, foreign investments, advertising, packing and credit methods, and maps and commercial geographies.

Closely related to the commodity divisions is the division on standardization and elimination of waste, recently set up under the general direction of the Department of Commerce. This division is headed by William A. Durgin, for several years public utility expert for the Commonwealth Edison Co., Chicago, whose activities with that company were similar to those now devoted to the department and industry generally. Mr. Hoover has made it clear that the policy of the division, instead of being to order industry to put into

Of great aid to the commodity division chiefs are the commercial attachés and trade commissioners, whose reports have become of a more specialized character and more interpretative than heretofore, and consequently are more important to industry and trade.

The plans of the Bureau of Foreign and Domestic Commerce are to increase the personnel of attachés and trade commissioners. It is proposed to increase the number of attachés from 13 to 15. They would be established for the first time at Havana and Stockholm. Offices already established would be continued at Berlin, Buenos Aires, Copenhagen, London, Madrid, Mexico City, Paris, Pekin, Rio de Janeiro, Rome, Tokyo and Santiago, Chile. One commercial attaché would be appointed at large. The estimate provides for 32 trade commissioners, instead of 18, as at present, and nine assistant trade commissioners, instead of five, as at present.

The Inter-American High Commission was transferred in December from the Treasury to the Bureau of Foreign and Domestic Commerce and Secretary Hoover made chairman of the United States section. The commission is established by treaty with all South American countries and its purpose is to act in common as an advisory body to the various governments in perfecting commercial and financial practices between the different countries.

Bureau of Standards

Ranking among the foremost Government organizations of vital importance to industry is the Bureau of Standards, whose director, Dr. Stratton, has been paid a remarkable tribute by a remarkable man. Thomas A. Edison has classed Dr. Stratton as being 100 per cent efficient. If it is humanly possible to attain such a high standing, it is easy to understand why the rating was given Dr. Stratton. His record reflects the greatest excellence of a man of science. In turn this proficiency is evident throughout the bureau, which is located high on the outskirts of Washington in an appropriate atmosphere of quiet that is conducive to painstaking research and study. Its duties and performances are manifold and its accomplishments are vast. Its functions, as its literature points out, relate to development, construction, custody and maintenance of reference and working standards and their intercomparison, improvement and application in science, engineering, industry and commerce. There is no scientific and technical problem within its wide range that it will not handle, dissect, analyze and work out to the minutest detail. Working standards involving balances ranging from that capable of measuring the thousandth part of a milligram to the large testing machine capable of measuring a load of thousands of tons all come within its purview merely as a fractional part of its work. Engineering students, as well as engineers, business men and many others in miscellaneous walks of life from the United States and foreign countries, are shown through the testing laboratories, seeking and obtaining invaluable information.

The Bureau and Industries

Dr Stratton further explains the relation of the bureau to industries as follows:

"Every one in the United States and particularly our industries are today showing much more interest in the work of the various departments and bureaus of the Government than was the case a few years ago. This is as it should be, and even where the interest is only a desire on the part of some one to increase in a general way the economy and efficiency of Government operation, such an interest is a good thing. With our industries, however, the underlying reason for this getting together of commercial concerns and the Government is more direct and of even greater importance. Industrial concerns have discovered that real service in the shape of good, practical advice can be obtained from the Government, and that this advice will often lead to greater production and increased dividends. Not long ago many manufacturers were unwilling to admit that a Government institution could tell them anything about their particular work.

"The Bureau of Standards of the Department of

Commerce has been a pioneer in this work of bringing together the Government and the industries.

"An investigation apparently of interest only from the point of view of pure science will yield results of untold value to several industries. Numerous examples might be given to prove this point, but it is sufficient to say that even pure scientific research work is well worth the hearty support of our industries, for

Dramatic Year in Foreign Trade

BY DR. JULIUS KLEIN,

Director Bureau of Foreign and Domestic Commerce

"The year which has just closed was without doubt one of the most dramatic in the entire history of the foreign trade of the United States. It has now gone beyond, however, and in the words of Secretary Hoover, 'just as 1921 was the year of liquidation, so 1922 will be the year of restoration.' Careful surveys of foreign fields show unmistakable signs of certain, if slow, improvement. They show also that there is nothing radically wrong with American export trade to-day. The principles of rational merchandising are the same at this moment as before the war. There is no fundamental cause for despondency, but there is a great deal of need for the exercise of prudence and shrewdness. To expedite rapid recovery, there must, of course, be evidence of a greater amount of care in planning sales programs coupled with a thorough understanding of the principles of economic production.

"Fortunately the coming difficult period of 'business restoration' finds the Bureau of Foreign and Domestic Commerce far better equipped than ever before to render essential service to American industries. For the first time in the bureau's history, it is now in a position to get at the heart of America's great export industries, The 'No-Man's Land' of official trade generalities has been crossed. From this time on, the coming together of business and Government for the purpose of trade promotion will be characterized on the part of the Government by an intelligent understanding and appreciation of the needs of business—not alone of its more general requirements, but also of the puzzling details and bewildering individual twists and turns which may be peculiar to each trade.

"This vastly improved and vitally necessary official trade service has come as the result of the creation of 14 special commodity divisions. The men in charge were selected with the help and upon the recommendations of the industries to be served.

"These new services were created for the special benefit of American industries and their facilities are at the complete disposal of all American manufacturers. They are in working order now and are being used to advantage by many American business men. A most cordial invitation is extended to the readers of THE IRON AGE to call upon the commodity divisions or any other service of the Department of Commerce for advice and assistance in connection with any matter related to trade promotion. No problem, no firm or no individual is considered too large or too small."

no one of them can tell when they may be recipients of highly important information of direct bearing on their own particular production process.

"Another kind of research work is that conducted with the object of solving some particular problem and is the type more often carried out in industrial laboratories. This work at the Bureau of Standards was prosecuted with great vigor particularly during

the war. The difficulty and in some cases the impossibility of securing certain materials and appliances from abroad made necessary the development of similar things in this country.

"When the manufacturers were virtually forced into unfamiliar lines of work, they turned to such institutions as the Bureau of Standards for the fundamental information which is always absolutely essential in starting any new production process. As a result of the war, very close co-operation now exists between the bureau and many of the foremost industries of the country.

"This is particularly true in the case of metallurgical work which may be taken as an example of the industrial research work of the bureau. Realizing the great importance of scientific investigation in this field, the bureau has provided a special division to care for such problems. Its laboratory is the best equipped in the world for general research work on both ferrous and nonferrous metals and alloys. As in several other lines, the bureau realizes that only by the study of actual manufacturing processes can real improvements be made. For this reason the equipment of the division includes a small experimental foundry, rolling mill, many different types of furnaces, a forging press, draw bench, etc., so that the actual processes conducted in a commercial plant can be studied on a small scale.

"The members of the bureau's scientific staff serve on many committees of manufacturers and industrial associations and through the contact thus established, the industries of the country are kept in close touch with the fundamental research work in progress at the bureau. Practically all the industries now realize the value of an unprejudiced general research organization which can take up those difficult and fundamental problems which are of interest to an entire industry rather than to the individual manufacturer.

"Through a system of research fellowships, which has now been in operation for some time, industrial organizations can send to the bureau a representative to work upon particular problems of interest to that industry. This research fellow is given the use of the bureau's laboratories and the advantage of association with the bureau's scientific staff. The funds for the development work are provided by the organization which sends the representative, and it is stipulated that the results are to be used as the bureau sees fit for the benefit of the industry as a whole. Advantage has been taken of this arrangement by numerous manufacturing concerns and industrial associations.

"A great opportunity exists for standardization in sizes and production methods, and the bureau has already done valuable work in this field. However, a start has hardly been made in comparison with what might be done in this as in other lines of industrial standardization.

"In closing, it should be pointed out that this important need for industrial research by such institutions as the Bureau of Standards can be met only if the bureau is granted the hearty support of all our industries. The work in some lines has only recently been started and in others has not even been commenced. The next few years ought to witness a steady growth in this class of research work, and it is to the interest of every manufacturer to further such a development, as upon scientific research of this sort will depend the future success of our industries."

"Probably few persons," said Director Steuart, "other than those connected with the census realize the magnitude of this undertaking and the difficulties of carrying it to completion within the three year period prescribed by law. It involves the printing and distribution of 25,000,000 schedules of questions; the organization and supervision of a force of over 90,000 enumerators and special agents employed to make a house-to-house canvass of the entire United States—including all the outlying possessions except the Philippines and the Virgin Islands—and to fill out schedules for 107,500,000 people, 6,500,000 farms, 450,000 manufacturing establishments, and 22,000 mining and quarrying enterprises; the examination, checking, and editing of the schedules when received; the punch-

ing of 300,000,000 tabulation cards; the running of the equivalent of over 2,500,000,000 cards through electrical sorting and tabulating machines; the computation of about half a million percentages, averages, and other rates; the preparation of elaborate manuscript tables; and, finally, the printing and publication of 12 or more quarto volumes averaging about 1000 pages each."

"Believing that there thus exist a great opportunity and a great need for the adequate analysis and interpretation of census figures and their application to the live questions of the day, the bureau, acting upon the earnest recommendation of the advisory committee, plans to prepare and publish, after the close of the decennial census period (June 30, 1922) a series of interpretative special studies or monographs on various subjects within the scope of the census; and I believe that this project, if it can be successfully carried out so as to realize or approach the standard of excellence which we hope to attain, will greatly increase the value and utility of the census to the public," Director Steuart says. The bureau is now publishing interesting industrial statistical data in its "Survey of Current Business," a new enterprise that has been well received.

The bureau's work is conducted by a staff of 850 employees, housed in 13 laboratory buildings. It has a technical library of nearly 22,000 volumes, and a range of subjects and variety of equipment unique in research laboratories. The research results are made available to the industries through the Bureau's publications, of which nearly 800 have been issued. During the fiscal year the bureau issued 86 new publications, comprising 33 scientific papers, 27 technologic papers, 18 circulars, 3 handbooks, and 5 miscellaneous publications. A technical news bulletin, issued each month, describes current investigations in progress and results obtained in the laboratories.

Cost of Operation

This sketch of the activities of the Bureau of Standards, although inadequate, gives a bird's-eye view of its work. And for all the splendid service it gives and offers to industry, its cost of operation is absurdly small. For the fiscal year of 1923, its estimates carried in the budget total only \$1,762,560, as compared with an appropriation of \$1,570,360, and \$1,847,560 requested. Of the estimates \$40,000 is for metallurgical research, the same is allowed in existing appropriations, but \$10,000 less than was asked for 1923.

It is all too common for the work of constructive Government agencies to be misunderstood and insufficiently appreciated. Despite the fact that its duties require it to get into touch with every institution and family in the United States and its possessions, comparatively little is known of the functions of the Bureau of Census and their vital bearing on industry and all other activities of the broad sweep of life it affects.

During the fiscal year ended June 30, 1921, the second of the three years constituting the decennial census period, the bureau completed the field work of the census, brought well toward completion the tabulation of the results, and published a considerable part of the statistics in bulletin form. The preliminary announcement of the total population of the United States was issued on Oct. 7, 1920. State bulletins on population, agriculture, manufactures, and other subjects covered by the census are being published and in addition, thousands of press summaries have been prepared and sent out. Thus the information collected for the fourteenth census has been given to the public with the least possible loss of time, and a very considerable part of it will have been made available for use long before the publication of the last of the bound volumes constituting the final reports.

This brings to a close an attempt to outline the relation of the Department of Commerce to industry. It comprehends only a part of such a big subject. But it is hoped it will bring about a greater realization of its value and increase cooperation, so greatly stimulated during the past year. It surely must be appreciated that industry is offered splendid returns on an annual investment of approximately \$20,000,000. It will indicate that the department is a safe guide to greater things for industry.

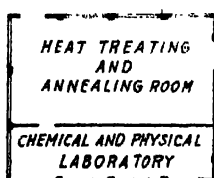
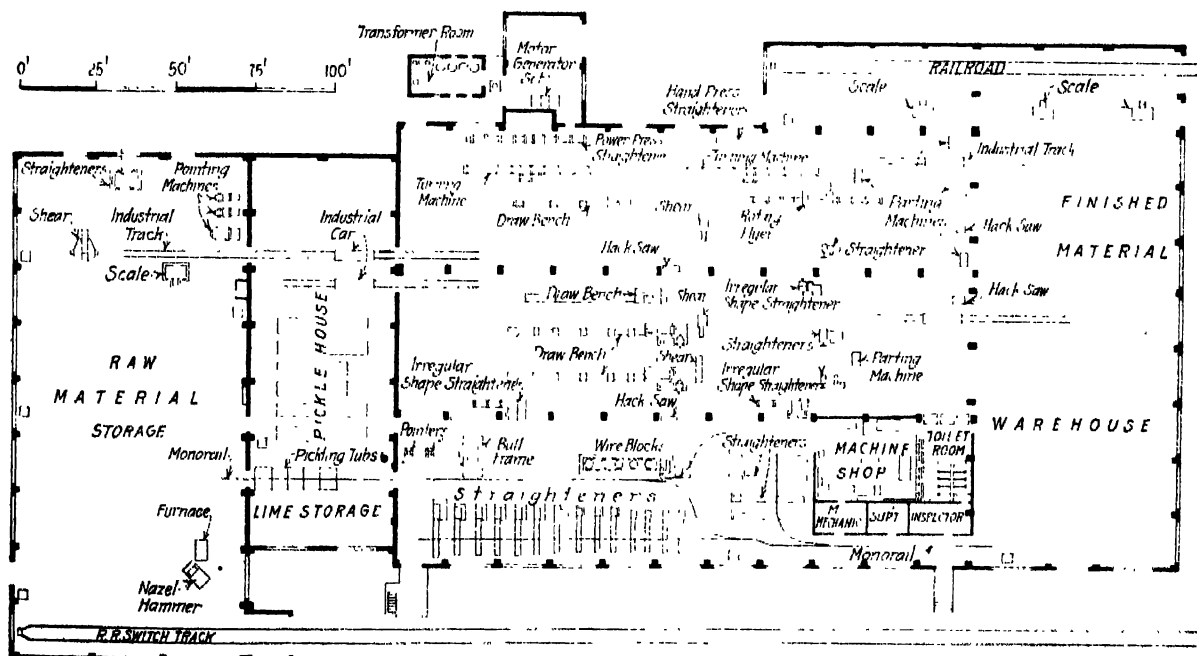
LaSalle Co. Completes Cold Drawing Plant

Designed for Handling Products in Maximum Lengths—Raw Material Protected from Elements—Plan Anticipates Expansion

BY GILBERT L. LACHER

QUANTITY, rather than quantity production, is the main desideratum in a plant manufacturing cold drawn steel bars and shafting. Maximum output is important in the sense that economy in operation is the aim of every manufacturer, but the necessity of producing material which will pass the rigid specifications imposed on cold finished steel demands more than usual care in the handling of material in process and in the inspection of a finished product. The recently completed plant of the LaSalle Steel Co., at Hammond, Ind., was designed and is being operated with heed for these considerations. The plant layout is such that the

progress of the product is uninterrupted from the raw material to the finishing ends. A large warehouse has been provided for incoming raw material, to protect it from the elements. Railroad sidings enter both the raw and finished material warehouses, thereby facilitating the movement of both incoming and outgoing products. The plant site comprises 35 acres and one side of the main building is constructed of hollow tile, so that all of the departments, or any one of them, may be extended as the future needs of the business may require. The plant was designed and equipped to handle material in maximum practicable lengths, bars up to 41 ft.



In the Layout of the Plant, Provision Is Made for "Straight-Line" Routing of Material, from the Raw Material Storage at Left, Through Pickling Vats and Draw Benches, to Finished Material Warehouse at Right

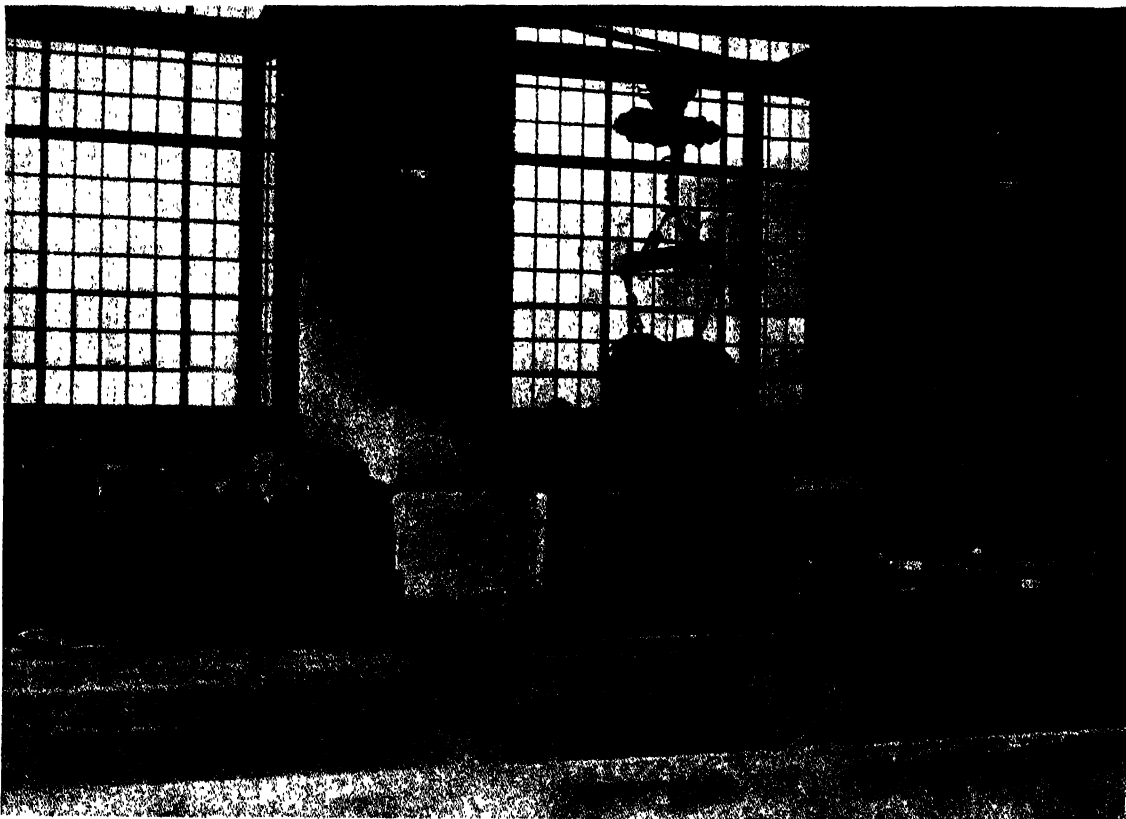
long being drawn and finished. Special attention has been given to the inspection of material, both in the process of manufacture and in the finished state.

The LaSalle plant consists of three buildings, a boiler house, 50 x 57 ft.; an annealing and heat treating department, 60 x 80 ft., containing a furnace of 25-ton capacity; and the main structure. The latter comprises raw material warehouse, pickling room, manufacturing department and finished material warehouse. This building, which is approximately 175 x 445 ft., contains 77,875 sq. ft. of floor space. It is built of structural steel, with an exterior of brick on all sides except that to which extensions are expected to be made. Continuous sash on the sides and in the roof monitors insure ample light in all parts of the plant.

All raw material is stored under cover in a warehouse, located at the end of the building farthest from the railroads adjacent to the property. A railroad siding enters one end of the warehouse, and here material is lifted out by a 10-ton Northern Engineering

used by the sample weight. Some of the coil stock is pointed in the warehouse before passing on to the other departments. This work is done on a motor-driven hammer, furnished by the Nazel Engineering & Machine Works, Philadelphia. Previous to pointing, the material is generally heated in a Strong, Carlisle & Hammond Co. oil furnace. This precaution is taken to prevent brittleness, which sometimes results from hammering. For the straight bar stock, three pointers have been provided, which will handle rounds up to 2½ in. Other equipment in the raw material warehouse includes a 5-ton dial scale furnished by the American Kron Scale Co., New York; a shear which will cut material up to 3 in. in cross section, manufactured by Doelger & Kirsten, Milwaukee, and a rotary straightener built by the Abramsen Engineering Co., Pittsburgh, through which all stock to be turned is passed before going on to the other departments.

Straight bar stock and coils are handled separately, from the raw material warehouse through the inter-



In the Pickle House Are Two Departments, for Coils and Straight Bars, Respectively. The coil tubs are served by overhead monorail, as shown, while the long vats, two of which appear in the immediate foreground, are served by overhead traveling crane

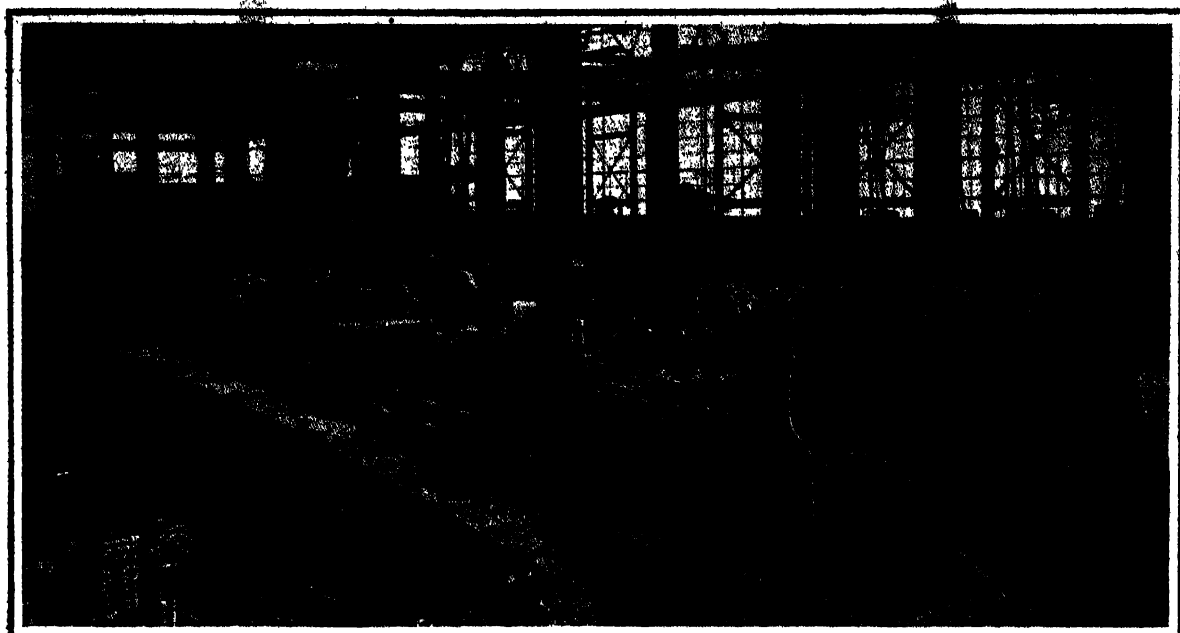
Works overhead electric traveling crane, by which it is distributed throughout the room. The crane drum from which the steel is suspended was made longer than usual, about 15 ft. in this case, to prevent swaying in the long bars handled. In this connection it is to be noted that raw material is ordered in maximum lengths which freight cars will permit—up to 40 ft.; at the request of the LaSalle company, cars are loaded by the mills in 5-ton lifts. Material is thence distributed in the warehouse in 5-ton bundles, and throughout the process of manufacture an effort is made to handle material in these units: four, five or six lifts of 5 tons each at a time. This method eliminates frequent weighing, which would otherwise be necessary in handling steel against specific orders, and facilitates the checking of the progress of material throughout the plant.

Material of small cross section is handled in coils, rather than in straight bar form. After the weights of a few representative coils out of the same shipment have been ascertained, a fairly accurate estimate of an order may be made by multiplying the number of coils

vening departments to the finished material warehouse. For handling the coils a monorail system equipped with four 2-ton hoists furnished by the Shepard Electric Crane & Hoist Co., Montour Falls, N. Y., has been provided. Three of these hoists are operated from suspended carriages; the fourth, in the pickle room, is controlled from the floor, because of the fumes rising from the pickling vats.

Straight bar stock is handled throughout the plant by overhead traveling crane (within each department) and industrial truck (from department to department). As the movement of stock from the raw material storage is all in one direction, the industrial tracks are laid on a slight grade, so that only a light pressure is required to set the industrial car in motion. These cars, designed by the company's engineers, are long, flat, narrow gage equipment, suitable for handling long bars.

Adjacent to the raw material warehouse, the pickle house consists of two departments, one for coils and the other for straight bar stock. The coil tubs—three for



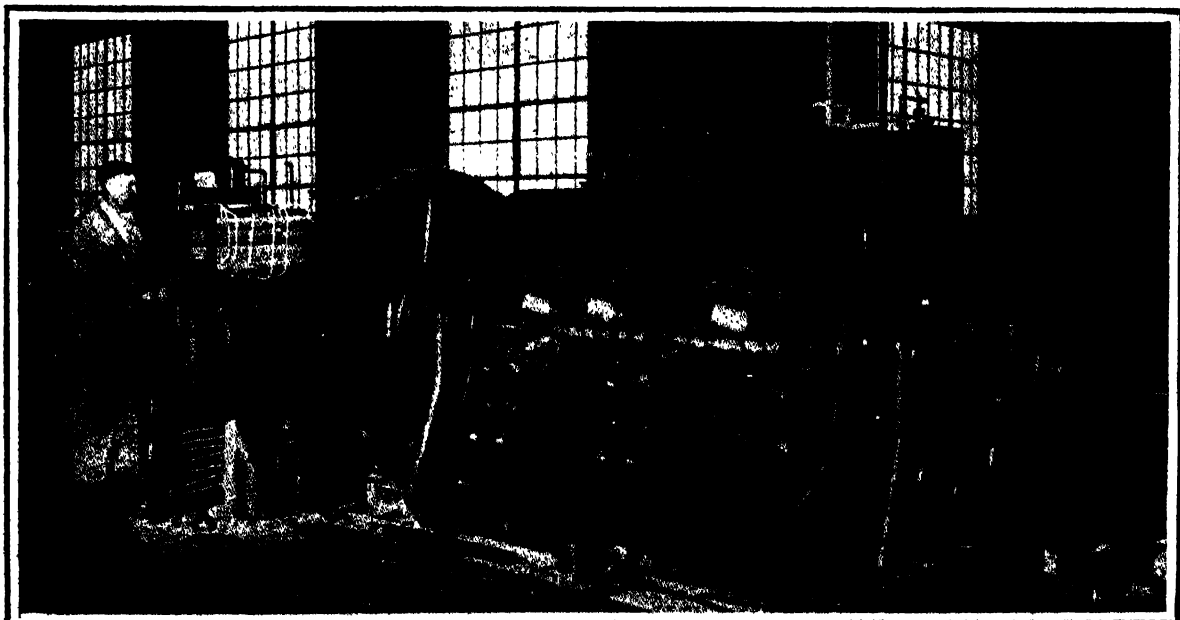
Two of the Draw Benches Are Equipped with Pushers Which Point the Stock Before It Is Drawn. Thus Eliminating Necessity of Using Separate Pointing Machines. One of these benches appears here

acid, one for water and one for lime—are located directly under the path of the monorail hoist. The tubs are made of wood and set in concrete depressions in the floor. Six long wooden vats, commanded by a 5-ton Northern overhead electric traveling crane, have been provided for straight bar stock. Of these, one contains water, one lime, and four acid. Four of these vats are 41 ft. in length, while two of the acid tanks are 32 ft. only.

The company considers pickling the most important step in its process of manufacture, and has a chemical engineer in charge who is responsible for the practice employed. The aim is to secure a complete removal of all scale from the steel without permitting the acid to eat into the surface, and at the same time to obtain a thorough removal of the acid subsequent to pickling, without incurring bad after-effects, such as brittleness. The steel is pickled, in a solution of sulphuric acid and an undisclosed compound, for from 30 to 45 min., after which it is placed for brief periods in the hot water and lime vats. The coating of lime serves as a lubricant during the subsequent drawing of the steel.

Three parallel bays, two for straight bar stocks, and one for coils, house the manufacturing department. The equipment for handling straight bars includes two turning machines and four draw benches. Both turning machines, one of which is a 4-in. and the other a 6-in. machine, are equipped with one roughing and one finishing tool, and have beds which will handle bars up to 40 ft. long. Adjacent to these machines is a power press straightener, which will take rounds up to 6 in. in diameter, and a hand press straightener which is held in reserve for any overflow in production. The material is put through the power press straightener before turning, this being the second straightening to which the stock is subjected, the first being in the raw material warehouse.

After turning, the material is passed through a 6-in. rotary flyer for straightening and polishing. The rotary flyer takes out all sweeps in the bars, but as an added precaution, to remove any slight kinks not visible to the eye, all shafting is again passed through the power press straightener before going to the parting machine. Finished shafting is run through parting



To Straighten and Polish Material After It Has Passed Through the Turning Machines, This 6-In. Rotary Flyer Uses Wood Polishing Blocks, Fastened in the Projection Shown at Right End of the Machine. The heavy rollers in the frame do the straightening as the frame revolves at high speed

machines, to prevent the distortion which might result from shearing. Some screw machine stock too large for shearing is also put through parting machines. The plant has five of these machines altogether, ranging in capacity from 1½ to 6-in. rounds. They were made by the Hurlbut, Rogers Machinery Co., South Sudbury, Mass., but certain modifications in their operation have been made by the LaSalle engineering staff. For shearing screw machine stock, three Doelger & Kirsten shears with capacity up to 3 in. have been provided.

Of the four draw benches, two will handle material up to 42 ft. in length, and the other two up to 80 ft. The two long machines have pushers which point the stock before it is drawn, thereby eliminating the necessity of the use of separate pointing machines. It is planned also to fit the smaller benches with pushers. A feature of the drawing equipment is its flexibility. All of the benches may be used for drawing irregular shapes, as well as rounds, and three are fitted for multiple drawing. Each bench is equipped with delivery arms, which raise the material after it has been drawn and drop it on adjacent horses, which carry rollers to facilitate the handling of the steel. Each bench is served with a round straightening machine, built by the Medart Pulley Co., St. Louis, and in addition there are three irregular shape straighteners, supplied by the F. B. Shuster Co., New Haven, Conn. For cutting irregular shapes four hacksaw machines have been provided.

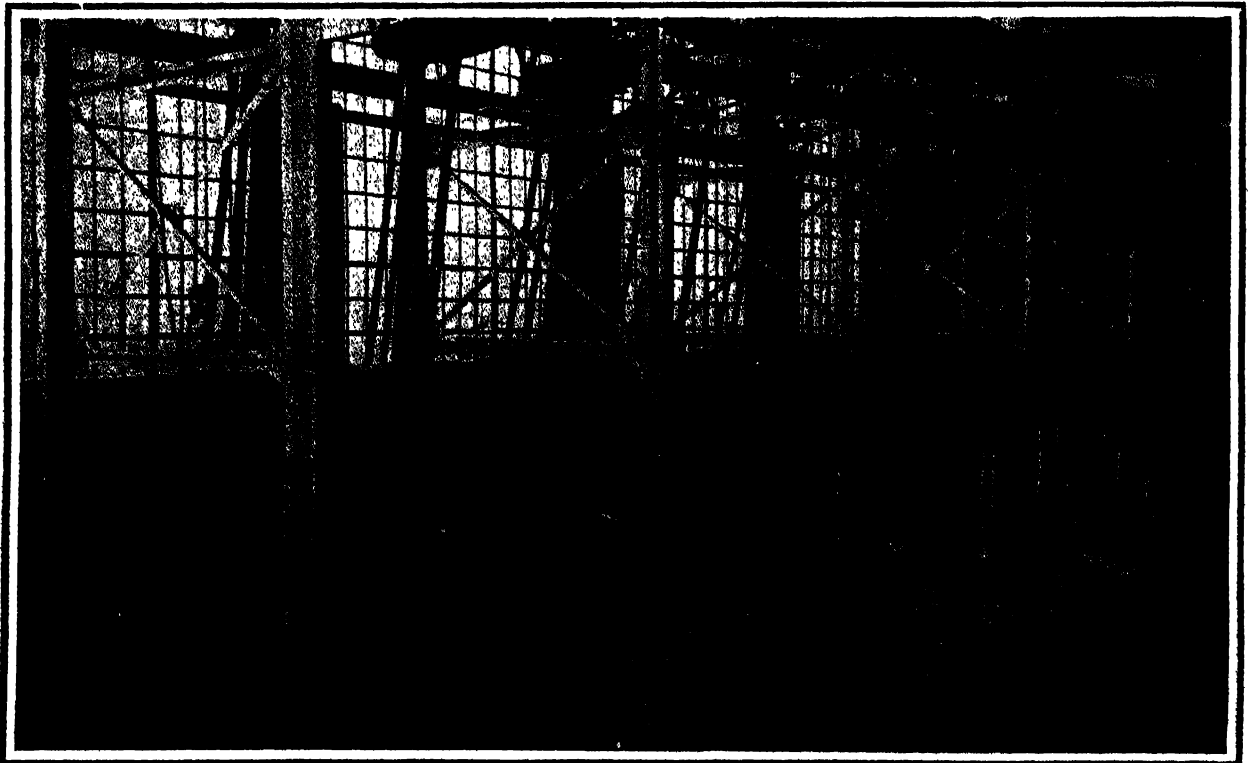
In the coil bay, larger gage stock is drawn through a double-drum bull frame, built by the Morgan Construction Co., Worcester, Mass. This machine will draw material up to 1 in. in diameter, one drum being arranged for drawing shapes and both drums for drawing rounds. Pointing for this machine may be done either in the raw material warehouse or on two pointers located in the coil bay near the entrance to the pickling department. For drawing sizes smaller than ½-in. four wire blocks, equipped with roll pointers, have been provided. Twelve Shuster straighteners, in a row, finish bars up to 12 ft., which is the ordinary length for screw machine work. In addition, two Shuster straighteners are used to finish bars from 14 to 24 ft. in length. Driven from line shafting, these straighteners automatically straighten, polish, and cut material to length in diameters ranging from ⅜ to ¾ in.

In one corner of the manufacturing department is a machine shop, where all dies are made and repair work and modifications and changes in the equipment are handled. The company also does its own carpentry and electrical work, aiming to be as self-contained as possible. The draw benches, the turning machines, the rotary flyer, the irregular shape straighteners, and the monorail system are operated by d.c. motors. All of the manufacturing units, except the Shuster round straighteners, are driven by individual motors. Current, bought from the Northern Indiana Gas & Electric Co., is stepped down from 10,000 volts a.c. to 440 volts.

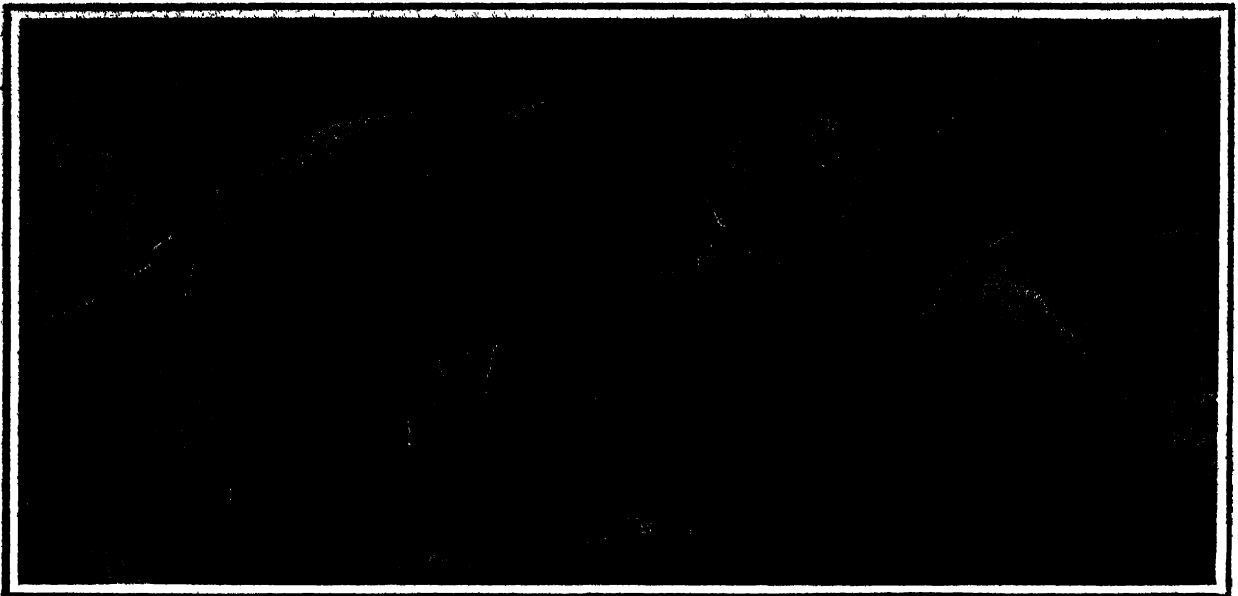
There are five Northern overhead electric traveling cranes, one of 10 tons in the raw material storage, and 5-ton cranes in the pickle house, the finished material warehouse and in two of the three manufacturing bays. All cranes are capable of taking an overload of 25 to 50 per cent. All are equipped with long cable drums, similar to the one in the raw material storage previously described, except that in the manufacturing bays the drums are at right angles to the bridge of the crane, the purpose being to keep the drum parallel to the material handled.

After material has been finished in the manufacturing department it is thoroughly sprayed with a flushing oil, free from acid and containing as small a percentage of moisture as possible. It is then transferred to the finished material warehouse. The joint storage capacity of the raw and finished material warehouse is 18,000 tons, and the manufacturing capacity of the plant is 6,000 tons a month. The output divides itself into two classifications, screw machine stock and shafting. For the former it is unnecessary that material be delivered in specific lengths. Orders for shafting, however, specify the length as well as the diameter of the stock. As an aid to the flexibility of the shipping department, shafting is ordinarily carried in lengths of 40 ft., which is a multiple of most of the sizes likely to be specified.

In the operation of the LaSalle plant, the works superintendent has no control over the finished material warehouse. The purpose of this division of authority is to prevent the head of the manufacturing department, who is naturally interested in the maximum output at minimum cost, to ship out any material not strictly up to specifications. The head of the shipping department is held responsible for all material leaving



Four Wire Blocks Equipped with Roll Pointers, Shown in Right Foreground, Are Used to Draw Steel in Sizes Smaller Than ½ In. Diameter. Behind them is a battery of twelve straighteners



Coil Stock of Larger Cross Section Is Drawn Through a Double-Drum Morgan Bull Frame, Which Will Handle Material Up to 1 In. in Diameter. Both drums are arranged for drawing rounds, and one for drawing shapes

his hands, and to this end is authorized to turn back to the manufacturing department all steel which does not pass his inspection. Frequent inspection is also required throughout all of the previous operations. Material is not permitted to pass from one department to another if it does not meet specifications. The effectiveness of inspection is probably to be attributed to the employment of a cost system, of which it is an incident.

As previously indicated, work is put through the plant in lots which are multiples of 5 tons. To facilitate this procedure a production order is made out in multiple, the office copy of which shows the amount of raw material to be used in terms of pounds, number of bars, size, shape, length, etc., the finished material to be made, in the same terms, and the specific orders against which the finished product is to be applied. Each production order is numbered, and the date on which it is sent out is registered on the office copy, and also on the raw material requisition which goes to the raw material warehouse. Copies of the order are attached, for each department through which the material will pass. On these copies are provided spaces for the insertion of the name of the foreman handling the work, the time required to perform the operation, the number of men employed on the job and the date on which the work is completed.

Before a department head will accept a production order, however, he inspects the material delivered, and in case it does not meet specifications, turns it back to the previous department. As soon as an operation is completed and material is passed on to a succeeding department, the copy of the production order showing the work completed, is returned to the office. This practice not only gives the management an accurate check on costs as compared with the previous costs for similar operations, but also enables it to keep track continuously of material in process. Separate copies of each production order go to the raw material warehouse, the pickle house, the pointing machines, the turning or drawing departments, the straightening machines, the cutting department and the shipping department.

The LaSalle plant has the advantage of excellent railroad facilities. Its sidings connect with the Pennsylvania Railroad and with two belt lines, the Elgin, Joliet & Eastern, and the Indiana Harbor Belt. The plant is only four miles from a large transfer yard at Gibson, Ind. One of the two switch backs serving the plant enters the shipping department, where box cars are spotted for loading. Raw material is weighed before shipment, three 5-ton Krone scales being located at convenient points on the shipping platform.

RATE INVESTIGATION

Cost of Production of Iron and Steel Products Will Be Involved

WASHINGTON, Jan. 3.—The bearing of present freight rates on the cost of production of iron and steel products and their effect on the market, together with a large volume of other facts, will be brought out in the course of hearings before the Interstate Commerce Commission when it resumes proceedings in the general rate investigation case. The date has been postponed from Jan. 9 to Jan. 11. From Jan. 11 to Jan. 18 the time will be devoted to direct testimony of the carriers and cross examination of their witnesses.

Then follows the presentation of the side of the shippers to be opened with subjects concerning the iron and steel industry. On Jan. 19-20 the coal and coke situation will be submitted, while on Jan. 21-23 the hearing will deal with ore, furnace materials, and iron and steel products. This gives representatives of the industry four days to present their views and they

are said to be prepared to submit a wealth of figures and observations as to the effect present high rates have on the industry, the absolute necessity of reducing them, and to go into the question of relationship of raw materials to manufactured products. This latter, however, is a subject of disagreement among rate authorities and opposing views have been expressed by representatives of the industry itself. The latest demonstration of this was in connection with informal conferences before members of the commission by Lake front iron and steel and interior iron and steel producers. The fact that the commission, as the upshot of these conferences, restored iron ore rates from Lake Erie ports to their previous high level, effective Jan. 1, has led some to think it takes the attitude that there is a direct relationship between rates on raw materials assembled to produce pig iron. This position is taken by reason of the fact that the Lake front manufacturers claimed it was discriminatory against them to permit interior furnaces to enjoy reduced rates on iron ore without allowing lower rates on coal and coke to Lake front plants. At the same time formal opinions of the commission have been handed down which do not uphold this theory.

Electrolytic Iron a Commercial Product

The Eustis Process Compared with Others—An Ore Instead of Scrap as the Anode—Tests and Properties —Fields of Usefulness

BY BRADLEY STOUGHTON*

FOR more than 50 years attempts have been made to produce pure iron on an industrial scale by means of electrolysis, which modern metallurgy recognizes as the "tonnage production" method for metals in a pure form, and which is the established process since a number of years for pure copper, gold, silver, aluminum, lead, zinc, etc. The combination of unexcelled cheapness with unexcelled utility for many purposes, possessed by *impure* iron, has diverted attention from the superior utility of the *pure* metal over pure copper, aluminum, etc., at a fraction of the price. We now know that pure iron is at least as soft and has better cold-working or drawing qualities than either pure copper or aluminum, besides having great advantages for household and machine purposes in respect of price, durability, maintenance of a bright surface, resistance to corrosion or tarnishing, to heat, etc.

Speculations as to the properties of pure iron—that is, iron of at least 99.99 per cent Fe.—which have been based upon researches carried out on metal having 99.50 per cent purity, are now known to be well below the actual quality of the metal in such properties as softness, malleability when cold, ductility, magnetic qualities and, probably, resistance to corrosion. The

extension of opportunities for research offered by the present industrial production of pure iron on a tonnage scale opens up a fascinating field of investigation for universities, research laboratories and others, with bright promise of discoveries having both scientific and commercial interest and importance.

Specimens of electrolytic iron exhibited in museums as "rare aves" may now be relegated to positions of mere historic value, because at least two industrial establishments are producing yearly hundreds of tons of metal having equal or greater purity than they possess. One of these plants is at Hawthorne, Ill., a second at Grenoble, France, and rumor has it that the Germans, under the stress of need for a metal with the softness of copper, produced noteworthy quantities of electrolytic iron during the war by the Fischer-Langbein-Pfanhauser process. And even in this brief summary mention should be made of the work of C. F. Burgess in America, and Cowper-Coles in England, because both contributed valuable aid to the final success of this useful and important industry.

Process of the Société "Le Fer"

The Société "Le Fer," which numbers among its directors the eminent metallurgist, Dr. Léon Guillet, controls the patents of Anthèlme Boucher, which were under laboratory investigation for several years prior to 1915, when the first industrial installation was made at the iron and boiler works of MM. Bouchayer and Viallet at Grenoble, France, using electricity from

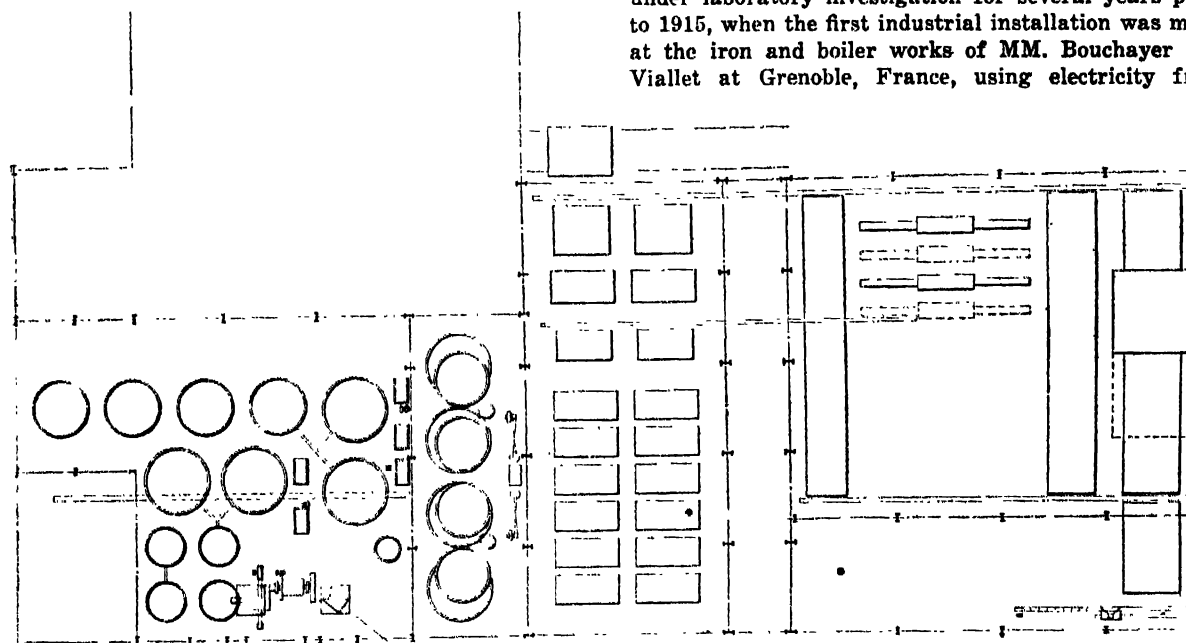


Fig. 1—Electrolytic Iron Plant Laid Out on the Unit System So As to Be Capable of Duplication. The pyrrhotite is delivered to the plant crushed through 200 mesh and concentrated by flotation so as to be practically free of any soluble impurities such as lime, magnesia and zinc

The Leaching House Contains: 4 first agitators mechanically agitated; 2 Dorr single tray thickeners; 4 final agitators mechanically agitated; 2 final Dorr single tray thickeners with the necessary filter presses; 4 cementation tanks for precipitation of copper; 3 overhead feed tanks and 2 heater tanks in which electrolyte is heated. There are also the necessary pumps and acid-proof transmission lines where necessary

The Cell House Contains: 2 or 3 acid-proof pumps for electrolyte circulation; 132 cells for deposition of 10 tons of 6-in. tubes $\frac{1}{4}$ -in. thick per day; 2 wash tanks for cathodes; 2 racks for mandrels; 2 racks for cathodes; 2 electric overhead traveling cranes and 1 transfer table

The Stripping and Drawing Room Contains: 1 storage rack for mandrels with tubes thereon; 1 electric annealing furnace; 2 motor-driven strippers; 1 tube rack and 2 tube draw benches with necessary conveyors

The Finishing and Shipping Department Contains: 1 tube storage rack; 1 tube conveyor; 1 cold saw; storage skids for finished tubes; 1 scrap hopper and 1 scrap conveyor

hydroelectric plants in the Swiss Alps. The process and works have been so well described and illustrated in the technical press, and especially by Guillet in *Revue de Métallurgie, Mémoires*, 1915, February, page 82, and by Jean Escard in *Le Génie Civil*, 1919, Aug. 23 and following issues, that details may be omitted here.

The electrolyte is ferrous chloride; the anode is iron in the form of cast iron; the cathode is a revolving mandrel upon which the pure iron (containing about

one-third of a horse-power year per ton of tubes produced.

In the matter of purity the Boucher tubes excel any other industrial product, and the process has the great advantage that a thin tube, which is the most costly to make by the prevailing boiler tube process, is the cheapest to make by the electrolytic process. M. Bouchayer says that he is able to meet all commercial competition in producing thin tubes, and he plans the construction of a second plant relatively near Grenoble, which would have double the capacity of the present plant.

Process of the Western Electric Co.

The research departments of the American Telephone & Telegraph Co. and the Western Electric Co., in seeking a commercial process for the manufacture of pure iron in a pulverized form, employed the very ingenious expedient of utilizing the hardness and brittleness of electrolytic iron from which the hydrogen had not been eliminated, in order to get the material into a finely powdered form and compress it into magnet cores which would have high electrical resistance because the particles were not soft enough to crush together into a unit mass. When these operations were concluded, the compressed cores were baked to remove the hydrogen, leaving pure iron particles.

This process proved cheaper and better than reducing the iron powder by hydrogen from the oxide. A commercial electrolytic iron plant was therefore equipped at Hawthorne, Ill., with a capacity of about two tons of iron per day. This method of securing pure iron proved to be relatively inexpensive and to afford a

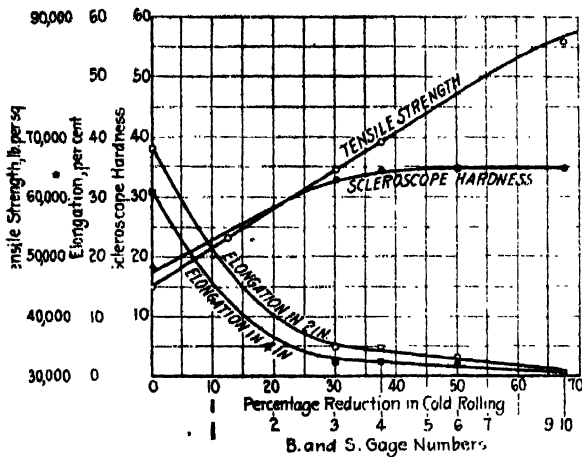


Fig. 2—Characteristic Curves of Electrolytic Iron

99.97 per cent Fe.) is deposited in the form of a tube, which is annealed to eliminate the embrittling hydrogen, stripped and used as a boiler tube, either with or without drawing through a die.

The metal is so soft that no inner "ball" is used in the drawing operation. The 0.03 per cent of impurity is made up of the metalloids of the cast iron, namely: Traces of carbon, silicon, sulphur and phosphorus. Hydrogen, which deposits with the metal, is completely eliminated by heat, as indicated by chemical analysis and physical properties, which will be described later. I have before me not only the two French monographs mentioned above, but also a thorough professional report by a Swiss engineer, and two independent reports by American engineers, each of whom made a couple of visits to the Grenoble plant, where every opportunity

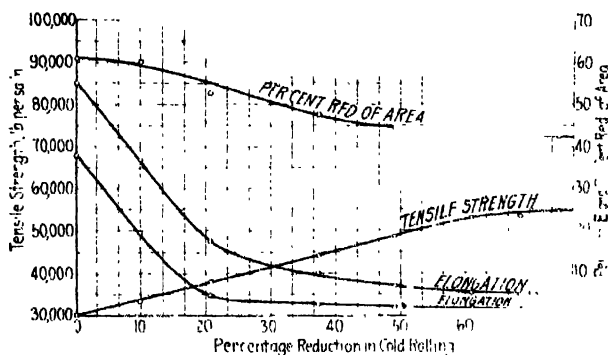


Fig. 3—This Characteristic Curve of Electrolytic Copper Represents the Change in Physical Properties Which Accompanies Cold Work on the Metal. The abscissae represent percentage of reduction in cold rolling

was afforded them by M. Bouchayer for inspection of the process. From the commercial viewpoint the Boucher process gains by avoiding the following operations in the making of a boiler tube: Purifying the pig iron; rolling and piercing the billet; annealing and rough-shaping the tube. The costly items are as follows: Cast iron for anodes;* loss of about 20 per cent in slimes due to the use of a soluble anode; and the use of electricity, which amounts to about one-quarter to

*Furthermore, a very impure cast iron must not be used, because some of the metalloids will migrate to the cathode.

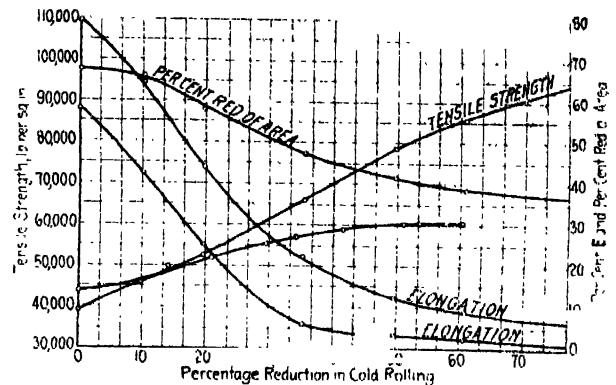


Fig. 4—Characteristic Curves of Tubing Metal

ready means of controlling the quality of the material.

The cores of the loading coils which are introduced at regular intervals to increase the inductance of a telephone circuit are now made of this material. The electrolyte is of ferrous sulphate and chloride and ammonium sulphate; the anode is mild steel; the cathode of polished sheets of steel, from which the deposited metal is stripped when it has reached a thickness of $\frac{1}{4}$ to $\frac{1}{2}$ in.; the current density is about 12 amperes per sq. ft. A brief description of the plant and process is given in the *Journal of the American Institute of Electrical Engineers*, July, 1921, pp. 598, 599, 608, and 609. The magnetic and electrical properties of the material and the completed cores are described on pp. 600 to 608.

Electrolytic Iron Direct from Ore

The deposition of iron by electrolysis is from the electrolyte directly on to the cathode. The use of a soluble anode is only a means of keeping the electrolyte supplied with iron. Any other means of accomplishing the same result would give the same deposition, electrical efficiency, etc. For example, the circulation of the electrolyte, always maintaining it up to the desired standard of iron content, would effect the electrolytic action and avoid some disadvantageous features, such

as the economic waste due to the loss in slimes with the soluble anode, the migration of impurities from anode to cathode, etc.

This is the novelty introduced by Frederick A. Eustis and Charles P. Perin in patents issued the former and developed jointly by them. This process has passed through the laboratory stage and commercial installation is under way. The solution of iron ore is the means of keeping the electrolyte enriched in iron in proportion as it is impoverished by the electrolytic deposition. The electrolyte is ferrous chloride; the anode is of some insoluble material such as graphite; the current density is 50 amperes per sq. ft. The cathode may be a revolving mandrel on which the iron is deposited in the form of a tube, or it may be in the form of a sheet, or a traveling belt from which the crumbs are removed continuously by mechanical means.

The process thus resembles the copper leaching and deposition process so successfully carried out at Ajo,

amount of copper, and the operations will deliver in marketable form the iron, the sulphur, and the copper in one short series of processes.

Pure iron is deposited on the cathode and the ferric chloride formed in the anode compartment is used over again for leaching, thus making the process cyclical. Sulphur is recovered as brimstone and copper is precipitated out on scrap iron. The speed of leaching depends on the fineness of pulverization of the ore, but presents no difficulties whatever after extended laboratory tests, although it is important to avoid unnecessary use of chlorine by mechanically separating such oxides as lime and magnesia before solution. Leaching is assisted by the circumstance that the reaction is exothermic. Counter current extraction has resulted in delivering 97 per cent of the iron, and 90 per cent of the sulphur content of the ore.

It is unique in metallurgy for one brief cycle of operations to deliver in marketable form more than 90 per cent of any ore. In the electrolytic vats the electrolyte is circulated vigorously, resulting in smooth, compact deposits being obtained; the cathode current efficiency is 90 per cent and over. With proper control no chlorine is lost, or other noxious gases given off. Each step of the process uses standard apparatus which has been developed after years of commercial operation, so that the transition from laboratory to full-scale industrial operation involves no costly experiments. The design of a plant to produce 10 tons of finished tubes per day, using standard apparatus, is shown in Fig. 1.

Purity of Electrolytic Iron

The only serious impurity in electrolytic iron is hydrogen, and this may be entirely removed by baking at a moderate temperature. Traces of other elements may be present by inclusion during deposition, but no great precautions are necessary to produce metal assaying 99.9 per cent and higher. Tubes made at Grenoble and analyzed in America showed 99.97 per cent Fe., and tubes made by the Eustis process assayed 99.99 per cent. It is noteworthy that it costs no more to make the very pure material than to deposit metal of inferior grade, depending upon the process employed.

Mechanical Qualities of Almost Pure Iron

The mechanical qualities of pure iron are greatly affected by heat treatment and cold working; furthermore, the presence of hydrogen, due either to original deposition or to absorption at a red heat—for some persons, through inexperience, have "annealed" the metal in hydrogen gas and then tested it tensilely—destroys its strength and renders it both hard and brittle as well. The crystalline structure of the deposited metal is fairly coarse and well defined. It is refined on appropriate annealing, (see Fig. 5), and, on rolling or drawing in the cold state, it takes a beautiful fine structure and brilliant polish, which is more than ordinarily durable on exposure to the atmosphere, dampness, etc. Naturally this refining of the structure is accompanied by increase of strength.

An average of tests made by the National Tube Co. on tubes made at Grenoble, in the condition in which they were received, showed tensile strength in the direction of rolling 62,000 lb. per sq. in., and elongation of 12 per cent in 8 in.; the average of three tests of similar material, redrawn and annealed at 900 deg. C. for 20 min. gave 39,000 lbs. per sq. in. tensile strength and 30 per cent elongation in 8 in. (See tests No. 4 and 6 in the table). The bursting strength of a Grenoble tube 4 in. in diameter and 0.03 in. thick, reported by Escard in the *Génie Civil* article cited above, was 1110 lb. corresponding to a fibre stress of 73,500 lb. per sq. in. It is very probable that pure iron, like very soft steel, would increase greatly in tensile strength

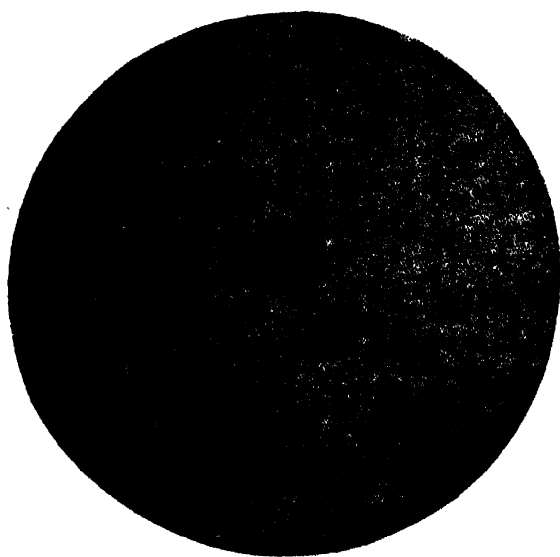


Fig. 5—Photomicrograph of Electrolytic Iron Made by the Eustis Process, 100 Diameters

Arizona, and elsewhere, and the established process of electrolytic zinc production. It faces the necessity of producing a metal which must sell in competition at a price lower than that of copper or zinc, but has the advantage of much lower price for ore and absence of some of the chemical difficulties encountered in the leaching and electrolysis of zinc. It may also be employed in localities where iron ore and a market for iron and steel exist, but where solid fuel for smelting is costly. It differs from the usual "direct process" in that it can deliver a product in finished form, ready for market, instead of a "sponge" which is commercially equivalent to a poor grade of steel scrap and must be submitted to several processes before it has industrial usefulness. It differs from the electric smelting of iron in that it will produce a very pure product without the use of any flux.

Obviously, it can be applied to any iron ore capable of solution, but its cheapest raw material is the abundant sulphide ores which occur in many parts of the world and which sell at a low price, because, first, of their abundance, and second, their inapplicability to blast furnace smelting until after a process of complete roasting. Such ores also yield their sulphur content as a by-product, at a price which more than covers both the cost of sulphur production and the total cost of the ore itself.

Application to Sulphide Ore

The present projected application of the Eustis process is to an iron sulphide ore containing a small

without losing much in ductility by subjection to a double heat treatment.

Table of Tensile Tests of Electrolytic Iron Tubes
(Made at Grenoble, France)

(See also the physical tests in "Characteristic Curve," Fig. 2)

Ultimate Strength, Lb. per Sq. In.	Yield Point, Lb. per Sq. In.	Elongation Per Cent	Reduction of Area, Per Cent	
72,600	.....	1.0	2	Cold rolled; tested in direction of rolling.*
78,500	.....	8.0		As received; tested direction of drawing.†
57,800		0.5		Cold rolled; tested in direction of rolling.*
62,000	52,000	12.0	50	As received; average.‡
38,300		0.5		Cold rolled; tested across direction of rolling.*
39,000	27,000	30.0	60	Annealed; average of three results.‡
41,800		35.0		Annealed; tested in direction of drawing.†

*Tests made at Columbia University.

†Tests made by General Electric Co.

‡Tests made by National Tube Co.

Cold-Working Properties

In *Le Génie Civil* monograph tests are described and photographs given showing the extraordinary softness and cold workability of the Grenoble tubes. Escard says it is the regular practice at Grenoble to draw five times through a die without annealing, as compared with the customary practice with soft steel to anneal before each draft. This statement is corroborated by tests made in America, at the plant of the Stanford Steel Products Co., of iron made at Grenoble and iron made by the Eustis process. Tests of cold rolling, deep stamping after cold rolling and without annealing, cold rolling and beading, threading, etc., showed that the electrolytic iron would undergo work with much less frequent annealing than soft, open-hearth steel, and would endure more cold deformation without cracking than ingot iron, Toncan metal, and, in some instances, electrolytic copper.

This softness and ductility opens a wide field of usefulness, because the saving in cost of annealings alone—which is an expensive item in cold rolling work—is an important economic feature, besides the greater ease of working and lessened defective articles. Additional light on the cold-working qualities of pure iron is shown by Fig. 2, "characteristic curve," with which are compared electrolytic copper (Fig. 3) and "Tubing Metal" (Cu 75%; Zn 25%). The latter is given because its qualities so much resemble those of pure iron.

Resistance to Corrosion

A test made at the Massachusetts Institute of Technology by Prof. Carle R. Hayward showed that a piece of Byer's wrought iron pipe corroded nearly twice as much, and Shelby steel tubing 2.6 times as much in the atmosphere as electrolytic iron made by the Eustis process. According to the same authority, an immersion test of 22 hr. in 5 per cent sulphuric acid gave a ratio of loss of weight per unit of area:

For electrolytic iron.....	1.00
For steel	4.25
* For wrought iron.....	18.50

Magnetic Properties and Electrical Resistance

The superiority of electrolytic iron for some kinds of electromagnets has already been discussed under the head of the electrolytic process of the Western Electric Co. Tests made in the laboratories of the General Electric Co. showed some samples of electrolytic iron gave lower, and some higher, values for permeability and hysteresis loss than the usual standard silicon steel sheets, depending on treatment and

source. It seems evident then that the best preparation of this material for magnetic purposes has yet to be found.

Tests made in the electrical engineering laboratories of the Massachusetts Institute of Technology showed that electrolytic iron made by the Eustis process had a specific resistance of 10.0 microhms per cm. cub. at 20 deg. C. This is six times as great as copper, but only 80 to 90 per cent. that of ordinary iron wire. These figures are confirmed by tests made by the General Electric Co. on iron from Grenoble and from other sources.

Fields of Usefulness

There are many articles whose value is dependent more upon their quality, or upon the amount of labor expended on their fashioning, than upon the cost of the material of which they are composed, so that one or two cents more per pound paid for the steel would return, with profit, in the price secured for a superior article, or would be more than made up in saving on labor in fashioning, or saving of defective product. Thus, a softer steel would require less force and less annealing than the grades now available for the manufacture of hundreds of tons of cold rolled and deep stamped articles, such as ware for enamelling; receptacles of various kinds, like oil cans; vacuum bottles; grease cups; thin stamped articles, like buttons; door knobs; shot shell steels; toys, and other thin stamped goods; bodies of automobiles, etc. There are other stamped articles, like the mirror reflectors for headlights, etc., which will not retain perfectly their shape after deep stamping, because of the springiness, or lack of softness or ductility, of the steel; softer electrolytic iron would retain exactly the mathematical form given by the dies.

This advantage would far outweigh the slightly greater cost of pure iron for this purpose. Stamped and beaded articles, like threaded caps, can be made with less annealing and less defective material. The possibility of greater thinness would find its advantage wherever heat conductivity is important, as, for instance, boiler tubes; and even the cook knows that tin cooking utensils bake quicker than aluminum, because they are thinner. The beautiful polish assumed by pure iron after cold rolling, and its resistance to corrosion, may result in cooking utensils being made without tin, and so perhaps avoiding the color which tinned articles assume after heating, and which is the great selling argument for aluminum and nickel utensils.

Thin boiler tubes is a use already mentioned, and involving enormous quantities. Many articles now stamped of copper, because of its softness, could be stamped of electrolytic iron at a greatly reduced price. Where the advantage of increased resistance to corrosion is valuable, there are many uses, such as caves troughs; boiler tubes (again); pipes and culverts; containers for water and corrosive liquids; parts of automobiles requiring to be bright; ornamental articles to be nicked and exposed to the weather, where rust soon attacks ordinary steel through its coating and mars its attractiveness; even galvanized, or tinned and painted goods would be more durable if the body of the material were of a less corrosive nature.

Add to this the economic possibility of making electrolytic iron in districts where solid fuel is now too costly for smelting, and we can visualize the commercial advantage of the new industry to localities which already use, or would use, large quantities of articles whose high price is due more to the labor expended on fashioning them than on the cost of the basic material. We are only beginning to secure the information as to the kind and amount of such articles. Where purity

alone is important, we have material like welding wire, for which a fancy price is now paid for relatively pure material. Iron for magnetic purposes has already been mentioned. It is thought that, as greater quantities of pure iron are available for research, investigation will enlarge this field. Electrical conductivity purposes should be included; and, finally, pure material as the basis for the manufacture of high grade, high priced steel for alloy steels, cutting tools, etc.

Electrolytic iron may be produced directly from the electrolytic vat in the form of a tube, suitable for use as a boiler tube; or it may be in the form of a cylinder which can be mechanically slit into strips of any desired width, gage or length in reason. These strips may be the equivalent of strips for cold rolling, or they may be of very thin gage equivalent to partially

cold rolled material, or rods for "rounding" and drawing into wire.

The "characteristic curves" of electrolytic iron compared with electrolytic copper shown in Figs. 2 and 3 indicate the use of this material in the form of wire for electrical purposes. It is evident that the wire can be cold rolled so as to have far better tensile properties as transmission lines than electrolytic copper. It will be noted from the previous tests quoted that electrolytic iron has 10 to 20 per cent greater conductivity than steel. It is therefore about the equivalent of copper clad steel; or the electrolytic iron may be copper clad, thus increasing its conductivity by another 20 per cent or so, and leaving it still not so soft and ductile as to have the objectionable stretching qualities of copper in transmission lines.

Pig Iron and Heavy Melting Steel Prices

In Nine-Year Period Iron Ranged from 3.79 to 116.8 Per Cent Higher Than Scrap—Interesting Side-lights on Law of Supply and Demand

BY H. A. KNIGHT

"HEAVY melting steel scrap is more active and higher. Recent prices have been enough below pig iron to increase the use of scrap as against pig iron at open-hearth plants."

The above paragraph is an extract of THE IRON AGE summary of market conditions for Nov. 10, 1921. It suggests a study of prices of heavy melting steel as compared with basic pig iron, both raw materials for the open-hearth furnace. For the purpose of this study, the quotations of these commodities have been investigated for nine years, thereby including the year 1913, when pre-war conditions prevailed.

The most representative basis of comparison is expressed by the percentage by which basic pig iron prices exceed those of heavy melting steel. For the nine-year period (this includes only 10 months of 1921) the price of pig iron exceeded that of scrap by 36.11 per cent on an average. The excess percentage for 1921 is the highest for the period, being 77.40 per cent. For 1920 it was 71.02 per cent; for 1919, 62.35 per cent; in 1918, only 16.18 per cent.

That this differential percentage is approaching the normal figure of 36.11 per cent is indicated by the fact that the percentage has dropped from 106.2 per cent in January, 1921, to 45.5 per cent for December, 1921.

The high water mark of this differential percentage was reached in March, 1919, when pig iron prices were 116.8 per cent higher than scrap; the low water mark was attained in March, 1916, when basic was only 70 cents higher, or 3.79 per cent.

The quotations used are those published weekly in THE IRON AGE, averaged each month. The heavy melting steel prices appear in the Pittsburgh market reports on old material, these prices representing "delivery to consumers' mills in the Pittsburgh and other districts taking the Pittsburgh freight rate." The basic pig iron prices are also quoted in the Pittsburgh market reports, being those prevailing at furnaces in the Mahoning and Shenango valleys. We have added the freight from the valleys to Pittsburgh, which has varied in this period from 90c. to \$1.96 a ton, in order that we may get our iron prices upon the same delivered Pittsburgh basis as the heavy melting steel.

Highest Pig Iron Prices

The highest point reached by pig iron was \$53.45, the average for July, 1917; the peak in heavy melting steel was touched the month previous, when \$41 per gross ton was the average for June. The lowest average for basic was in January, 1914, the price being \$13.40; the

lowest for scrap was in November, 1914, when the average was \$10.

When there was a difference of 116.8 per cent in the price of basic over heavy melting steel in March, 1919, pig iron was selling at \$30.34 (monthly average) and scrap at \$14. The Government had released control of prices on Jan. 1, 1919. That month the price of \$30, Valley furnace, for basic was agreed upon after it had been recommended by the price committee of the American Iron and Steel Institute. On March 21 this price was reduced \$4.25 per ton after the conference between the Industrial Board of the Department of Commerce and a special committee representing the iron and steel industry. Business in both pig iron and scrap was very poor during this month. However, the pig iron prices were kept up because of the influence of the official character of these March 21 price fixings. Scrap, however, did not have any official backing, so to speak. THE IRON AGE, reports for March 6 under a Pittsburgh date line read as follows: "Conditions in the scrap trade are no better in any direction and some dealers believe they will be worse before there is any betterment. There is no demand from consumers, whose stocks are heavy. Any scrap disposed of to consumers is by forced sales of material on cars that has to be moved and is sold at the best prices dealers can secure." Mention was made of a large list of scrap issued by the Pennsylvania Railroad, bids on which were lower than had ruled for several years.

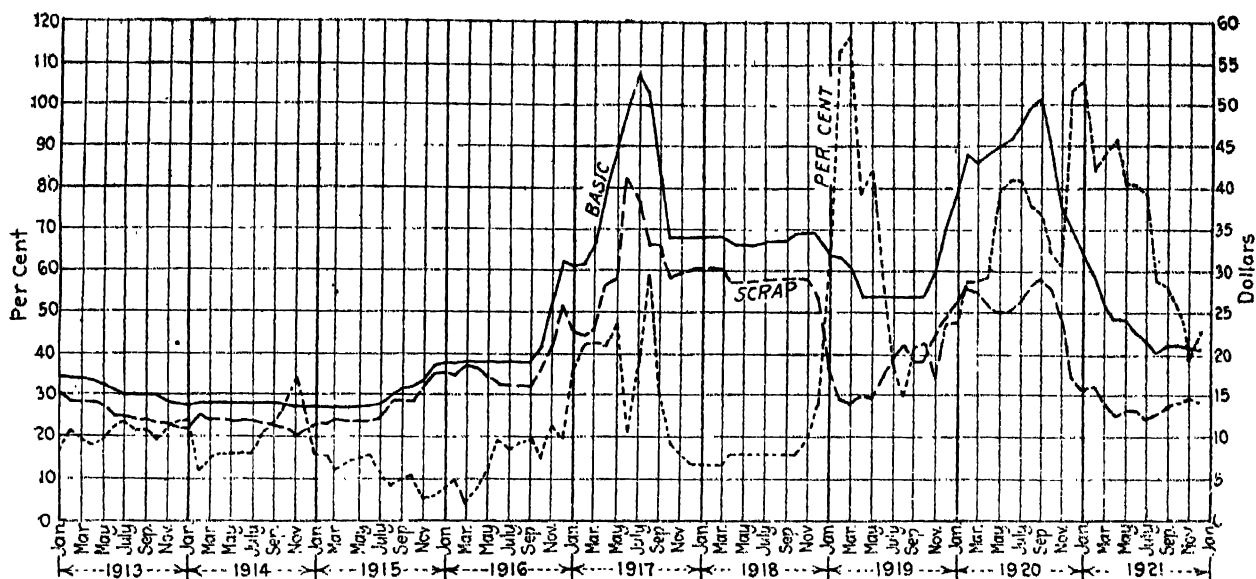
Very Little Difference

When there was only a 3.79c per cent difference between prices of basic and heavy melting steel in March, 1916, pig iron prices averaged \$19.15 for the month and scrap, \$18.45. Again, conditions were unusual. There was a great abundance of iron. THE IRON AGE, for March 9 declared: "Production is now proceeding at the unprecedented rate of 39,500,000 tons a year." Next week it was stated: "There is thus far none of the tension in pig iron that has long been seen in the steel end, nor are there signs of famine conditions." For heavy melting steel, on the other hand, there were both an enormous demand and a great scarcity. In one week the United States Steel Corporation bought 100,000 tons of heavy melting steel for plants in the Chicago and Pittsburgh districts. According to THE IRON AGE report of March 9, "There are many evidences of difficulty of covering short sales, particularly heavy melting steel. For the present a real shortage of scrap exists, as distinguished from the not infrequent apparent shortages of the past." The United States steel

mills were busy during this period with orders for the foreign warring countries. According to THE IRON AGE, of March 2, "Steel prices are rushing up at a furious pace and in the past week conditions have grown more excited."

In July, 1917, instead of the great abundance of pig iron which prevailed in March, 1916, conditions were the reverse and pig iron touched the highest peak of the period, the month's average being \$53.45. We reported then: "Sales are light, not because of lack of inquiry, but because iron can't be had. Basic advanced in June over May \$7.26, the highest advance in one month in the whole history of the pig iron trade." Basic did not remain on its pedestal long, however,

freight rates from the principal producing centers of pig iron and scrap to the principal consuming centers. There are 80 hauls tabulated; in four of these the freight rates on iron and scrap are the same; in six, pig iron rates are higher; in the rest, or 70, scrap takes the higher rates. For instance, from Birmingham to Cincinnati, pig iron is favored to the extent of \$1.245 per ton, or 28 per cent from Chicago to Moline, the difference is 70c. per ton, or 85 per cent; from Cleveland to Toledo, pig iron is favored 42c. per ton or 17 per cent. At present it is impossible to move scrap any considerable distance because of the high freights. Theoretically, at least, scrap is therefor not in a position to compete so keenly with pig iron, which has lower rates.



The Solid Line Represents Prices of Basic Pig Iron. The broken line portrays heavy melting steel. The dotted line shows the percentage difference in price between basic and heavy melting steel. The solid and broken lines are governed by the dollar scale at the right; the dotted line, by the per cent scale at the left

because of railroad embargoes against shipment of American iron abroad, which turned iron, held up at the ports, into resale iron, bringing the market down \$3 a ton.

High Price for Heavy Melting

Heavy melting steel reached its high price one month previous, touching \$41 for the month's average. Quoting from THE IRON AGE of June 7, "The whole scrap market is very much excited, material of all kinds being scarce and dealers looking for higher prices. They point to the shortage of ore, the increase of open-hearth capacity by 3,000,000 tons in the past year without a corresponding increase in pig iron output." Next week it was stated, "It seems that steel scrap has finally come into its own." Later that month—"The supply of scrap of all kinds available for the market is short of meeting the demand and some dealers are holding scrap for higher prices."

When pig iron reached its low of \$13.40, average for the month of January, 1914, the steel industry was in a great depression. Some of the steel mills were starting to resume "after one of the longest and most extensive holiday shutdowns the industry has known." The "million-idle-men" exhibit had been paraded before Congress to call attention to the Government the serious conditions of unemployment.

Heavy melting steel's low mark was reached in the same year, but during November. THE IRON AGE reports said: "There is no inquiry for scrap from consumers and the only trade is between dealers. Operations among open-hearth steel plants have been on so low a basis for some months that the consumption of scrap has been more than cut in half." A later report stated that the mills using scrap were operating at from 35 to 40 per cent capacity.

Effect of High Freights

The use of scrap has been lessened because of freight rates, which are higher on old material than on pig iron. A scrap concern in Chicago has drawn up a chart of

Lack of competition, then, would tend to keep the prices of pig iron and scrap far apart. Perhaps that is one reason why, in December, 1921, there was still a 45.5 per cent difference.

As "history repeats itself," a study of the past should prove a guide to the future. Valuable lessons should be learned from the fluctuations of the past nine years.

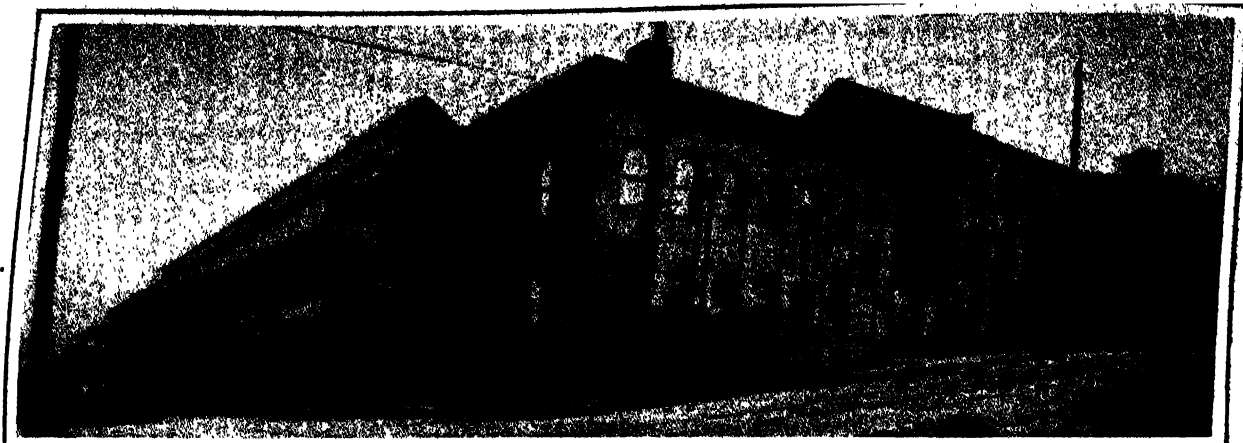
Election of Officers of Allied Machinery Co. of America

The directors of the Allied Machinery Co. of America at a meeting held in New York on Dec. 23 elected the following officers for the ensuing year: J. W. Hook, president; S. T. Henry, vice-president; E. M. Hartridge, vice-president, in charge of business in Europe; T. G. Nee, vice-president, in charge of business in the Orient; W. H. Gilbert, treasurer; Gordon C. Carson, secretary. The directors of the company are the following: J. W. Hook, M. C. Brush, John E. Gardin, T. W. Streeter, H. A. Arthur and Gordon H. Balch.

Purchasing Agents to Have Exposition

The National Association of Purchasing Agents, 1408 Kimball Building, Chicago, has completed plans for its seventh annual convention, May 15 to 20, 1922, at Rochester, N. Y., in conjunction with which there will be an exposition of products of all kinds which its members buy. The exhibit feature, which has been named the "Informashow," will take place at Exposition Park, Rochester, and a large number of exhibit spaces will be provided for manufacturers who desire to take advantage of this opportunity to display their goods before the purchasing agents.

Sheet metal contracting interests at Youngstown, Ohio, have established a course of training for apprentices, classes meeting regularly, in order to solve the problem of the dearth of skilled journeymen.



New Foundry for Casting Chilled Rolls

Raw Material Charged in Air Furnaces Direct from Stock
Pile at Garrison Foundry, Pittsburgh—Parent
Company Made Cannon Balls

BY GEORGE F. TEGAN

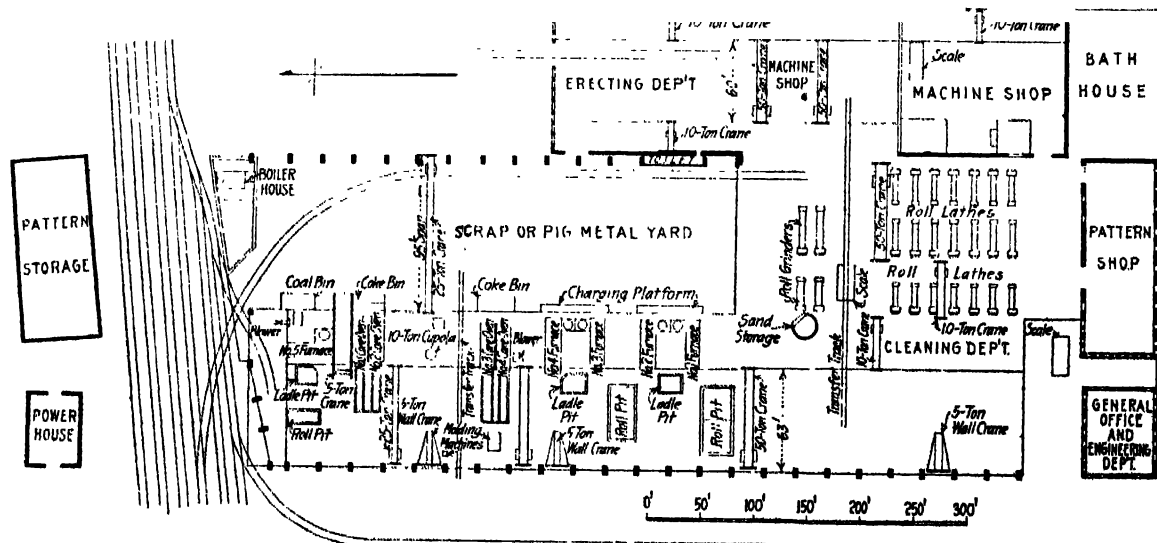
IT is a far cry from casting cannon balls for General Jackson at the Battle of New Orleans and for Commodore Perry in the Battle of Lake Erie in the War of 1812, to the building of rolling mills and the casting of rolls weighing 45 tons or more. In 1803 the company now bearing the name of the A. Garrison Foundry Co. came into existence and it has kept pace with the growth of Pittsburgh. It was the pioneer producer west of the Alleghenies of chilled iron rolls, but did not stop there; for in the development of the present day rolling mills, notably for rolling steel plates, the company played an important part. Hanging in the company's office is a photograph of a 3-high, 24-in. plate mill, which was exhibited and was awarded a grand prize at the Centennial Exposition in Philadelphia in 1876. This was more than 30 years after the company had cast its first chilled iron roll. So long has the company been making rolls and rolling mills that its name has become synonymous with those products. Keeping pace always with the demands for rolling equipment, not only for the finishing of steel but of all other metals which have to be rolled for further manufacture, the company today is equipped

to meet the most extreme demands with regard to size, whether they are for mills or rolls. This largely is so because of the completion of a new foundry, work on which has been in progress during the past year or more, which was erected without interruption to the operation of its old foundry, and over which the new one was built.

In the issue of October, 1885, of the *Magazine of Western History*, edited by William W. Williams and published in Cleveland, was a personal sketch of Abraham Garrison, from whom the company takes its name, which we quote:

"The first iron foundry in Pittsburgh, and probably the first west of the Allegheny Mountains, was built in 1803 by Joseph McClurg, Joseph Smith and John Gormley, and was called the Pittsburgh Foundry. It stood on the ground now occupied by the custom house and postoffice,* corner of Fifth Avenue and Smithfield Street, until 1852, when it was removed to its present location on the south side of the Monongahela River, embracing the squares bounded by Ninth and Tenth streets, Bingham Street and the river. On

*Now occupied by the Park Building.



(Above) The New Foundry Is at the Left. The office buildings are at the junction of the two streets; the building housing the pattern shops and pattern and lumber storage are at the right. Below is a plan of the new foundry

the shelves of its lofts are still to be seen patterns which recall the infinite variety of its former business, and the early history of western Pennsylvania. In 1812 were cast in this foundry the cannon balls which, on the outbreak of the war with England, were sent to New Orleans and used by General Jackson on the memorable eighth of January, 1815. Many of our Pittsburgh readers will remember hearing their parents tell of the time when a dozen wagons were seen waiting, at once, in front of the old foundry for the projectiles to become cool enough to be shipped to Commodore Perry on Lake Erie. After peace was declared, the molten metal was poured into ploughshares instead of cannon balls, and water pipe, hollow ware, threshing machines, castings and stoves took the place of the instruments of war.

"The first chilled roll made west of the mountains, the manufacture of which was destined to become the great specialty of the Pittsburgh Foundry, was cast in 1825 at the Eagle foundry of Kingsland, Lightner &

Garrison, and from 1863 to 1865, Bollman, Garrison & Co. In 1864 Mr. Garrison bought Mr. Bollman's interest and the partnership of A. Garrison & Co. was formed Jan. 1, 1865."

The sketch credits Mr. Garrison with having begun, in 1842, to furnish the sheet brass mills of the Naugatuck Valley in Connecticut with chilled rolls, which prior to that time had been imported from England. In passing, it might be stated that today the company is particularly conspicuous as a maker of rolls for mills running on copper and other non-ferrous metals. Besides having helped to capture the home market for chilled rolls for American manufacturers, it is an exporter on a fairly extensive scale both of rolls and mills. Recent shipments of the company were of two 44-in. plate rolls, each weighing 80,000-lb., to Japan; a 34-in. x 100-in. 3-high plate mill and a 42-in. 3-high Universal plate mill to Italy.

When the health of Mr. Garrison failed in 1862, the company passed to the management of his son-in-



A Spur of Track of the Allegheny & South Side Railroad Runs into the Storage Yard. The crane is of 25-ton capacity, with a span of 95 ft. During the war it was necessary to use this yard for erecting mills for shipment to take the load off the machine shop

Co. As rolling mills began to be built in western Pennsylvania, the Pittsburgh Foundry was equipped to supply their machinery.

"The Pittsburgh Foundry can boast of fewer changes of ownership during the 82 years (to 1885) of its existence than most establishments of its age in the United States. Shortly after its erection Joseph McClurg bought out his partners, Smith and Gormley, and with his son, Alexander McClurg, conducted the business successfully till 1814. From 1814 to 1822, the foundry was owned and operated by McClurg and McKnight and then by Alexander McClurg & Co. till 1830, when the establishment was purchased by Kingsland, Lightner & Co., proprietors of the Jackson and Eagle foundries, the business of which was merged into that of the Pittsburgh Foundry. From 1831 to 1836, the firm was known as Kingsland, Lightner & Cuddy. In 1836, Abraham Garrison obtained an interest in the business, and in 1840 Mr. Garrison, who was a nephew of Kingsland, and H. L. Bollman, a nephew of Lightner, succeeded their uncles, and associating with them H. F. Bollman, carried on the business under the name of Bollmans & Garrison till 1851, when H. F. Bollman withdrew. From 1851 to 1863 the firm was Bollman &

law, J. H. Ricketson, who held the presidency until his death in 1900. His son, J. H. Ricketson, Jr., was then elevated to the presidency, and has been active head ever since, except during the period of the world war, when he served as a captain in the 315th United States Infantry in France. The other officers of the company are O. G. Ricketson, vice-president; J. R. Williams, treasurer and general manager, and G. W. Caulkett, secretary and assistant treasurer. The officers of the company also form the board of directors.

By the completion of its new foundry the company now possesses the facilities for taking care of demands for mills exceeding in size any now installed, and for rolls of larger diameter and wider face than are now operating. The capacity of the equipment of the old foundry was taxed to the limit in the casting of one roll 42 in. in diameter with a face of 152 in. In the new plant the company has arranged for a pit capacity of four rolls, 44 in. in diameter, also for rolls having a rolling surface up to 210 in. long. Dozens of small rolls can be poured daily.

The new structure, which replaces the one of brick erected in 1852, when the company moved from its original location to its present one, is of all steel con-



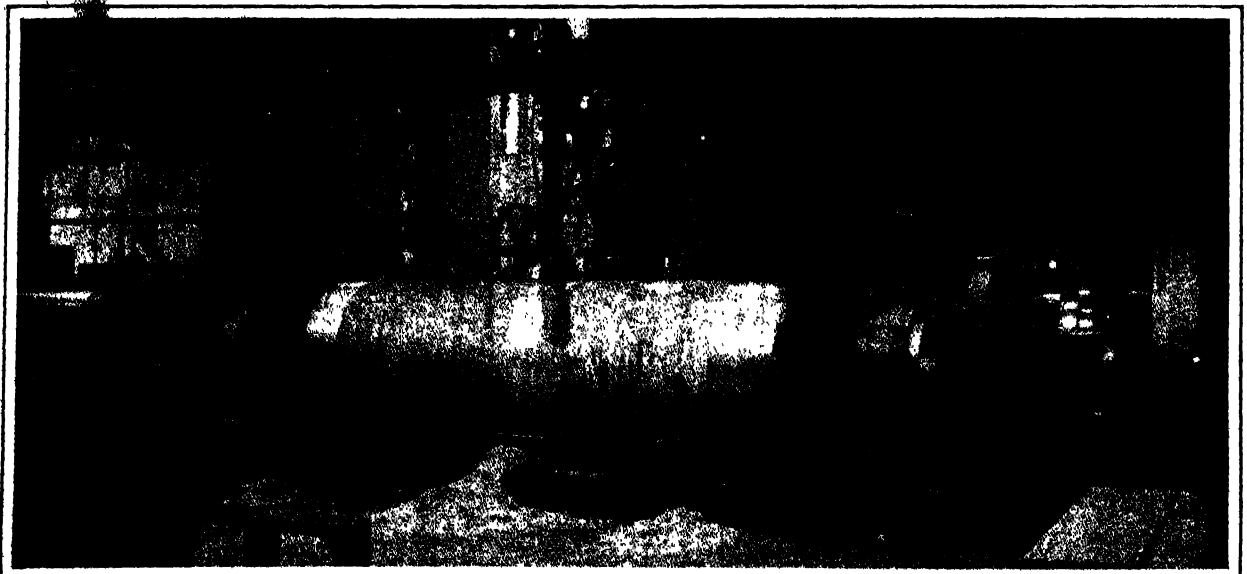
In the Background and at the Right of the Molding Floor Is a Cupola. The core ovens are in the center and at the left is No. 5 furnace and ladle

struction, with the exterior of asbestos-protected corrugated sheet steel. The roofs are Pond truss type with operating steel sashes, which assure perfect ventilation and ready egress of mold and furnace gases. These roofs are covered with a gypsum compound, which it is claimed keeps out the heat in summer and the cold in winter, and also obviates the need of painting, while repairs are seldom necessary. The building begins a short distance below Bingham street and extends down Ninth Street in the direction of the Monongahela River, 480 ft. to the tracks of the Allegheny & South Side Railroad, a connecting line with the Pennsylvania and the Pittsburgh & Lake Erie railroads. A spur of the Allegheny & South Side Railroad runs into the yard of the company, which thus has the service of the two trunk lines with which that road connects. The building comprises a main bay, 60 x 480 ft., and a leanto, 30 x 400 ft. The latter has an additional floor at an elevation of 25 ft. The foundry building thus has an effective area of over 40,000 sq. ft. The entire plant, with the foundry and shops, covers several acres. The impressive features of the building are the skillful utilization of this area and the practically perfect lighting achieved by the generous use of steel sashes on all sides, aided by the fact that the structure stands apart from other buildings, and consequently is free of light obstructions.

As will be observed from the accompanying layout

plan, the deep pits for casting long rolls are located conveniently near to the melting units and the pouring pits. These casting pits, which go below the level of the bed of the Monongahela River, are water tight. The smaller of these pits is 26 ft. deep and 30 ft. long and 15 ft. wide. The dimensions of the larger casting pit is 40 ft. long by 18 ft. wide. The upper end of the foundry floor is used as storage for chills and flasks. The leanto floor forms an alcove which affords storage space for refractories and other material which must be readily available, and surmounts the furnaces, cupolas and core ovens, which thus are installed off the main foundry floor. In the old foundry was a round casting pit, 15 ft. in diameter and 24 ft. deep, which is located in the leanto of the new plant. It was the first plan of the company to fill in this pit, but later it was decided to use it for a winter storage for sand, thereby keeping it dry.

The melting units already in operation consist of two 15-ton and one 25-ton coal-burning stoker-fired air furnaces and a cupola, with normal capacity of 15,000 lb. of metal per hr. but which, if forced, can produce 20,000 lb. Two more air furnaces are to be installed later, these being indicated in the layout plan as Nos. 1 and 2. Furnaces already in are Nos. 3, 4 and 5. Nos. 1 and 2 are paired, as are Nos. 3 and 4. No. 5 stands at the lower or river end of the building. Besides the feature of stoker-firing, in which the company



A 42-In. x 152-In. Chilled Iron Roll Is Here Being Turned in a Lathe



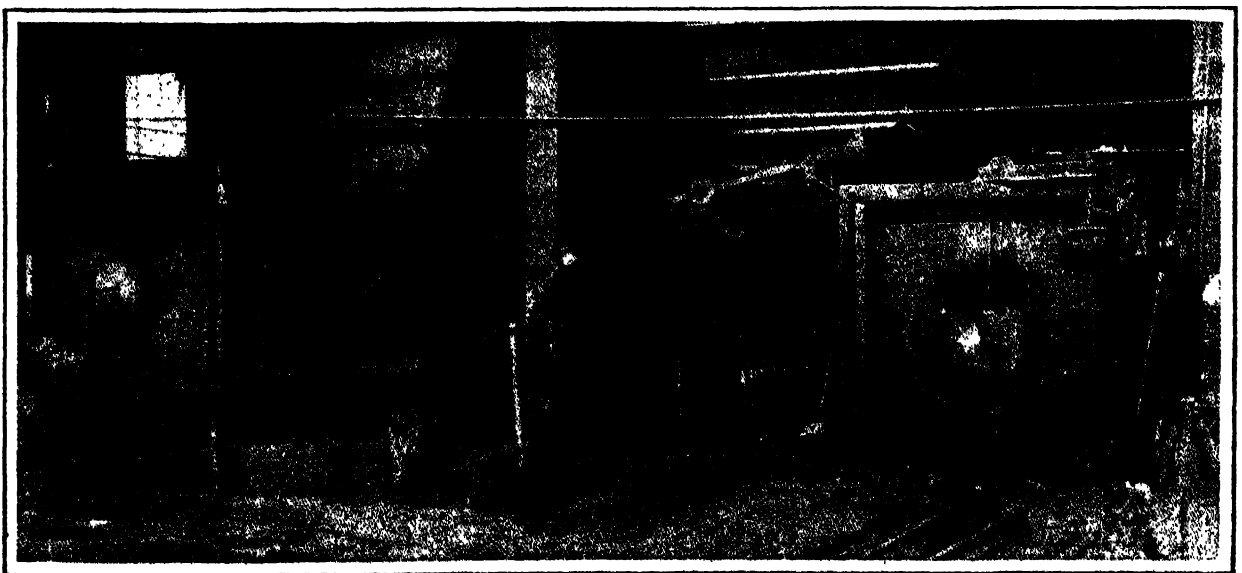
The Fine Smooth Surface, So Necessary in Rolls for Mills for Non-Ferrous Metals, Is Obtained in This Improved Grinder or Polisher. The new type of tool has a completely enclosed headstock

has been a pioneer and claims to have had a good success, is the charging arrangement. As the furnaces back up to the storage yard, pig iron and scrap are charged direct from the stock piles and the labor and handling costs thus are reduced to a minimum. The furnaces, pits and the foundry proper are served by two overhead electric traveling cranes, one of 50 ton capacity and the other of 25 tons, while for handling the flasks for the molders there are three 5-ton wall cranes. Another 50-ton main bay crane is to be installed. The molding floor covers an area of 25,000 sq. ft. An air-operated jarring machine is used to mold medium-sized flasks, while several small machines are used for small work. Compressed air is used for ramming the sand and for chipping. In the cutting off of risers, the company has experimented with gas and electric torches, but without success—at least not for cutting the surplus metal from roll castings, which can be removed only by heavy roll lathes.

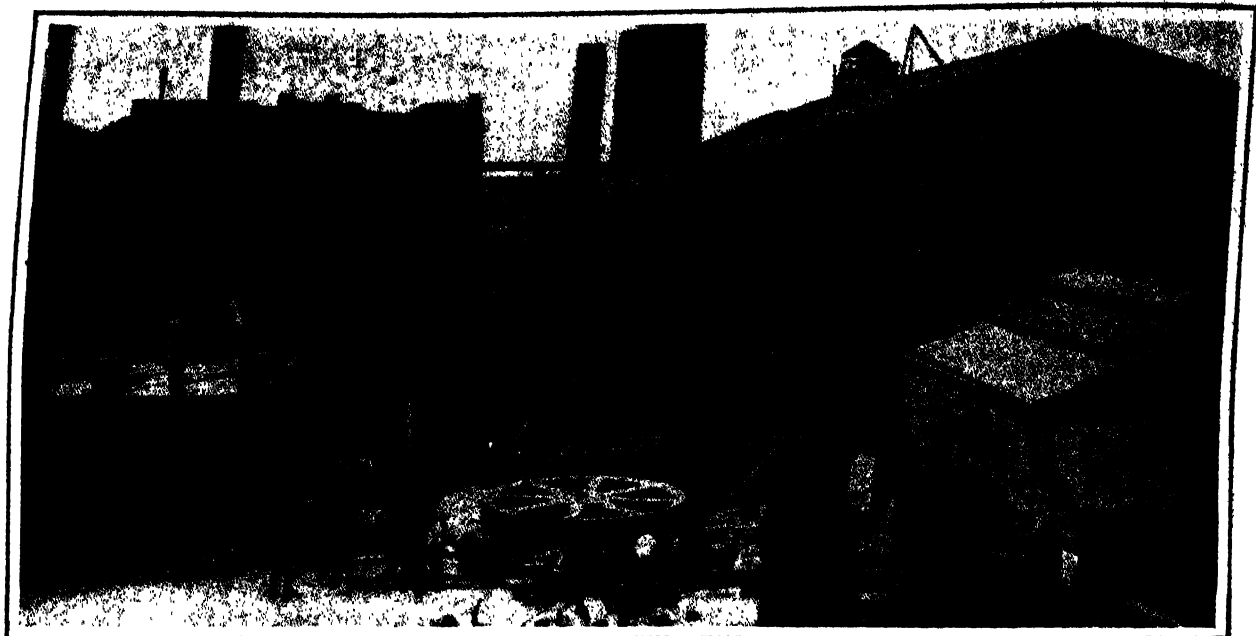
A mezzanine floor, independent of the leanto floor and below it at the lower end of the building, contains the motors and blowers for the cupola and air furnaces. This floor and the main one above are steel plate over a concrete base. A 24-ft. elevator at this end of the building, with an opening to the stock yard, lifts coke,

pig iron and scrap for charging into the cupola. It also serves a core room and core ovens on the main leanto floor. This floor is to be served by a monorail system running its entire length and to extend out to the storage yards, where the company is to construct a coal pocket, etc. Coal is to be conveyed in grab buckets from this storage to the air furnace hoppers opening on this floor. Aside from the coal handling, the monorail system will serve a multitude of purposes, among them being the conveying of coke and metal to the cupolas, the delivery of sand to the large storage pit and the transferring of patterns to the projecting platforms that extend into the main foundry building. The traveling cranes carry the patterns from these projecting platforms and place them on the molding floor.

The machine shop contains no equipment uncommon to a plant of this kind except a 42-in. milling machine with four heads, designed especially to mill bed plates for rolling mills. The machine shop is served by two overhead electric traveling cranes of 25 ton and 50 ton capacity, respectively. The entire plant is practically self-contained for, in addition to the foundry and machine shop mentioned above, the following adjuncts are in use: An extensive laboratory, a large pattern



All of the Air Furnaces Burn Coal and Are Stoker-Fired. Nos. 3 and 4 furnaces, respectively of 15-ton and 25-ton capacity per heat, are shown here. The large coal hoppers appear in the upper part of the picture



The Space Formerly Occupied by the Old Foundry and Stock Yard, Shown Here, Now Contains the New Foundry Building

shop, an immense roll turning and grinding shop, as well as consulting, engineering and designing departments. The thoroughly equipped departments have facilities for turning out mills and rolls from 8-in. in

diameter tin foil mills to 44-in. diameter steel plate mills. At one time there could be seen on the erecting floor separate mills for the rolling of aluminum, brass, copper, lead, steel and zinc.

Bad Year for Machinery Exports

But J. W. Hook of Allied Machinery Co. Says its 1921 Business Was 40 Per Cent of That Done in 1920

"EXPORT machinery trade is bad, but whether it is much worse than domestic machinery trade at present is doubtful," said J. W. Hook, president Allied Machinery Co. of America, to a representative of THE IRON AGE. "Our reports for November and December are not all in, but I believe I am safe in saying that my company, which sells only in foreign markets and confines its efforts to American machinery exclusively, booked about 40 per cent as much business in 1921 as in 1920. Japan and France yielded the greatest portion of this volume. Belgium, England and Italy dropped back the most.

"There are two great obstacles in the way of selling machinery abroad at present. Exchange depreciation is one of them and it affects almost the entire world except Japan. German competition is the other and it is beginning to affect seriously the European and South American markets. These obstacles, when coupled with the surplus and distressed stocks of machinery in all countries, and the low buying power of everybody because of the depression, offer a resistance to the sale of American machinery that is indeed formidable.

"I am so tired of reading and hearing about 'conditions' that I've about come to the conclusion that there are none. I have sold goods for the past 18 years and there have always been conditions and obstacles and difficulties and even impossibilities. The thing that counts is one's ability to succeed despite conditions, and this is what we must all steel ourselves to do.

"If German competition is demoralizing for the moment, let us remember that it cannot remain so always. One of these days, not so distressingly far off, their prices must advance and, provided we have held our markets in the meantime, we will give them a merry chase.

"As for the exchange problem, it would be hard to find a more perfect way to show the people of the world the need for more production than by depreciated exchanges. Production is the only natural way to correct

exchanges, and production means a demand for machinery as well as for every other essential.

"The thing to do now is to protect our markets by getting a share of the foreign machinery orders even though it may cost us some money to do it. We certainly can afford to spend or lose more money than Germany, and some day those markets across the water will be indispensable to us. I have supreme faith in our foreign markets. I believe the world will demand an increasing amount of the goods we produce. I think this applies particularly to machinery, which is the converter that takes raw and worthless material and transforms it into useful and necessary merchandise. This thought alone is enough for anyone except the most confirmed skeptic. Suppose we forget about conditions and go after orders."

New England Iron League Dinner

Approximately 70 persons attended the 1921 annual dinner of the New England Iron League, which was held Thursday evening, Dec. 29, at the Boston Athletic Association. It was one of the most entertaining annual affairs ever before held by the league. Credit is due Charles H. Carter, Midvale-Cambria Co., chairman; Harold L. Stevens, Lackawanna Steel Co.; and John G. Andrews, president Boston Bridge Works, who constituted the dinner and entertainment committee.

Among those who sat at table with R. B. Wallace, Bethlehem Steel Co., dictator of the league, were M. Congdon, Congdon & Carpenter Co., Providence, R. I.; H. W. Hayes, Midvale-Cambria Co.; W. S. Locke, Carnegie Steel Co.; and E. P. Sanderson, E. P. Sanderson Co., Cambridge, Mass.

No speechmaking followed the dinner, that part of the evening being reserved for vaudeville entertainment and moving pictures.

Production and Yield of Rolling Mills

Their Present State of Development—Some Useful Operating Data—Losses Which Should Be Lessened
—European Practice Leads in Yield

BY JOSEPH F. SHADGEN*

THE acute reaction and severe setback now affecting the whole business world have brought into the limelight the overshadowing importance of low cost of production in every branch of industry. Sudden or progressive reductions of selling prices, constantly shrinking margins of profit, have forcibly drawn the attention of all interested to the various factors that make up the cost of production. Economy has become the watchword in every enterprise, and efficiency the remedy, for salvation.

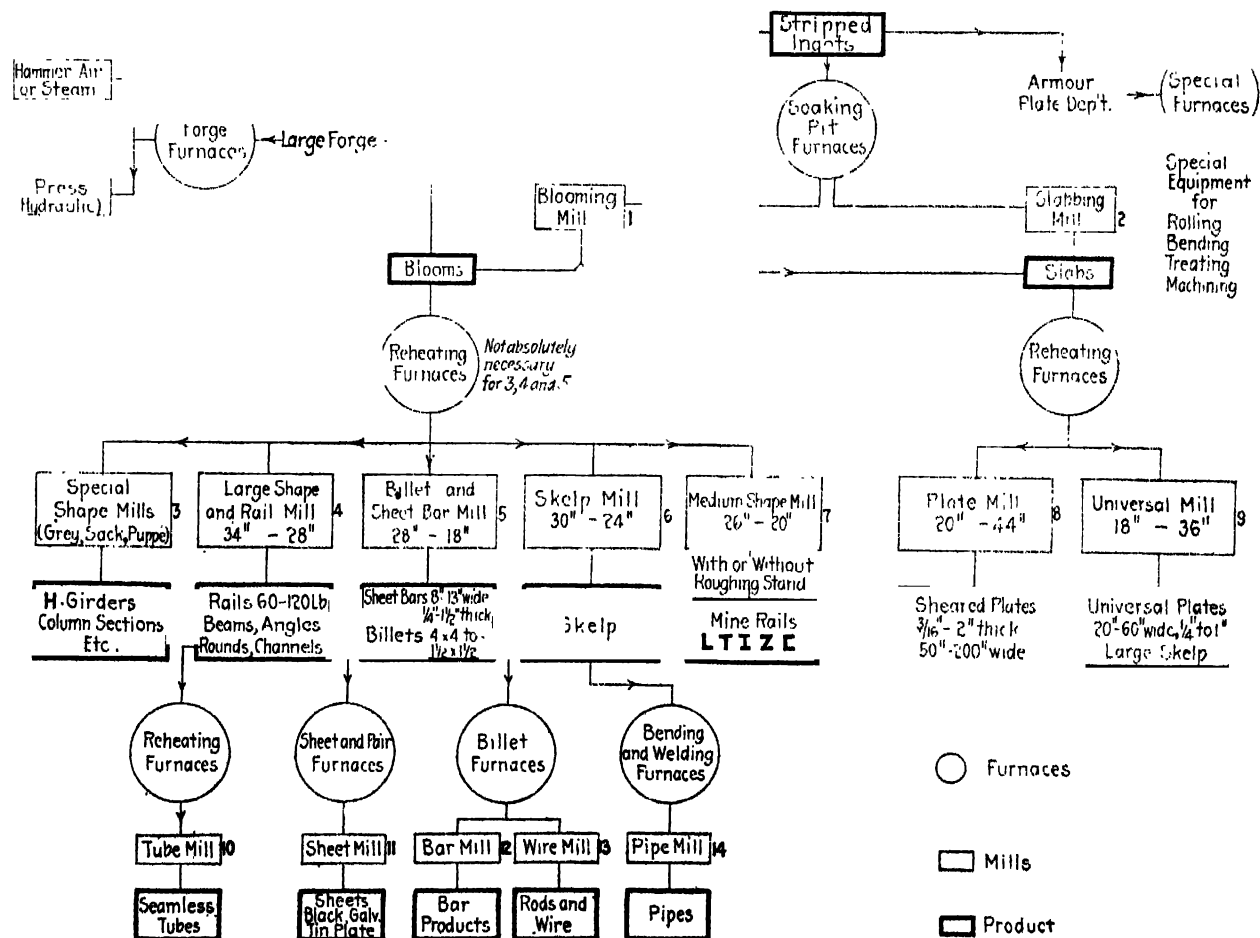
The iron and steel industry did not escape this universal readjustment, and had to carry a heavy burden during the shifting of economic conditions. Yet it is remarkable to notice the complete absence of discussion, even of reference, in the trade press, to the actual difficulties confronting the managers of the various plants. While selling prices are mentioned everywhere, the problem of production costs is rarely mentioned, although the close relation that links the two is obvious. No industry can neglect the one without detriment to the other.

In the light of present experience, the extravagance of recent years is bitterly paid for by many enterprises not prepared for the unprecedented slump in production. A detailed study of the cost of produc-

tion seems therefore most timely in order to show the relative values of the various component factors, and to enable the individual operator to compare his results with the general averages obtained elsewhere. These lines, in attempting to present these results from the modern rolling mill, represent an effort to fill a long-felt gap in technical literature. Far from being didactic, the analysis presented should form the basis of a discussion for the common good of the entire industry. Criticism therefore will be welcome as a co-operative reaction of the reader's mind. The author's attitude is clearly reflected by the French proverb: "Du choc des idées jaillit la lumière."†

While the practical application of the rolling mill process is the outgrowth of a century of experience, standardization is the main feature of the art today. The period of development may be considered past, and no startling novelties are to be expected. But we have ahead of us a period of crystallization characterized by the study of details, of problems of which the proper sequence of grooving of the rolls is the most important.

Starting from the ingots cast in the steel plant, the sections are progressively reduced on various rolling mills built especially for each purpose, and equipped with accessories that permit quick handling in large tonnages. The accompanying chart is a flow sheet of the modern rolling mill, showing the accepted spe-



Flow Sheet Showing Progress of Steel from the Ingot to Final Product

cialization of the industry of today. Recent descriptions of modern installations are familiar to the readers of *THE IRON AGE*, which can be usefully consulted in conjunction with this study. Special reference is made to:

Plate and Structural Mills at Fairfield, Ala., Jan. 2, 1919, page 47.

Steel Plant and Rolling Mills of the Weirton Steel Co., March 10, 1921, page 619; March 17, page 693.

Steel Plant and Rolling Equipment of the Inland Steel Co., July 10, 1919, page 91; July 17, page 155.

Brier Hill Steel Co.'s Plate Mill, Dec. 19, 1918, page 1521.

Mark Mfg. Co., Universal Plate Mill, July 11, 1918, page 65.

Flexibility of Output Assured in Scullin Mills, March 31, 1921, page 829.

Re-rolling Rails at Sweets Steel Co., May 12, 1921, page 1227.

Future of To-day's Developments

The practically universal application of electricity as motive power for cranes and the majority of auxiliaries, and for lighting, places its economic superiority beyond the shadow of doubt. For main mill drives, opinions vary between reciprocating steam engines and electric motors, with a decided leaning toward the electric medium. Generalities on this detail problem are not only futile but deceptive; individual study of local conditions, only can do justice to the problem. Technical literature is full of the controversy of motor versus steam engine, and there is still keen competition between these two prime movers. But it is precisely this struggle for supremacy which is responsible for the great progress and improvements realized in the last fifteen years. Electricity has won in most fields, but has found in the steam engine (especially of the uniflow type) a stubborn competitor, able to hold its own under certain circumstances, and we are not yet at the end of the story.

Blooming mills built as large reversing units are of especial interest. Of the new installations built lately in America, Weirton (1920) remains practically the only, but decided, partisan of the steam engine drive; not forgetting the large plate mill of Lukens (1917) and the Grey mill drives (1915) of Bethlehem. But electric motors in conjunction with motor-generator-flywheel sets were installed in Bethlehem, Sparrows Point, Inland, Mark Mfg. Co., Tata, Trumbull, etc., and some interesting replacements of old engines by motors, such as Lackawanna, Steelton and Atlanta, merit special notice.

The superior economic operation of the electric drive is an incontestable fact, but the high cost of first installation creates financial burdens that counteract, at least partly, this advantage. Progress lies in the direction of finding less costly electric devices, of equal efficiency. In Europe, steps have been taken in that direction, and the results will merit close watching.

For smaller drives, of the continuous-running type of rolling mill, electric motors prevail in the majority of new installations, although several large uniflow steam engines were installed in the Pittsburgh and Youngstown districts, on new mills or replacing old drives.

The second outstanding characteristic of the present day development is the increasing automaticity of all auxiliaries (largely made possible by the adaptability of individual motor drives) reducing the labor factor to a minimum. On all big mills manual skill is really superseded by mechanisms of marked dexterity. This tendency explains also the supremacy of the continuous mill principle, originated by Morgan, over the odd and ingenious solution of the billet and sheet bar mills of a decade ago. If the tonnage is large enough, there is today no doubt about their advantages; even in the European plants, where lower production tonnages

prevail, continuous roughing mills have gained favor, in combination installations, with two or three finishing trains.

Reversible Versus Continuous Running

Actual comparisons of costs of production showed the desirability of greater specialization of the blooming mill; this was done by narrowing the range of its finished product. While in 1900 a 20 sq. in. section was commonly rolled on reversing mills, in 1910 the standard bloom section averaged 35 sq. in., and today it has reached 60 sq. in. In other words, while in 1910, 4 x 4-in. billets were produced on blooming mills, today's experience teaches that the most economical bloom sections are 8 x 8 in. or 8 x 7 in., and all recent large installations have been laid out accordingly.

This means that the large mills of the reversible type have proved to be the most economical for roughing down ingots of short length, on account of the slow speed of rolling, quick gripping of the material and because of the elastic adaptability of the modern reversing drives to create, at will, conditions best suited for superior results. Modern blooming mills are therefore extremely powerful—for example, the Inland or Sparrows Point installations, which are fed by large ingots that are knocked down into blooms or slabs in tonnages over 50,000 monthly (600,000 tons per year).

Accumulated experience of modern reversing drives, adapted with great success to universal plate mills, has created new standards of operating economy and new records in quantity production. Further immediate developments in the plate mill field will be handicapped by the extraordinary expansion (rather overexpansion) caused by the war necessities and the shipping policy—conditions that will practically prevent new construction in that particular field for some years to come.

Cost of Production

While the factors entering into the cost of producing rolled shapes are known, and are similar in most plants, their relative values may vary considerably, according to geographic location and economic conditions. In last analysis, the experts have subdivided the cost into two items: (a) operating cost, (b) overhead expense. Operating costs are under the direct control of the plant management, and are made up of six factors: Fuel, power, material yield, labor, maintenance, miscellaneous.

Overhead expense is a general term familiar to accounting departments. It includes all financial burdens due to capital investment, insurance against obsolescence, interest on investment, sinking funds, etc. All these factors are specific to each company, and beyond the horizon of the operator of the plant. They are closely connected with taxation problems and questions of finance and market conditions, and they may be considered outside the scope of a technical discussion, although a greater uniformity as to their conception and application is highly desirable for the good of the industry as a whole.

To the practical operator, the tangible factors making up his various cost items are most important. Comparable figures between plants are easily obtainable, because they reflect material things specific to the rolling mill operation.

Operating Costs in Terms of Fuel

If rolling mills adjoin the steel plants, the ingots are usually rolled out hot without losing their initial heat. This is economically possible through modern soaking pits. These furnaces may be heated by an outside source to balance a possible deficiency of B. t. u., or simply consist in well-insulated holes that equalize the temperature balance of the freshly stripped ingots. Reheating furnaces are built for blooms, slabs,

billets and rods, and use fuel in the form of coal on grates or stokers, producer gas, oil, powdered coal, coke oven gas or natural gas.

To heat 100 lb. of iron or steel to 2300 deg. Fahr. rolling temperature, roughly 40,000 B. t. u. are required, equivalent to about 3 lb. of coal of 13,500 B. t. u. per lb., or 0.27 gal. of oil of 150,000 B. t. u. per gal., or 80 cu. ft. of coke oven gas of 500 B. t. u. per cu. ft. or 300 cu. ft. of producer gas at 135 B. t. u. per cu. ft.

Most of the soaking pits in America are of the heated regenerative type, and use either rich or lean gas. Under careful operation they should use not more than 2 to 3 lb. of coal per 100 lb. of steel heated, including the fuel needed during Sunday, when the furnaces have to be kept hot. The soaking time, varying with the ingot section, averages 1 to 2 hr. when hot ingots are fed, and 2 to 3 hr. when cold ingots are handled.

Reheating furnaces are built either in the form of regenerative side-door furnaces for slabs, large blooms, etc., or continuous heating furnaces (pushing type) for blooms and billets. Regenerative reheating furnaces have recorded 9 to 11 lb. of coal per 100 lb. of steel blooms or slabs, and modern continuous furnaces should easily better this performance, with proper flame control.

Billet furnaces built to reheat 1½-in. billets, 30 ft. long, for continuous mills, have averaged 5 to 6 lb. of coal per 100 lb. of steel, in spite of the transformation loss in the gas producer, and reached a production of 200 tons in 12 hr. Continuous annealing furnaces have been built to consume less than 7 lb. of coal per 100 lb. of steel, and have attained 6.25 lb. as a monthly average (producer gas fired).

Sheet mills, with their various reheating operations and annealing, should not require over 22 lb. of coal per 100 lb. of sheet bars, as some well managed plants have averaged 15 to 18 lb. over long periods. These figures can easily be bettered with proper care, and the application of recent progress in heating science and the present slump in production should be used for improvements in that respect, to stop the great waste of heat, and take advantage of the economies of modern devices. Here is the greatest field of endeavor for the alert operator to reduce his costs.

The achievements above quoted will certainly lead to some searching comparisons. With natural gas still greater economies are possible, but they have seldom been attained, as no refinements existed in the past era of low fuel cost; but the hard necessities of today will forcefully bring these problems into prominence.

Special attention should be drawn here to the importance of proper temperature of the steel to be rolled. The highest steel temperature compatible with the quality of the material should be used, as the classic investigation of Puppe has shown that 1 kilogrammeter displaces at 1300 deg. C., 90 ccm.; at 1200 deg., 45 ccm.; at 1100 deg., 30 ccm.; at 950 deg., only 20 ccm.; a reduction of 78 per cent in a 350 deg. drop of temperature.* The influence of proper heating appliances on power costs is therefore conclusively demonstrated, and it is unfortunate that these data have not received adequate attention and consistent application every day in the shop or mill.

The cost of fuel is not only the value of the coal consumed; it includes also the handling and transformation charges of the heat into the form of ultimate utilization, which usually involves labor, power and maintenance, as in the case of a producer house or a pulverization station. Besides that, gasification, including the loss of heat, brings a total charge of

60c. or \$1 per ton of coal, according to local conditions, while pulverization will be taken care of by a surplus of 30 to 70c. per ton, varying with the size of the plant. Modern oil installations are practically automatic in their operation, and necessitate very little overcharge, while the rich gases are delivered at such pressures that practically no additional cost is involved.

In large rolling mill installations, working a sequence of trains, the ingots may be rolled in one heat down to 1½ x 1½ in., or 8 x ¾ in., if continuous mills, are used in conjunction with the blooming mill, but it is not safe to figure on that performance. Shapes down to 3 or 4 sq. in. cross section (10 to 14 lb. per ft.) are also rolled in one heat, although it is customary to figure on reheating, intermediately, about one-third or one-fourth of the tonnage. Smaller shapes and bars are made from blooms or billets that are all reheated. In Europe the tendency is to standardize on 4 x 4 and 6 x 6 in. billets up to 6 ft. long, and reheating furnaces of the continuous type are commonly built for those sections. Figures for oxidation, covering various plants over years of operation, are given later.

Power Consumption in Rolling

The importance of the power cost cannot be overestimated; to give simple and comparable figures only electrical drives are considered, and only the number of kilowatt-hours per ton rolled are given, as it is impossible to go into specific details in a perspective study.

1.—Large blooming mill, with 36 to 40-in. pinion diameter, driven by 5000-hp. motors, under Ilgner system control, guaranteed to roll 45,000 to 60,000 tons of ingots monthly (24 x 24 in. of 9100 lb. and 28 x 39 in. of 18,000 lb.) to 8 to 12 elongations, average 10; and standard bloom 8 x 8 in.

Average main drive per ton of ingots.....	16 kw/hr.
All auxiliaries plus cranes plus shear.....	4 kw/hr.
Total per ton of ingots.....	20 kw/hr.

2.—Medium size blooming mill, with 30 to 35-in. pinion diameter, driven by 4000-hp. motors, Ilgner system, guaranteed to roll from 30,000 to 45,000 tons of ingots monthly (20 x 22 in. of 6800 lb. and 25 x 25 in. of 11,500 lb.) to 10 to 18 elongations, average 14, and standard bloom 6 x 6 in.

Average main drive per ton of ingots.....	20 kw/hr.
Auxiliaries.....	6 kw/hr.
Total per ton of ingots.....	26 kw/hr.

3.—Small blooming mill (roughing or billet mill) with 24 to 30-in. pinions, driven by 3000-hp. motors, Ilgner system, guaranteed to roll 20,000 to 30,000 tons of ingots or blooms per month (18 x 20 in. of 5500 lb. or 12 x 12 in.); elongations 12 to 25; average 20; standard output, 4 x 4 in.

Average main drive per ton of ingots.....	25 kw/hr.
Auxiliaries.....	8 kw/hr.
Total per ton of ingots.....	33 kw/hr.

4.—Large shape mill (continuous running, three-high type in America; reversing two-high type, in Europe), 30 to 60 tons per hr. according to layout; rolling rails, beams, etc., from blooms 8 x 8 in. to 12 x 12 in. or larger; roll diameter, 28 to 34 in.

Rails, average of mill, per ton of blooms.....	35 kw/hr.
Beams, shapes, etc., per ton.....	40 kw/hr.
Auxiliaries.....	8 kw/hr.
Total for rails.....	43 to 45 kw/hr.
Total for beams, etc.....	48 to 50 kw/hr.

5.—Large plate mill, 110 in. and upward, two-high or three-high, large tonnage, 15,000 tons or more per month, well equipped and with sufficient furnaces and large cooling beds.

Main drive, per ton of slabs.....	20 to 25 kw/hr.
Auxiliaries.....	15 to 20 kw/hr.
Total per ton of slabs.....	35 to 45 kw/hr.

6.—Small plate mill (either three-high or two-high

*An effort represented by 7¼ ft. lb., on steel at 2375 deg. Fahr., displaces 5.5 cu. in.; at 2200 deg. Fahr., 2.75 cu. in.; at 2015 deg. Fahr., 1.83 cu. in.; at 1750 deg. Fahr., only 1.23 cu. in.

universal), 12,000 to 20,000 tons per month; good auxiliaries.

Main drive, per ton of slabs.....	25 to 35 kwhr.
Auxiliaries	20 to 25 kwhr.

Total per ton of slabs..... 40 to 60 kwhr.

7.—Continuous Morgan mill 4 stands, 21 in. and 6 stands, 18 in.), 15,000 to 20,000 tons per month; one or two separate motors; taking 7 x 7-in. or 6 x 8-in. material and producing 1½ x 1½-in. billets or 8 x ¾-in. sheet bar.

Roll drive, per ton of blooms.....	20 to 22 kwhr.
Auxiliaries	2 to 4 kwhr.

Total per ton of blooms..... 22 to 26 kwhr.

8.—Billet mill or medium shape mill (rolls 18 in. to 24 in., one to four stands).

4 x 4 in. to 1½ x 1½ (10,000 tons monthly), per ton of blooms.....	26 kwhr.
4 x 4 in. or 7½ x 1½ in. to shapes (6000 tons monthly).....	55 kwhr.
10 x 10 in. to 4 x 4 in. (6000 tons monthly).....	38 kwhr.
7 x 6 in. to 7 x ¾ in. sheet bars.....	44 kwhr.
Auxiliaries	10 to 20 kwhr.

Total per ton of blooms..... 35 to 60 kwhr.

9. Bar and rod mills less than 18 in. in diameter:

(a) Belgian mill, 4 stands of 16-in. and 3 of 12-in., 1 drive, monthly average 6000 tons; maximum billet, 5 x 5 in.

Main drive	60 kwhr.
Auxiliaries	15 kwhr.

Total

(b) 10-in. continuous mill; 6 passes; 5000 tons monthly; 1½ x 1½ in. to 0.5 x 0.5 in. or 0.4 x 0.4 in.

Main drive	54 to 56 kwhr.
Auxiliaries	2 to 3 kwhr.

Total

(c) Rod mill, 10 passes continuous, 6 on Belgian stands; No. 5 rod; 5000 to 6000 tons per month.

Main drive	100 kwhr.
Auxiliaries	15 kwhr.

Total

(d) Bar mill, two continuous stands, three finishing trains; 5 x 5 in. to all kinds of finished sections; 5000 to 8000 tons per month.

Mill drives, per ton of billets.....	100 kwhr.
Auxiliaries	12 kwhr.

Total

Determined by tests:

180 to 67 sq. mm. (28 to 10½ sq. in.), per ton.....	23 kwhr.
67 to 20 sq. mm. (10½ to 3½ sq. in.).....	37 kwhr.
20 to 14 sq. mm. (3½ to 2.2 sq. in.).....	58 kwhr.

(e) Wire mill, continuous type all through; 1½ in. to No. 5 rods.

Mill drives, per ton.....	120 kwhr.
Auxiliaries	8 kwhr.

Total

10.—Sheet mills (24 to 30 in. diameter, 6 to 10 stands; 30 x 7 x ¾ in. to sheets of 0.01 to 0.09 in. in thickness).

Mill drives, per ton of sheet bars.....	105 to 125 kwhr.
Auxiliaries	10 to 12 kwhr.

Total

These data can be substantiated by numerous concrete figures in international technical literature. As a year's average, certain plants show an energy consumption of 175 kwhr. per ton of ingots in reducing from ingots to wire, and below 200 kwhr. per ton of finished product. The figures covered the tonnage rolled and not the amount of finished product, for reasons yet to be discussed.

The net power cost includes, of course, a further amount for labor, material, etc., but the power as represented by the electric energy makes up over 85 per cent, and usually 90 per cent, of the whole item, as shown by figures of numerous mills over years of operation.

(To be concluded)

CAR ORDERS AT LOW POINT

Total for 1921 Was 20,667—Locomotive Buying Also at Minimum

Figures compiled by the *Railway Age* show that additions to rolling stock represented in orders placed in 1921 were the smallest since these statistics began to be kept. Only 20,667 freight cars were ordered last year. The smallest previous number was in 1919, when it was 25,899. During the five-year period ending with 1917 the number of freight cars averaged 108,000 a year, or more than five times the 1921 number. Freight cars actually built for all railroads in the United States in 1921 were 40,354, the smallest number before this year being 60,955 in 1920.

In 1921 only 241 new locomotives were ordered for domestic service, the smallest previous number being 272 in 1919. The number of locomotives ordered in the five years ending with 1917 was considered small at the time, but it averaged about 2,400 a year, or ten times as much as the orders placed in 1921. Locomotives actually built in 1921 numbered 1,121, the smallest number built in any year since 1897.

During the year railroad mileage declined about 1,200 miles. About 475 miles of new track was built, the smallest known except in 1920, when it was 314 miles. Mileage abandoned during the twelve months was 1678 miles, the largest ever known. The net decrease of 1200 miles of track is the largest on record. In the five years between 1917 and 1921 more than 5700 miles of road have been abandoned, while only 3200 miles have been built, making a net decline in trackage in five years of 2500 miles.

Better Business Expected in Valley

Youngstown, Jan. 3.—While buying is inactive for the moment in the Mahoning Valley, makers generally are hopeful that the first quarter will develop considerable new tonnage in the aggregate. Business in January is expected to be somewhat sporadic, in the opinion of a leading sales executive, who looks, however, for some betterment commencing with Feb. 1. Improved buying is expected to be particularly felt in the lighter steel products, such as sheets, tinplate, plates, strips, bars and angles. Sustained demand for such products from the automobile industry is anticipated, in view of the fact that many warehouses in the Detroit district have largely depleted and unbalanced stocks.

Inquiries from larger jobbing interests are making their appearance, and buying from this source is expected to produce considerable tonnage during the next few months. Price unsettlements have acted as a retardant, but there is a more determined effort on the part of producers to stabilize the market. Efforts in this respect have been temporarily successful, at least, in the sheet market. Gross volume of sheet buying in the first quarter is likely to be less than during the last quarter of 1921, and it is unlikely that schedules in this branch of the industry will swing back to the 80 per cent mark reached last October, until in the spring. One of the leading interests, which has consistently maintained normal production in its sheet department, is now curtailing; another is operating its (preponderant) sheets capacity, in negligible volume.

Though basic pig iron was recently sold in the Valley at \$18.25, steelworks interests are endeavoring to establish a minimum market of \$19. Merchant furnaces are largely out of blast. Open-hearth sheet bars are stabilized at \$30. Valley makers are holding plate prices to a 1.50c minimum, but have been at a disadvantage with producers in Eastern territory owing to certain freight rate inequalities. Strip steel business is being accepted on the basis of 2c for hot strip and 3.75c for cold rolled. Tin plate is firmly maintained at \$4.75, for the time being, but a lower price on long-time contracts is not considered unlikely. The leading independent maker of wire products is quoting the new prices recently announced by the leading interests, of \$38 for wire rods, \$2.25 for plain wire per 100 lb. and \$2.50 for nails per base keg.

Steel Plant Installed for Sheet Mill

Mansfield Sheet & Tin Plate Company's New Steel Unit Provides Sheet Bars from Bottom-Poured Open-Hearth Ingots

BY CARL W. PEIRCE*

ABOUT seven years ago the old National Rolling Mills Co., at Mansfield, Ohio, was taken over by W. H. Davey and his seven brothers, all practical sheet mill men. The plant was remodeled, and in two months was engaged in the manufacture of steel sheets under the name of the Mansfield Sheet & Tin Plate Co. The old plant, which consisted of three hot mills, housed in a building 67x140 ft., had operated only for a few months.

From time to time, additions have been made to the old plant, so that to-day the building is 167 ft. wide by 940 ft. long, and houses seven tin mills with their accompanying equipment.

Early in 1917 ground was broken for a new sheet mill unit, which is located south of the old plant and on the other side of the Pennsylvania Railroad tracks, between the railroad and Bowman Street. This plant, mainly for the manufacture of high polished sheets, was designed and built under the supervision of Austin Davey, chief engineer of the company. The building, which houses twelve sheet mills with their pickling, annealing and cold roll departments, is 226 ft. wide by 1039 ft. long. This plant was put into operation in the fall of 1919.

On account of its inability to get a satisfactory delivery of sheet bars, the company in the fall of 1919 began to consider the advisability of building its own steel making unit. A piece of land lying between the Baltimore & Ohio and Pennsylvania railroads, and adjoining the company's property, was occupied by two hills which it was necessary to remove. This site was selected on account of its railroad connections and its proximity to the other two parts of the plant.

In March, 1920, the Fred R. Jones Construction Co. started to prepare the site for a steel unit large enough to produce what bars the sheet and tin mills would consume, and the work of designing the unit was begun. This work was done by F. A. Davey, chief engineer, with Frank I. Ellis, Pittsburgh, as consulting engineer.

Plans were drawn for an open-hearth department,

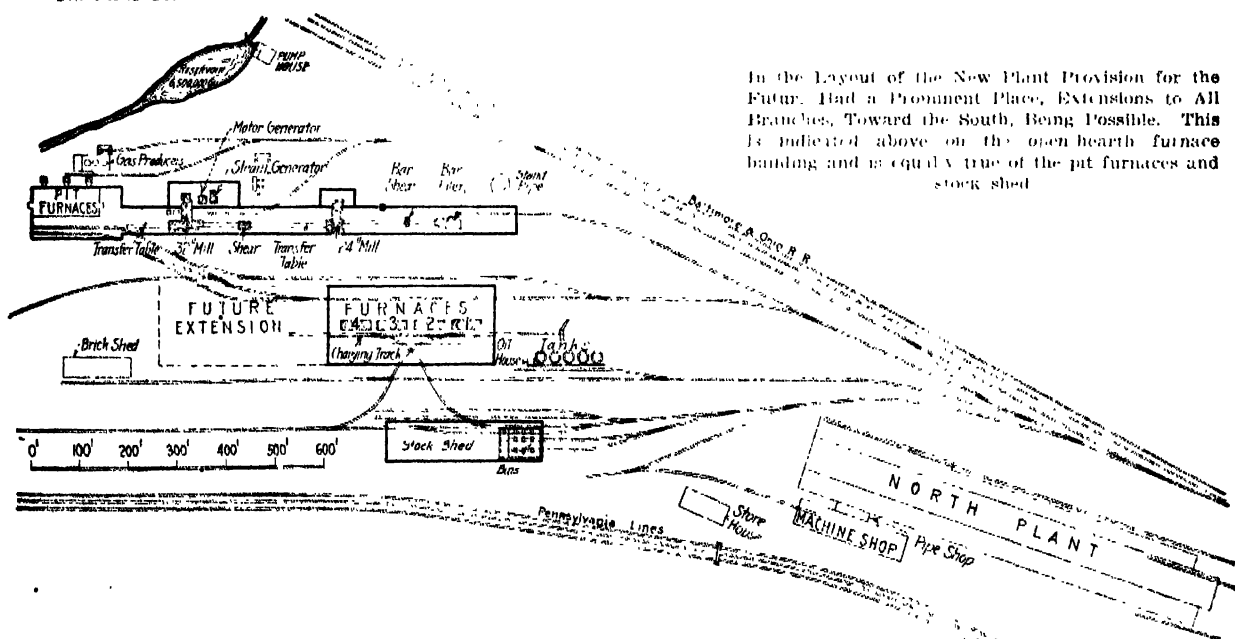
*Open-hearth superintendent, Mansfield (Ohio) Sheet & Tin Plate Co.

with four 80-ton furnaces and covered stock house, and a rolling mill department consisting of soaking pits, a 32-in. mill for breaking down the ingots and a 24-in. sheet bar mill. On account of the product of the mills being mainly highly polished sheets, it was held desirable that the steel should be poured by the bottom-case method, in order to guarantee a high grade sheet bar. The general layout plan shows the relation of the steel plant to the tin mills, and of the open-hearth and rolling mill units, indicating in dotted line the future furnace extension.

In view of the peculiar shape of the land, it was early decided to leave a part of the hill on the west side of the property, and to place the stock yard upon it, bringing it on a level with the open-hearth charging floor and parallel to that building. In making the crossovers from the stock yard to the open-hearth building, a new arrangement has been used. Instead of pulling out from the ends of the stock-yard and entering the charging floor at the ends, a double crossover track extends from each end of the stock yard and crosses to the opposite end of the charging floor, the crossovers connecting with the furnace track between furnaces Nos. 1 and 2 and between Nos. 3 and 4.

The advantage of this layout is that the stock yard engine is able to deliver a drag of loaded pans onto the furnace track over one crossover, and then to back down the floor and remove the empty pan cars to the stock house over the other crossover, performing the two functions by the one shift. By this arrangement, too, it is impossible to have a furnace blocked from charging because another furnace between it and the stockhouse inlet is being charged, as the second charge can come in over the other crossover.

The buildings, furnished by the McClintic-Marshall Co., are of strong, sturdy construction in keeping with the other equipment of the plant. In the stock yard building, which is 77 ft. wide by 300 ft. long, is a 20-ton crane for loading the charges. The first two bays at the south end of this building are occupied by large concrete bins for the storage of limestone, raw dolomite and iron ore. Two tracks run through the east side of the building. The one nearest the open-hearth build-



In the Layout of the New Plant Provision for the Future. Had a Prominent Place. Extensions to All Branches, Toward the South, Being Possible. This is indicated above on the open hearth furnace building and is equally true of the pit furnaces and stock shed.



Bar Mill Building from the East, with Soaking Pit and Gas House Buildings at Rear. In the center foreground may be seen the lower section of 300,000-gal. standpipe under erection

ing is used for loading the charging pans, and is on a level with the charging floor; the other track used for loading is 4 ft. lower. This arrangement brings the tops of the gondola cars of scrap and the charging pans on the same level. This latter track, being 4 ft. lower than the loading track, decreases by this amount the grade of the track leading from the mill level into the stockhouse.

On the brow of the hill outside the stockhouse, and between it and the open-hearth building, are two tracks, one being used as a storage track. The other, nearest the stockhouse, is a run-around track in going from one end of the stockhouse to the other. A 75-ton two-section scale, with self-indicating weightograph attachment furnished by the Buffalo Scale Co., and located on the loading track midway between the crossovers, will weigh all charges. A 150-ton, 4-section railroad track scale, furnished by the same company, is located in the yard between the north plant and the Baltimore & Ohio Railroad.

Charging pan and ingot cars, furnished by the Pittsburgh Steel Foundry Co., are of skeleton steel casting type, equipped with Hyatt roller bearings and with a patent coupling device designed by the foundry company. These cars, in addition to all mill cranes and run out tables, will be lubricated by the Adkins lubricating system.

Between the stock yard and open-hearth buildings, and just outside the valve cellar wall of the open-hearth, is a depressed track to allow for passage of cars under the crossover tracks leading from the stockhouse to the open-hearth department. Space has been left on the mill level between the depressed track and the stockhouse for a future installation of gas producers. The depressed track also permits the wheeling of dirt directly onto the cars, when the furnace regenerators are cleaned, or for the removal of ashes from the gas producers.

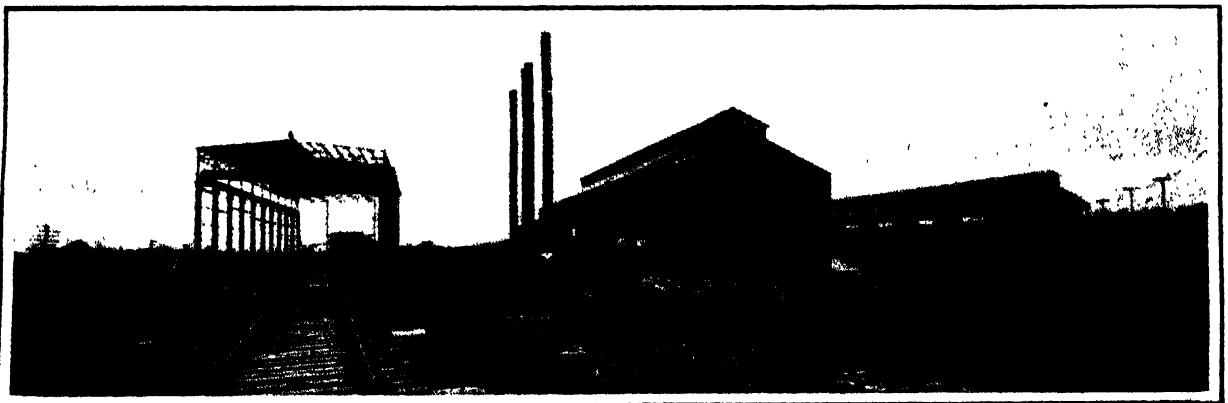
The open-hearth building, housing the four 80-ton furnaces, is 360 ft. long, with a pouring aisle 65 ft. wide and a 25-ft. leanto over the valve cellar. The charging floor, which is 16 ft. above mill level, has its furnace track 6 ft. 6 in. center from the front of the furnaces, permitting the passage of standard gage

cars over it. This arrangement permits the dumping of iron ore and limestone through the tail trestles at each end of the charging floor, and will permit the unloading of a car of brick at a furnace under repairs.

The 80-ton open-hearth furnaces, which are being built by S. R. Smythe & Co., Pittsburgh engineers and furnace builders, are at 80-ft. centers in the building. They are 65 ft. 3 in. long over the brick-work, having a hearth 15 ft. x 35 ft. x 5 ft. deep. They have been designed to burn either oil or natural gas as fuel. They will be started out on oil, five 100,000-gal. tanks having been provided for oil storage. Each furnace hearth is supported upon two piers 8 ft. 7½ in. x 17 ft. 7½ in. x 15 ft. 3¼ in. high, placed 19 ft. apart. These piers are made of 18 in. of wire-cut brick on the outside, and the center filled with concrete. On these piers are placed ten 20-in., 80-lb. beams with 12-in. cross channels, the channels forming the bottom of the pan upon which the hearth is built. The chills at the end of the hearth are made of plates and angles properly braced.

Buckstays supporting the hearth and roof are made of 15-in. beams and channels, the latter reinforced by 1-in. plates riveted to them. The front and back of the furnace pan between the buckstays is made of heavy iron castings properly ribbed. The door castings are designed with the front corner cut away, for the installation of a 4-in. water line to care for the waste water from the doors, this arrangement providing for a very short connection from the door to the telescope pipe.

Port-ends and regenerators are bound with 12-in. beams and channels properly reinforced. The furnace regenerators are 22 ft. 10½ in. long and 9 ft. high from the top of the rider walls to the square of the arch, the gas chambers being 7 ft. 1½ in. and the air chambers 12 ft. 10½ in. wide, with a 3-ft. wall between them. The flues leading from the regenerators to the valves are of the standard design for 36-in. gas and 42-in. air valves, of Blair Engineering Co. design, with which the furnaces are equipped. Waste heat boilers, of 500 h.p. each, built by the Erie City Iron Works, Erie, Pa., have been installed on furnaces Nos. 3 and 4, for utilizing the heat from the waste gases from



General View of New Plant from North, with Stock House at Left, Open-Hearth Building in Center and Bar Mill Building at Right. In foreground are five oil-storage tanks. The difference in level between the two as yet ungraded tracks in the stock house is apparent

the furnaces, 60-in. Blair valves making the connections between the furnaces, the boilers and the stacks. Mechanical draft for the boilers is furnished by 7 ft. 6 in. Sturtevant fans driven by steam turbines. The fans and turbines are located on the leanto floor adjoining the boilers.

Each furnace has five electrically operated charging doors of the Knox water-cooled type, the middle door opening being 48 in. wide x 45 in. high, the others being 42 in. x 42 in. The motors and drums controlling these doors are located on platforms underneath the charging floor, and just back of the regenerators.

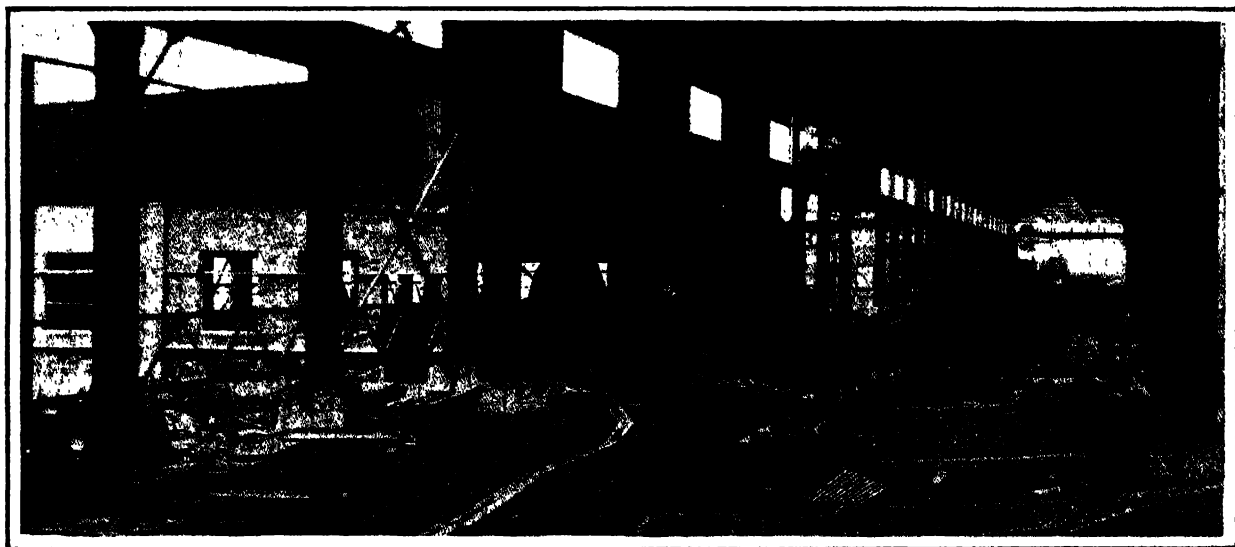
A 5-ton high type charging machine of Alliance Machine Co. make, with track span of 14 ft. 6 in., has been installed. This machine is designed with a 2-foot clearance between the charging rails and the lower framework of the machine. The furnace aisle has been designed for the future installation of an overhead crane.

The charging floor between the furnaces slopes gradually to the platform behind the furnaces, which is on a level with the tapping hole platforms. Six-ton electric jib-cranes furnished by the Pittsburgh Crane & Equipment Co. are at the back of each furnace, for

having a capacity of 165 cu. ft., and placed on the floor alongside the ladles. After the slag is sufficiently cooled for transportation, the box with its contents is placed on a specially designed side dump car large enough to hold one slag chunk, the box is then stripped from the chunk, leaving the slag on the car ready for transportation to the slag dump. The small dirt will be handled in 12-yd. side dump cars. A grinding house with heavy duty 9-ft. pan is on the mill level, and joins the pouring aisle at the south end.

At the south end of the pouring aisle and at a level with the top of the crane girders is a repair platform, arrangements having been made for the future installation of a mono-rail and crane for serving cranes in both the charging and pouring aisles. An escape platform has been provided for the ladle crane operators above the pouring platform, and on a level with the crane cab, extending the entire length of the building. This platform has a runway outside the building, with steps leading to the ground, to allow operators to escape in case of a bad spill.

From the pouring aisle, the ingots are taken to the soaking-pit building, which with the mill building lies to the east of the open-hearth department and



Looking into the Bar Mill Building from the Soaking Pits, with 32-in. Mill in Central Foreground and Motor House at the Left. Beyond the mill are the 8 x 8-in. Mesta shear and the 24-in. Slick sheet bar mill

the removal of the tapping spouts, which are of the V-shaped steel casting type.

On account of the steel being poured by the bottom cast method, the pouring aisle is traversed by only one track, which will serve alike for the removal of ingots to the pits, slag, dirt, skulls, etc. Two pouring platforms are provided along the building columns on the east side of the building, on the floor in front of which are placed the pouring plates. These plates are 8 ft. 4 in. square and designed to permit the pouring of twelve 14 x 15 in. ingots from one fountain. Five plates will be required to handle the output of each heat, the two pouring platforms being long enough to accommodate twenty-five pouring plates. Between the two platforms is a hydraulic stripper for pushing out sticking ingots. This stripper is equipped with a motor driven pump, making it a self-contained unit. The 90-ton ladles, with sloping bottoms and the nozzle at the lowest point, were made by the Treadwell Construction Co., Midland, Pa.

The pouring aisle has a 125-ton main hoist ladle crane with a 25-ton auxiliary trolley, and a 5-ton stiff-leg crane of the soaking-pit type, both of Alliance Machine Co. make. The stiff-leg crane was designed to be able to strip molds from the ingot, twist the latter from the bottom roots, and pile on the cars for delivery to the soaking-pits, in addition to setting the molds back on the pouring plates. This method of handling bottom-poured ingots guarantees their delivery to the soaking pits as quickly as though they were top-poured.

Overflow of slag from the ladles will be caught in large steel casting boxes of the truncated pyramid type,

runs parallel to it. A space of 100 ft. separates the open-hearth and mill buildings. The soaking pit building, which is 192 ft. long by 77 ft. wide, and with a 20-ft. leanto over the valve cellar, houses three pit furnaces of four holes 5 ft. 6 in. x 8 ft. each, built by the Smythe Co. The arrangement of the pit holes is opposite to that of the usual design, the twelve holes being in line with the length of the building, the covers being designed to back into the leanto building when open, so as to be out of the way of possible damage from the crane.

This arrangement also permits the use of a tunnel running under the line of the twelve pits, which is served by track, slag cars and boxes. Between pits are openings for the removal of the slag boxes by the crane. The pit covers are operated by a special design of shaft driven by motor, with a separate clutch for each cover. By this arrangement one motor will operate the four covers of each furnace.

These furnaces are designed to operate without regenerating the gas, no checkers being placed in the gas chambers and all outgoing ashes passing through the air regenerators. The furnaces are very strongly reinforced with three sections of 20-in. beams with 9-in. vertical channels. The bottom structure of the pit holes consists of 2-in. cast iron plates resting on 12-in. beams. The valves are of the ordinary butterfly type. The stacks are self-supporting, and are 4 ft. 6 in. in diameter and 120 ft. high.

At the east of the soaking pits and at the rear of the stacks is a gas producer building, housing three 10 ft. 6 in. stationary producers equipped with direct



Lower End of the Open-Hearth Building, from Stock House Scales, with Stacks of Nos. 3 and 4 Furnaces and Two Waste-Heat Boilers. One of the crossovers from stock house to open-hearth building appears in foreground between stacks, while the stacks of the soaking pit furnaces are at extreme left

drive Chapman agitators built by the Chapman Engineering Co., Mt. Vernon, Ohio, which will furnish gas for heating the ingots. Over each producer is a large steel coal hopper of 50-ton capacity, served by a 5-ton Northern crane and grab bucket. The coal is delivered to the gas producers over a trestle, from which it is dumped into a hopper, crushed and conveyed to a bin under the gas producer crane. The single roll crusher and belt conveyor were built by the Webster Co., Tiffin, Ohio. Between the soaking-pit stacks and the gas-house cellar is a depressed track, which permits the wheeling of ashes directly onto a side dump car.

In the soaking pit building and to the west of the pits are three tracks, the two on the outside for the delivery of ingots from the open-hearth building, and the one nearest the pits for the ingot chariot. This building is served by a 5-ton standard type soaking pit Alliance Machine Co. crane. From the pits the ingots are carried by a motor driven chariot, built by the United Engineering Foundry Co., and delivered on the approach table leading to the 32-in. mill, which is of the 3-high type, built by Wm. Tod & Co., Youngstown, Ohio.

The General Electric motor driving this mill is 2000-hp., 240-rpm., 2200-volt., a.c.; the power passing through a 20-ton flywheel, a 5 to 1 reduction gear built by the Morgan Construction Co., then through the pinion housing to the rolls. The hydraulic lift tables are operated by an Aldrich 600-lb. pressure pump and accumulator, the table on the entering side being served by a manipulator car with fingers for turning the ingots.

The 14 x 15 in. ingots will be reduced in eleven passes, the last an edging pass, to $2\frac{1}{2}$ x $7\frac{3}{4}$ in. bars, after which they pass to an 8 x 8 in. motor driven Mesta shear, from which the cut bars pass to a 24-in.

Slick patent sheet bar mill, made by the United Engineering & Foundry Co. The runout tables between these mills, the rolls of which are equipped with Hyatt roller bearings, were made by the Woodard Machine Co., Wooster, Ohio, and lubricated by the Adkins system.

The General Electric 24-in. mill motor is a 2500-hp., 240-rpm., 2200-volt. a.c.; the power passing through a 40-ton flywheel, then through the reduction gear and pinions to a 3-high stand, in which the bars make four passes, being carried from the lower to the upper passes by a series of chutes which form the basis of the Slick patent. From the final pass in the 3-high mill the bars are shoved over to the final pass in the 2-high stand by a hydraulic arm. Both stands of rolls in this mill are in line and run by the one motor.

The bars, after leaving the 24-in. mill, are conveyed by pinch rolls and chutes to a 1 x 8 in. shear made by the Cleveland Punch & Shear Co. and from there to a Kennedy bar piler made by the United Engineering & Foundry Co. Ample cooling beds occupy the space between the bar piler and the end of the building. The mill building, 850 ft. long x 55 ft. wide, is served by a 25-ton and a 10-ton crane of Alliance Machine Co. make. The output of the mill unit, which will consist mainly of a high grade sheet bar for the manufacture of highly polished sheets, will be approximately 10,000 tons of bars per month.

In the 32-in. mill motor room have been installed a 600-kw. General Electric motor generator set and a 400-kw. steam generator set, to insure sufficient power to operate all cranes, in case power should be shut off by the outside source of supply.

Control on all cranes has been furnished by the Electric Controller & Mfg. Co., Cleveland, the general control by the Westinghouse Co.; all small motors and main switchboard by the Westinghouse Electric & Mfg.



Kennedy Bar Piler and 1 x 8-In. Shear Are in Foreground in the Bar Mill Building, with 24-In. Slick Sheet Bar Mill Toward Rear

Co. The yard work is served by a 20-ton, 50-ft. boom McMyler crane and a 40-ton saddle tank American locomotive.

In the general layout of the plant, attention has been given to sewers, water and power conditions. A 36-in. reinforced concrete sewer, into which empty two 24-in. sewers from the open-hearth building and mills, and running west from the creek across the north end of the future extension of the open-hearth building, will care for all waste water. A concrete dam with two 4-ft. flood gates has been placed in the creek near the Baltimore & Ohio tracks, and the creek widened above the dam to accommodate a water storage of 6,500,000 gal. In the pump house adjoining the dam are two 10-in. 2000-gal. per min. Manister centrifugal pumps, which pump the water through a 12-in. line to

a 300,000-gal. standpipe, located at the south end of the bar mill building. All water will be measured through a Venturi tube, giving an accurate estimate of the total water consumption.

In the designing of the plant, special attention was given to the elimination of hand labor by the substitution of machinery and labor saving devices. The location of the plant, too, is particularly well chosen, as it has railroad connections with three trunk line roads, the Pennsylvania, the Baltimore & Ohio and the Erie; and, as it is the only steel making unit in the district lying north of Columbus, and between Cleveland-Canton on the east, and Gary on the west, it has a marked advantage in freight rates on the steel scrap produced in this district. It is also close to its supply of pig iron, limestone and coal.

Practical Aspects of Electric Gray Iron

Advantages Over the Cupola—Actual Results from Heats Made Recently—Effect of Nickel and Chromium—Comparative Costs

BY C. H. VOM BAUR*

WHEN it is considered that it takes but very little oxygen in iron to make it weak or blowy and that this oxidation can be overcome by combining it with some of the carbon of the bath at a high temperature, we get a mental picture of what the electric furnace does to insure good iron regularly. As an indication of this phenomenon, iron of practically the same chemical composition, after being superheated in the electric and consequently deoxidized, often for only half an hour or less, shows increased transverse strength of from 2800 to 4800 lb. per sq. in.

More than 10 years ago Schoenawa mentioned briefly some of the possibilities of the electric furnace for gray iron. Some work was done in the next five years, notably at a small foundry in California where coke and pig iron are expensive and scrap and electricity are cheap. However, it was not until 1917, when a basic electric furnace was installed in a Cincinnati plant as described by Elliot two years later, that real interest was aroused among a few to install electric melting and refining furnaces with cupolas as preheating furnaces for the charge, or to install them alone where the electricity is cheap enough. Since then Dr. Moldenke's paper on electric gray iron has appeared, further discussion and tests have been made, as well as new installations. With each new installation the higher quality of the electric gray iron is being recognized. The lesser cost of this superior iron is one cause of the newer installations, irrespective perhaps of the higher quality.

Use of Borings and Turnings

In considering the lower cost of the electric gray iron, as mentioned later on, compared to cupola iron one feature stands out pre-eminently. This feature is also a determining factor of the lower cost of the electric iron. It is the fact that cast iron borings and steel turnings are used for the major part of the charge and no pig iron. Sometimes some cast scrap is used in the mixture of borings and turnings. It is the difference in the cost of the raw materials between the cupola alone and the electric furnace charge, that makes the first main difference in the final saving. Borings have so far really never been used to advantage in the cupola.

When these boring mixtures, with or without turnings and cast scrap, are preheated in a coal or coke fired furnace and then charged hot into the electric, the saving in favor of the electric is even greater. Electricity has to be very cheap indeed, in order to beat out this preheating, yet the preheating always has the advantage of producing a greater output and a greater tonnage for the capital invested. When the cupola duplexes with the electric, the older type can use the cheapest mixtures of all cast scrap, irrespective of the silicon, sulphur, manganese or carbon content. Phosphorus can be entirely absent, as it is not needed, the electric heat producing abundant fluidity. The other four elements can be altered to suit, the test samples taken during the progress of the heat showing what is necessary.

Advantage of Superheating

Further advantages making for the importance of this subject are that as electric iron can be superheated, no cold iron need be poured into pigs for there will not be any; consequently there will be a greater amount of castings shipped compared to the iron poured. Second, there is the deoxidation mentioned in the opening paragraph. Third, with the basic bottom, sulphur is reduced to 0.02 per cent with ease and to traces if desired. The interference of sulphur with the silicon action therefore has no more terrors for the foundrymen. Lastly any adjustments in the chemical composition can be made with ease before pouring.

Some Heats That Have Been Made

Numerous heats have been made recently of which very accurate results were kept. Some of the mixtures have been all No. 2 cast scrap; some 50 per cent cast, 25 per cent borings and 25 per cent turnings. When steel scrap is added, depending on the specifications to be met, different adjustments must be made, and the ease with which these are accomplished is one of the delights of the process. The carbon to be added, when in the form of coke is about three times the theoretical when charged with cold or preheated scrap in the beginning, where steel is part of the charge. It is better to have too much recarburizer than not enough, as it is more difficult to recarburize later on, (unless pig iron is added, which is not economical) than to lower the carbon which is often done by adding steel scrap. This also lowers the silicon somewhat and dis-

*Consulting, electrical engineer, 25 Church Street, New York.

turbs the graphitic carbon ratio, yet the desulphurization at the end of the heat will rectify this to a certain extent, the lower sulphur allowing a lower silicon to do its work in making a gray iron.

Any steel scrap addition also lowers the phosphorus and it can be increased by adding stove plate. As the basic bottom is preferable, in all campaigns made with it the sulphur is lowered with the heavy basic lime slag, fluor spar and coke breeze, all added toward the end of the heat when the superheating takes place. If the carbon is too low, this can be raised by adding coke mixed with enough borings in the form of a brick to make it sink in the molten bath. Manganese usually is not too high but too low. After the bath is only partially melted test samples can be taken, poured into vertical flat bars, chilled on one side, the depth thereof showing the relation of the division of the carbon; after that, adjustments are made as desired.

Thus any chemical and physical changes can be made while the electric is in operation, and these corrections consummated with a degree of finality which is impossible in the cupola, and made at a trifling cost. Thus poor cupola metal can be superheated and refined in half an hour in the electric.

Effects of Nickel or Chromium

The effect of small amounts of nickel and chromium is interesting. The silicon will not do its work of throwing out the carbon, even when the silicon is nearly 2 per cent, with these two elements present in small amounts yet iron with as low a silicon as 1.30 per cent will more than do this when there is no nickel and chromium present. The resulting combined carbon may be as high as 1.25 per cent with the nickel and chromium present and the iron, though hard and extraordinarily strong, can yet be machined.

Scope and Future of Electric Gray Iron

The economical limitations of the electric melting and refining furnace in the iron foundry to-day are defined by the size of the output, not too small and not too large—the price of electricity, available scrap and some form of suitable recarburizer.

The output should not be smaller than 3 to 4 tons a day of 9 to 12 hr. The higher production is perhaps only limited by the size of the electric furnace. A company having a very large foundry, as in the case of some of the large automobile manufacturers, might possess a blast furnace having an output the same as the foundry, a mixer between the two, and the electric might be of 40 or even of 60 tons per heat. At present a 12-ton electric will give 100 tons in 24 hr., when melting cold cast scrap, and 50 per cent more when preheating the scrap. Electric power should not cost over 1.75c. per kw.-hr. Near some of the water power stations it can still be purchased for less than ½c. per kw.-hr. For raw material, the cheaper the borings, turnings and other cheap scrap compared to pig iron prices, the cheaper the process. Recarburizer costs from \$4 to \$12 per ton, depending on the material and the location.

Concretely, then, what does the process offer? Taking specific cases where electricity is 1.50c. per kw.-hr., turnings and borings \$5 per ton; cast scrap \$11; pig iron, \$24; coke, \$10, and an output of 20 tons of electric gray iron in 10 hr., the saving over the cupola, when melting cold scrap in the electric consisting of 75 per cent borings and the balance turnings, is \$10 per ton. When this same material is preheated, the saving is \$18 per ton. When melting a mixture of all cast scrap in the cupola and refining in the electric, the apparent saving when in the ladle may be only a dollar or two. However, the real saving with any of the foregoing electric processes is in having a greater percentage of merchantable gray iron castings go out of the shipping

room for the money expended, compared to any straight cupola castings. This greater ratio of good castings accomplishes another saving, as large as the direct saving mentioned. The so-called semi-steel can also be made in any of these electric processes.

More water powers are now being rapidly developed. Millions of tons of high sulphur scrap are yet to be remelted. Specifications for better and stronger gray irons are called for daily. The cupola alone cannot make the newer and higher class iron and it cannot operate cheaper than it does. Truly this is the age of the electric furnace.

Will Investigate Coal and Other Industries

WASHINGTON, Jan. 3.—As one of the results of the recommendations made by the President's Unemployment Conference, Secretary of Commerce Hoover next week will name a special staff to conduct a survey of the bituminous coal situation. It will relate specifically to intermittency of production and employment as well as to questions of reduction of operating costs and prices, and probably will take five or six months before it is completed. The work is to be financed by funds raised from coal operators, but the cost is not expected to exceed \$6,000 or \$7,000. The services of engineering societies, superintendents of mines, mine operators and employers, and others, have been volunteered, and by reason of this co-operation the cost of making the survey will be kept at a minimum, and will make it possible to expedite the work.

The study to be made with regard to the soft coal industry is one of a number of others that will be instituted with regard to intermittent and cyclical employment based on recommendations of the Unemployment Conference. Machinery already has been set up which will enable the conduct of these studies and as pointed out by Secretary Edward Eyre Hunt of the conference, in a recent postscript to the report of the conference itself, public opinion, for the first time in American history, has been focused on unemployment, and municipal committees have been organized for the first time on a nation-wide scale to relieve the situation. Other results of the conference also were stated by Mr. Hunt, such as the unprecedented sale of municipal bonds for public works, the appropriation by Congress of funds for important public works, and the introduction by Senator Kenyon of the bill for long range planning public works.

Changes Proposed in Engineering Contracts

Six changes in engineering contracts are urged by the Engineering Association of Nashville. The association has sent a copy of the proposed changes to the American Engineering Council of the Federated American Engineering Societies, of which it is a member, and to the Association of General Contractors to be considered by them in the drafting of a general uniform engineering condition to a contract. The Nashville recommendation is that the general provisions to a contract should include clauses on the following subjects:

1. A satisfactory arbitration clause should be adopted and should be legally binding on both parties.
2. A definite policy of inspection should be adopted and if two or more separate interests are concerned in payments for work, one authority shall act for all.
3. The contract should specify results, or the method to be followed, but not both.
4. The time of acceptance should be as early and period of maintenance as short as practicable.
5. The contractor should not be held responsible for contingencies beyond his control, and contingencies should be defined.
6. Reasonable limits should be placed upon the engineer's power to increase, or decrease the amount of work to be performed by the contractor.

The Connecticut Labor and Factory Inspection Department estimates the average weekly earnings of factory workers decreased 15 to 20 per cent in 1921.

Lowest Output in Relation to Capacity

(Continued from page 3)

of which 332,375 tons were shipped, as compared with 245,133 tons; and steel sheets, of which shipments were 159,069 tons, as compared with 151,513 tons in 1920.

Japan was a very heavy buyer in certain lines. This was particularly true of steel sheets, Japanese purchases of 97,710 tons representing 62 per cent of our entire sheet exports. In rails Japan took 32,589 tons, which is far more than any other country. One explanation of the great quantities of steel sheets taken by Japan is that they are used extensively for roofing, for billboards and for the making of toys and small household utensils. Considerable tonnages also are going to galvanizing plants in Japan.

The table below shows how export shipments of products which are stated in the statistics in tons compared with previous years:

Exports of Iron and Steel, Gross Tons				
	1918	1919	1920	1921
January	495,345	360,456	333,601	547,394
February	440,532	234,793	308,185	393,328
March	382,195	344,506	417,216	230,635
April	465,865	408,204	395,120	162,592
May	493,241	447,050	420,359	142,551
June	421,963	544,580	402,707	119,081
July	457,233	287,823	458,866	86,523
August	511,858	396,743	431,484	75,827
September	478,066	363,505	409,200	95,169
October	388,777	302,466	452,016	106,582
November	448,716	295,045	434,297	122,290
December	357,703	254,676	498,765	.....
	5,836,494	4,239,837	4,961,815	2,195,000*

*Estimated.

Wage Reductions

In striking contrast with the preceding year, 1921 was not marked by any serious labor troubles, although numerous threats were made, including that of a general railroad strike to be called on Nov. 1. There were many reductions in wages at iron and steel works. As the year came in, cuts of 20 to 25 per cent went into effect at independent steel mills. The Steel Corporation made its first wage reduction on May 16, amounting to 20 per cent. This reduced common labor from \$5.06 to \$4.05 per day. Salaries were reduced also. Up to that time the Corporation had adhered to its schedule, announced Feb. 1, 1920, which recorded the ninth advance since Jan. 1, 1916. The Steel Corporation abolished overtime on July 16 and on Aug. 29 made another reduction, bringing the wage of common labor to \$3 per day. There was serious unemployment in steel works communities throughout the year. At some Eastern Pennsylvania plants the wages of common labor went as low as \$2 per 10-hour day, or to the level of 1915. At some Central Western works the rate for common labor declined to 25 cents per hour as against 30 cents at Steel Corporation plants.

An Unemployment Conference assembled in Washington through the efforts of President Harding and Secretary Hoover adopted various measures to improve the situation and succeeded to some extent.

Federal Trade Commission Cases

The Federal Trade Commission early in May, by a vote of three to two, issued a complaint in the now famous Pittsburgh price basing case, setting forth alleged violation of the Clayton anti-trust act. The Steel Corporation filed its answer about a month later and the Government attorneys have been busy since in studying the case, but it is not known when the hearing will be or when a decision may be expected. The complaint is directed against the Steel Corporation and its subsidiaries only, despite the fact that independent steel producers participated in the hearings and the arguments of the original case in 1919 and 1920.

Another matter before the Trade Commission attracted considerable attention—the charge made on

behalf of domestic producers that British makers of ferromanganese and their American agents had been dumping that product in this market. There were protracted hearings. The final decision was that the charge of dumping had not been sustained.

The Federal Trade Commission has taken a position of antagonism to many iron and steel companies in its efforts to compel all such companies to submit to it regular detailed reports of their costs. The demands of the Trade Commission for data and for the filling out of forms entirely different from those used in company business, involving in some cases an expense of thousands of dollars a year, are being contested vigorously and the case is now before the Supreme Court of the District of Columbia.

Consolidation Tendencies

The probability that a number of independent steel companies would be consolidated has been before the trade in the past year or more. The strain all producers were under in 1921 and the prospect that a condition of unprofitable operation would continue for some time have caused leaders in the industry to think seriously of various merger projects. Saving in overhead and the benefits of mass production through concentrating operations in a given line of product at a particular plant have been among the advantages considered. Just as the consolidations of the late eighteen-nineties and the early nineteen-hundreds came after the depression that began in 1893, so the present period of distress for iron and steel works is developing a tendency to concentration.

Seven companies are involved in the most important consolidation project now being worked on: Midvale Steel & Ordnance Co., Lackawanna Steel Co., Youngstown Sheet & Tube Co., Republic Iron & Steel Co., Inland Steel Co., Steel & Tube Co. of America, and Brier Hill Steel Co. Their combined steel ingot capacity is about 20 per cent of the country's total, while that of the Steel Corporation is 45 per cent.

A separate project involving the merger of the Youngstown Sheet & Tube Co., Inland Steel Co. and Steel & Tube Co. of America had been under negotiation before the seven-company merger was seriously taken up. More recently the three-company merger has seemed to have better prospects of consummation than the other. A number of smaller mergers are also talked of, and in the last 10 days of 1921 the American Rolling Mill Co. acquired the Ashland Iron & Mining Co., Ashland, Ky., with its two blast furnaces, six open-hearth furnaces, sheet mills and coal and timber lands.

Profits Disappear

The year was disastrous for producers of iron and steel in all lines. A statement submitted at Chicago in December at the hearing on Lake Superior iron ore rates before an examiner of the Interstate Commerce Commission, made the following showing of deficits in the first three quarters of the year: Republic Iron & Steel Co., \$2,177,472; Lackawanna Steel Co., \$2,182,687; Midvale Steel & Ordnance Co., \$3,933,731. The United States Steel Corporation showed net earnings of \$32,286,722 in the first quarter, against \$42,089,019 in the first quarter of 1920; \$21,892,016 in the second quarter, against \$43,155,705 in 1920, and \$18,918,058 in the third quarter, against \$48,051,540. The corporation paid its preferred and common dividends for all three quarters. After such payments it had a balance of \$2,816,905 in the first quarter and deficits of \$4,571,668 and \$6,965,504 in the next two quarters. The more favorable showing for the Steel

Corporation than for independent companies may be explained in part in the light of the \$95,000,000 fund it set aside from surplus "to absorb any sudden and

violent diminution in inventory valuations." Charges and allowances for depreciation have been considerably less than in times of good earnings.

Poorest Iron Ore Production in Many Years

Reduced Mining Operations and Ore Shipments—Agitation Concerning Rail Rates Continues

WITH the movement of iron ore from the mines reduced in greater proportion than the consumption, 1921 was the poorest ore year in 17 years. Lake shipments were only 22,300,726 gross tons as compared with 21,226,591 tons in 1904. Compared with these figures is the record year of 1916, when the movement by water was 64,734,198 tons. The average shipments by water during the past ten years have been slightly over 50,000,000 tons.

With the reduced demand for ore, mining operations in the Lake Superior district were materially reduced early in the year and later many mines were shut down entirely. Many ore boats did not leave the docks during the season, the ore cargoes being insufficient to keep half the lake vessel capacity busy. As the iron and steel industry continued to go backward during the first half of the year, early estimates that ore shipments would reach 35,000,000 to 40,000,000 tons were scaled down.

Before the opening of the season of navigation, a number of consumers having long-time contracts advised shippers that they would be unable to take any ore during the year, for, with reduced consumption during the previous winter and early spring, they had carried over enough ore from the previous season to last them through 1921.

There were no reports of sales of Lake Superior ore in the East during the season and very little was taken by Eastern consumers on long-time contracts. Had conditions created a demand, the high freight rates would have shut out lake ore, as delivered prices on foreign ores were much lower. The shipping season got under way very late and with most shippers closed early, there being very little ore shipped after October.

Greatly Curtailed Shipments

Ore shipments were curtailed during the year to a greater extent than the reduction in consumption. As a result, the year 1922 starts with over 3,000,000 tons less ore on the lower lake docks and in furnace yards than on the same date a year ago. On Dec. 1 the amount of ore on docks and at furnace yards was 38,300,000 tons as compared with 41,500,000 tons on Dec. 1, 1920.

On May 1 last, stocks on docks and in furnace yards amounted to 31,500,000 tons, being over 10,000,000 tons greater than on the same date in any previous year. This large surplus was due to the slump in the iron and steel industry that started late in 1920. Figured on the rate of ore consumption in November, 2,188,000 tons, the balance on docks and in furnace yards on May 1 this year would be approximately 27,300,000 tons, or a reduction of over 4,000,000 tons from the amount carried over from May 1 last. However, there was an increase in the rate of consumption in December owing to the blowing in of additional furnaces. The probable balance on May 1 compares with a normal ore reserve at furnaces and at lower lake ports of 18,000,000 to 20,000,000 tons on that date.

Ore Market Lags

Owing to the condition of the iron and steel industry, no interest was taken in the ore market early in the year and ore prices were not fixed until June 16, or the latest in 30 years. The prices named represented a reduction of \$1 from the 1920 prices, but with a reduction of 30c. in the vessel rate on ore for last season, the mining companies took a net cut of only 70c. a ton. The new prices brought ore down to within 50c. a ton of the prices that prevailed in 1917, but mine oper-

ators claimed that this 50c. reduction was more than offset in advances in transportation costs and taxes over 1917. At any rate, with the light sales, few Lake Superior mines were operated at a profit during the year.

Railroad rates on iron ore was one of the most important matters to which shippers devoted their attention during the year and the only headway made in securing lower rates was a temporary reduction in the carrying charges on ore from both the lower lake ports and the seaboard, which was made by the Interstate Commerce Commission Oct. 20. This was a 28 per cent reduction and brought ore rates virtually back to where they were before the 40 per cent general freight advance Aug. 26, 1920. This reduction was ordered to remain in effect until Jan. 1. In December, the railroads agreed to extend the reduced rates to March 31, but the Interstate Commerce Commission refused to allow this extension of time. This was a victory for lake front furnace and steel interests, some of which had asked that the ore rates be restored Jan. 1, claiming that a reduction in ore rates, without a cut in rates on coal and coke, was a discrimination against them. No further change in rail rates on ore from lower lake ports is expected until the Interstate Commerce Commission makes a general rate reduction.

In connection with the demand for lower rail rates on ore, an application from consuming interests is pending for a reduction in dock handling charges. These charges were advanced 40 per cent shortly after the advance in rail rates, but with the temporary reduction in rail rates, a corresponding reduction in the dock charges was not made.

Lower Rail Rates Asked

While interior furnaces were striving for lower rail rates on ore from Lake Erie docks, the interest of the iron ore mining companies on rate matters was centered largely during the year in efforts to secure lower rail rates from the mines of the Lake Superior district to upper lake ports. In December, 1920, the mining companies belonging to the Lake Superior Iron Ore Association filed a complaint with the Interstate Commerce Commission against the rail rates on ore from the mines to the upper lake ports, charging that the successive rate advances made during the war had brought rates up to a point where they were unjust and unreasonable. With this action pending, the four Michigan and Wisconsin railroads, Feb. 25, 1921, made another advance in rail rates on ore from the old ranges, this advance being 15c. a ton on shipments to Ashland and Escanaba, and 10c. a ton on the rate to Marquette. Mining companies in the two States protested against these advances because the increased rates virtually wiped out the freight differentials that old range mines had previously enjoyed. An appeal was made to the Interstate Commerce Commission to suspend these new rates, but this being refused, the higher rates remained in effect during the shipping season. Later the mining companies consolidated their complaint against the Michigan and Wisconsin rate advances with their bill of complaint asking for a reduction of rail rates on ore from all the Lake Superior districts.

The action to bring down ore rates from the mines to upper lake ports dragged along during the year with the shippers anxious for an early hearing and the railroads apparently playing for a delay. After a postponement made at the request of the railroads, the first hearing finally took place in Chicago in July before an examiner of the Interstate Commerce Commission. The hearing was resumed in Chicago Dec. 7,

when leading representatives of the steel and iron ore interests appeared as witnesses and presented strong testimony in behalf of lower rates. If this case takes its regular course, a decision by the Interstate Commerce Commission cannot be expected until near the end of this year.

Miners' Wages Reduced

As in other branches of the iron and steel industry, miners' wages were reduced during the year. Successive advances had brought these wages to 171 per cent above the pre-war scale. Several leading independent

producers made a 15 per cent wage cut Feb. 1, following cuts by individual companies. The Oliver Iron Mining Co., operating the mines of the Steel Corporation, made a wage cut of 20 per cent May 16, and another cut of 10 per cent Aug. 1. Other wage reductions were made by independent mining companies during the year, and outside of the Steel Corporation mines uniform wage scales to a large extent disappeared. Near the end of the year, some mines resumed operations at further wage reductions, not that they needed to get out the ore, but solely to furnish work for their men who would otherwise have been idle.

Steel Companies Dominate Pig Iron Market

Surplus Bar Important Influence—Downward Tendency Almost Continues Throughout the Year

PIG iron production in the United States in 1921 showed a marked contrast with that of 1920. In 1920 blast furnaces were crowded at maximum capacity to meet the large demands, with a total output of 36,925,987 tons, a figure not far below the best results ever achieved in the greatest production years, whereas in 1921 demand for iron fell off so sharply that the year's total production only slightly exceeded 16,000,000 tons—the lowest mark since the depression of 1908.

Though the operation of steel company furnaces was in larger ratio to capacity than that of merchant furnaces, the decline in output among both classes of producers was a striking reflection of the drastic contraction in consumption of iron and steel in all divisions of the metal-working industry.

Steel company furnaces dominated the pig iron markets throughout the year. Many owners of merchant furnaces kept their stacks in idleness rather than engage in selling iron at prices which in the latter part of the year represented actual losses of several dollars per ton. Those merchant furnaces which remained in blast were constantly in competition with the steel companies on both steel-making and foundry grades. Forced liquidation of iron ore stocks by the steel companies placed iron on the market at constantly declining prices, which were only slightly checked beginning in September, weakness again developing late in the year with some further declines.

On basic iron the net loss during the twelve months is indicated by the January average of \$30, Valley furnace, as compared with the December average of \$18.62. Foundry iron in the Pittsburgh and other producing districts declined correspondingly.

High Freight Rates

Throughout 1921 the high freight rates greatly reduced the degree of competition between districts. As usual, Buffalo and eastern Pennsylvania furnaces competed actively in New England and other intermediate Eastern territory where freight rates to consuming points were about equal, but in most districts iron business was definitely localized. This, of course, particularly affected the Alabama and Virginia furnaces, which had always been obliged to seek a considerable part of their orders out of their own districts. Very little Alabama iron came north. The Virginia furnaces, with high producing costs and high freight rates, were so completely shut off that in the latter part of the year that iron producing district was entirely idle, not a single furnace remaining in blast.

Features of the Pittsburgh Market

The Pittsburgh pig iron market was headed downward almost constantly from the beginning to the end of 1921. An attempt was made about the middle of August to advance prices, and for about six or seven weeks there was sufficient demand to sustain a rally

from \$18 to \$19, and later to \$19.25 for basic and of about \$2 in foundry grades, which moved up from \$19, Valley furnace, for No. 2 (1.75 to 2.25 silicon) to \$21. Before Nov. 1 the market began to give way and December found prices only slightly above the low point of the year reached early in August, when basic touched \$18 and No. 2 foundry \$19 at Valley furnace. It was one of the worst years the pig iron makers in that district ever experienced as far as business was concerned, and while coke prices were fairly reasonable and even low compared with those of 1920, neither that nor the reduction of \$1 per ton in ore, a dip in limestone prices, nor the cut of 30c. per ton in the lake freight on ore, enabled producers to get costs down to a point where profit remained at the prices obtainable. High freight rates kept up costs for all makers, the common claim being that the assembling costs on the materials required for a ton of iron were from \$9.60 at Youngstown to about \$10.50 at points just outside Pittsburgh, though within the Pittsburgh district. The reduction in ore of \$1 per ton did not help much because most makers had a good deal of ore brought down in 1920, which had not been used up and as bearing on costs the ore had previously been written down about \$1 per ton. Moreover, purchases of ore were small because the need of supplies did not exist.

The cut in rail rates on ore came practically at the end of the lake shipping season and too much was down at furnaces to help iron makers.

The lot of the merchant producers was a hard one. They had to carry a lot of high priced iron made up against old orders, on which shipping instructions could not be obtained because the buyers were able to do better at other than their regular supply sources, while on the steel making grades and occasionally on foundry iron they were constantly in competition with the steel companies. A Youngstown steel maker made up at least one lot of 10,000 tons of foundry iron and the supposition is that this was not the only instance or that others did not do likewise to some extent. The steel companies made the iron market during much of the year. They were slower to curtail production than were the merchant producers, some being obliged to keep on furnaces to use up coke from by-product plants, which once started cannot be entirely stopped without serious impairment and consequential loss. Little merchant, as distinct from steel company, basic iron, figured in transactions during the year, the bulk of the iron coming from steel works' stacks.

In July the Carnegie Steel Co. went as low as 13 furnaces active out of 59, the lowest point ever touched by the company. Only one merchant furnace in the Pittsburgh district was in blast throughout the year, this being a stack of the American Manganese Mfg. Co., Dunbar, Pa., which was on foundry grade most of the time.

Steel Companies Also Dominated East

During most of 1921, the eastern Pennsylvania pig iron market was dominated by three steel companies, which, however, are regular producers of merchant iron.

The exclusively merchant operators kept their stacks idle during a considerable part of the year, but there was resumption at three or four merchant furnaces late in the year. The price tendency of steel-making and foundry iron was downward, beginning with the first week of January. Re-sale iron was freely offered during the first few months and to a certain extent dominated the market.

Steadily declining prices met with resistance on the part of producers on two or three occasions, even slight advances being put into effect, but these were short-lived. Whenever a fairly good tonnage was inquired for, the competition of producers for the business resulted in further concessions. The price decline halted in August, when \$18.50, furnace, was reached on No. 2 plain iron, this comparing with prices of \$30 to \$32 early in the year on the same grade. Buying became more active when the low price had been reached, the principal large consumers being the cast iron pipe companies, but later in the year the furnace and stove companies were fairly active buyers. The improvement in buying set in in August and was followed by a very good September. In the latter month, the active furnaces succeeded in selling enough iron to fill their order books for the remainder of the year. After the fourth quarter buying had subsided, the market lapsed into quiet again and this continued until inquiries for first quarter of 1921 made their appearance early in December. First quarter buying was in fairly good proportions, but the competition for business resulted in lower prices in late December, despite the expectation of some sellers that first quarter prices would be slightly higher than for the last quarter of 1921. One sale to a New England melter was made at \$19.30, eastern Pennsylvania furnace, for No. 2 plain, and though this was a special transaction that was not duplicated, the market settled to \$19.50 for No. 2 plain and 50c. or \$1 higher for No. 2X at the close of the year. One sale of No. 2 plain was made as low as \$18, furnace. Basic iron sold in December at \$19, furnace, a net decline in quoted prices of about \$14 within the year. Low phosphorus, malleable and gray forge grades were in small demand and prices remained nominal much of the time.

Pig Iron Demand in New England

During the summer months the consumption of pig iron by the New England foundries dropped to within striking distance of the vanishing point, but before the end of the third quarter improved business conditions set in. It is doubtful whether the average melt of the jobbing foundries since improvement in business started has exceeded 30 per cent, at best, of the 1920 average. The showing of New England as a whole probably would run near that figure because of the activities in the textile machinery, heating and stove industries. Makers of such equipment have consumed large pig iron tonnages. The year closed with textile machinery makers less active, the stove makers only fairly so, and the heater interests operating at capacity, while the jobbing foundries were operating indifferently.

Competition for business in New England among furnaces in these two districts has been unusually keen. On the almost steady decline in prices throughout 1921, eastern Pennsylvania furnaces at first were leaders in price cutting. Possibly this was largely due to the activity of the Eastern steel mills for pig iron business. The advent of a Buffalo steel company in the market brought a change in price cutting leadership. Even with a freight differential against them, the Buffalo furnaces by the end of November practically forced the eastern Pennsylvania furnaces to give up the fight for business in New England. The Buffalo furnaces accomplished this by disregarding silicon differentials. Central Pennsylvania furnace interests, entering the market late in the year, were obliged to meet Buffalo prices.

Cincinnati Market Extremely Quiet

The Cincinnati iron market, in common with that of other districts, was a quiet one during the whole of the year 1921. True, there were some spurts, but nothing that could be termed activity developed. Practically

all of the jobbing foundries, which cater principally to the machine-tool manufacturers, were closed for several months early in the year on account of a strike of molders, and when this was settled business had fallen away to such an extent that only about one heat a week, on an average, was being secured.

Prices of pig iron steadily declined throughout the year, Southern foundry having been quoted at an average of \$36.50, delivered, in January, and at \$22, delivered, in the last week of December. The same condition was true of Northern iron, the average quotation for January being \$33.77, while that for December was \$22.27. Silvery irons showed an even greater decline, the quotation for 8 per cent on Jan. 1 being \$52.52, delivered, while on Dec. 29 the quotation was \$30.02, delivered.

The output in the Ironton-Ashland district during the year was the smallest for many years. Practically all the furnaces in that district were down for the greater part of the year, and early in February there was only one furnace operating. For the first time in many years, during the month of March, pig iron production in that district ceased entirely, though one silvery furnace in the Jackson County district was in operation during the whole of the year. At the close of the year two furnaces were operating, one at Ironton making foundry iron, and one at Ashland on basic. The prospects for the year 1922 were brighter, as the Portsmouth stack was about ready to go in, and one of the Bessemer furnaces at Ironton was expected to blow.

Cleveland Iron Buying Small

With Ohio foundries operating at around 25 per cent of capacity or less, the demand on lake furnaces for pig iron was light throughout the year. Only two important industries appeared to keep up to near the normal consumption of pig iron, the radiator manufacturers and the makers of enameled iron sanitary ware. These bought iron in liberal quantities. There was virtually no demand from the large stove foundries in this territory. The demand from foundries engaged in automobile work was very light, as large quantities of motor castings were carried over from the year before. Pig iron buying during the year was almost wholly in small lots for early shipment.

At the start of the year there was a large amount of foundry iron carried over on old high priced 1920 contracts. Furnaces have worked this iron off slowly. Different plans have been followed in cleaning up these old contracts, but the more general plan has been for a furnace to ship a consumer one ton of iron at the current market price and another ton on his old contract carrying the high price. There is still a large tonnage of this high-priced iron on the furnace books. A disturbing feature of the market was the offering of considerable resale iron by foundries, either directly or through brokers, during the early part of the year at from \$1 to \$2 a ton below regular prices.

Prices steadily declined during the first seven months of the year. At the beginning of the year No. 2 foundry iron was quoted at \$34 lake furnace. By April it had got down, to \$25 and late in July to \$20. In August the market stiffened up 50c. to \$1 a ton, but it gradually slipped back to \$20 in October. In December the market was rather weak and some sales were made at \$19.50.

Chicago Pig Iron Market

The dullness of the Chicago pig iron market during 1921 was accentuated by the fact that the agricultural implement industry, ordinarily a large consumer in that territory, was practically idle the entire year. The railroads bought practically nothing until June. At that time, the St. Paul entered the market for iron for its Milwaukee foundry and continued to buy from month to month through the remainder of the year. Railroad equipment manufacturers like Griffin Wheel Co., American Steel Foundries, and others also became more active in the latter half of the year. Buying by

Iron and Steel Prices for Twenty-One Years

Monthly Averages Computed from the Weekly Market
Quotations of THE IRON AGE in the
Period of 1901-1921

IN this issue of THE IRON AGE are our two annual charts, in which lines are plotted to indicate the course of prices for pig iron, billets and leading forms of finished iron and steel and non-ferrous metals in the 21 years ended with 1921.

The diagrams are based on monthly averages of prices quoted week by week in our market reports from the leading selling centers. In the tables following are the monthly average prices on which the charts are based.

Bessemer Pig Iron at Pittsburgh, Dollars per Gross Ton (2240 lb.)

	1901	1902	1903	1904	1905	1906	1907	1908	1909	1910	1911	1912	1913	1914	1915	1916	1917	1918	1919	1920	1921
January	\$13.15	\$16.70	\$22.15	\$13.91	\$16.85	\$18.35	\$23.15	\$19.00	\$17.34	\$19.90	\$15.90	\$15.05	\$18.15	\$14.95	\$14.59	\$21.53	\$35.05	\$37.25	\$33.60	\$40.00	\$33.95
February	14.43	16.93	21.45	13.66	16.41	18.35	22.85	17.90	16.78	19.34	15.90	14.90	18.15	15.09	14.55	21.61	35.95	37.25	33.60	42.90	31.45
March	16.31	17.37	21.85	14.25	16.35	18.28	22.85	17.84	16.25	18.80	15.90	14.90	18.15	15.09	14.55	21.75	37.70	37.25	32.54	43.40	38.16
April	16.75	18.75	21.26	14.18	16.35	18.19	23.35	17.43	15.78	18.27	15.90	15.15	17.90	14.90	14.55	21.65	42.20	35.15	29.35	42.60	35.90
May	16.30	20.75	20.01	13.60	16.16	18.10	24.01	16.43	15.94	17.62	15.90	15.13	17.70	14.90	14.59	21.95	45.15	36.15	29.35	44.03	35.16
June	16.00	21.56	19.72	12.51	16.65	18.23	24.27	16.90	16.05	16.60	15.90	15.15	17.14	14.90	14.70	21.95	44.70	36.28	29.35	44.80	34.71
July	16.00	21.60	18.89	12.40	14.85	18.41	23.55	16.83	16.46	16.40	15.90	15.20	16.70	14.90	14.95	21.95	47.45	36.60	29.35	45.11	31.96
August	15.75	21.62	18.35	12.81	15.20	19.00	22.90	16.23	17.03	16.09	15.90	15.46	16.62	14.90	15.95	21.95	44.75	36.60	29.35	45.11	31.96
September	15.75	21.75	17.22	12.63	15.91	19.54	22.90	15.90	16.05	15.90	15.90	16.15	16.65	14.90	16.65	22.25	48.03	36.60	29.35	45.11	31.96
October	15.89	21.75	16.05	13.10	16.54	20.35	22.00	15.71	19.83	15.90	15.44	17.80	16.60	14.84	16.95	24.05	37.25	36.60	29.35	49.16	21.96
November	16.00	21.63	18.18	14.85	17.85	22.85	20.65	16.59	19.90	15.82	15.90	18.02	16.02	14.59	17.31	30.15	37.25	36.60	31.26	41.10	21.96
December	16.31	21.75	14.40	16.65	18.35	23.75	19.84	17.40	19.90	15.90	15.03	18.15	15.77	14.70	19.65	35.68	37.25	36.60	36.65	36.96	21.96
Average	16.78	20.18	18.88	13.74	16.46	19.45	22.85	17.08	17.41	17.19	16.71	15.94	17.18	14.89	16.78	23.90	43.64	36.67	31.09	44.89	35.84

Basic Pig Iron, f.o.b. Mahoning or Shenango Valley Furnace, Dollars per Gross Ton

	1901	1902	1903	1904	1905	1906	1907	1908	1909	1910	1911	1912	1913	1914	1915	1916	1917	1918	1919	1920	1921
January	\$15.46	\$17.06	\$21.90	\$16.90	\$15.50	\$16.87	\$13.25	\$12.35	\$16.41	\$12.50	\$12.50	\$17.81	\$30.00	\$33.00	\$30.00	\$37.40	\$30.00	\$33.00	\$30.00	\$37.40	\$30.00
February	15.25	16.82	22.00	15.97	15.12	16.31	13.65	12.25	16.30	13.19	12.50	17.69	30.00	32.00	30.00	42.25	27.50				
March	15.55	16.85	21.50	15.62	14.94	16.00	13.75	12.81	16.11	13.00	12.50	18.20	32.25	32.00	28.94	41.80	24.20				
April	15.06	16.88	21.50	15.25	14.05	15.94	13.75	13.00	15.87	13.00	12.50	18.13	38.75	32.00	25.75	42.40	22.88				
May	15.06	17.00	22.90	14.91	14.12	15.19	13.32	13.00	15.15	13.00	12.50	18.00	41.60	32.00	25.75	43.25	23.00				
June	11.76	14.60	18.94	12.40	15.25	14.62	14.70	13.05	13.12	14.60	13.00	12.50	18.00	46.75	32.00	25.75	44.00	20.75			
July	11.20	14.00	17.12	11.75	14.51	15.05	14.60	13.12	13.40	14.37	13.00	12.74	18.00	52.50	32.00	25.75	45.65	19.38			
August	11.69	14.32	17.70	11.25	14.60	15.25	14.12	13.90	13.94	14.06	13.00	12.74	18.00	51.20	32.00	25.75	48.10	18.20			
September	11.60	14.86	18.44	10.96	14.43	15.90	13.70	12.80	14.37	14.00	13.00	14.75	18.31	42.75	32.00	25.75	46.50	19.13			
October	12.19	15.25	19.55	19.50	14.04	16.94	13.15	12.52	15.98	13.90	12.81	15.90	19.88	38.00	33.00	25.75	43.75	19.19			
November	14.00	16.87	21.37	18.12	14.72	17.25	13.25	12.42	16.37	13.09	12.48	15.75	25.10	33.00	33.00	23.31	36.50	19.00			
December	15.70	16.75	21.50	17.50	16.60	17.05	13.40	12.25	16.50	12.71	12.50	17.50	30.00	33.00	33.00	34.25	33.00	18.83			
Average	15.59	16.85	18.10	16.87	15.16	15.48	14.76	13.97	13.98	14.71	13.87	13.74	19.76	38.60	33.60	27.66	40.81	31.74			

Southern No. 2 Foundry Pig Iron at Cincinnati, Dollars per Gross Ton

	1901	1902	1903	1904	1905	1906	1907	1908	1909	1910	1911	1912	1913	1914	1915	1916	1917	1918	1919	1920	1921
January	\$13.45	\$14.55	\$21.65	\$12.37	\$15.25	\$16.75	\$26.00	\$15.15	\$16.25	\$17.25	\$14.25	\$13.25	\$16.95	\$13.88	\$12.40	\$17.90	\$26.10	\$35.90	\$34.00	\$41.80	\$36.75
February	13.12	14.75	21.60	12.12	16.25	16.75	26.00	15.75	16.12	17.08	14.25	13.31	16.99	13.81	12.40	17.90	27.53	35.90	34.00	43.60	32.63
March	14.00	14.75	21.37	12.10	16.25	16.65	26.00	15.80	15.05	16.80	14.25	13.60	16.31	14.00	12.27	17.90	31.90	35.90	33.84	43.60	29.80
April	14.50	16.87	20.16	12.60	16.25	16.63	25.05	15.20	14.25	15.87	14.15	13.75	15.65	13.75	12.34	17.90	37.40	35.90	30.85	44.00	28.00
May	13.85	18.35	18.87	12.25	15.81	16.75	24.25	14.70	14.80	15.00	13.95	14.15	14.94	13.75	12.40	17.90	41.90	35.90	29.85	45.60	26.70
June	13.37	20.19	17.75	11.80	14.65	16.44	24.10	15.25	14.70	14.85	13.44	14.25	14.06	13.63	12.60	17.34	45.15	36.68	29.39	45.60	26.38
July	13.00	20.75	16.15	11.81	13.94	16.06	23.85	15.60	15.75	14.75	13.25	14.70	13.75	13.30	12.71	16.90	49.90	36.68	29.35	45.60	24.75
August	13.00	23.06	15.19	12.00	14.40	17.30	23.00	15.25	16.88	14.31	13.45	15.06	14.06	13.25	13.71	16.70	49.90	36.60	30.40	45.78	23.50
September	13.06	23.00	14.75	12.00	14.37	18.99	21.50	15.65	17.35	14.25	13.31	15.87	14.25	13.25	14.15	17.28	49.90	36.60	31.25	46.50	23.50
October	13.75	25.65	13.80	12.81	15.31	20.00	20.95	15.75	17.88	14.25	13.25	16.80	14.35	12.90	14.78	18.03	49.98	37.60	31.60	46.50	23.50
November	14.00	23.62	12.00	15.19	16.60	23.88	19.50	16.00	17.75	14.25	13.20	17.25	13.87	12.90	16.15	22.40	35.90	37.60	34.35	42.50	22.90
December	14.25	22.44	12.05	16.85	16.75	25.00	17.00	16.25	17.45	14.25	13.19	17.25	13.95	12.50	17.10	25.90	35.90	37.60	38.00	42.80	21.75
Average	13.61	20.00	17.08	12.78	15.57	16.87	23.10	16.54	16.18	15.16	13.87	14.93	14.00	13.41	13.68	18.67	40.07	36.58	33.10	44.47	30.68

Local No. 2 Foundry Pig Iron at Chicago (at Furnace), Dollars per Gross Ton

January	\$15.10	\$16.25	\$23.45	\$14.47	\$17.85	\$19.60	\$25.85	\$18.45	\$17.35	\$19.00	\$15.50	\$14.00	\$17.90	\$13.75	\$13.60	\$30.00	\$33.00	\$31.00	\$40.00	\$31.50	
February	14.60	16.85	23.35	13.91	17.85	19.41	25.85	18.16	16.75	19.00	15.50	14.00	17.31	14.00	13.60	18.50	32.00	33.00	31.00	42.25	29.00
March	15.60	18.51	23.22	14.05	17.80	19.35	26.10	17.85	16.50	18.30	15.50	14.00	17.25	14.00	12.65	18.70	36.00	33.00	29.94	42.00	25.60
April	15.85	18.97	22.87	14.35	17.60	19.10	26.35	17.73	16.50	17.50	15.00	14.00	17.00	14.25	13.60	19.00	39.25	33.00	29.75	43.00	24.00
May	15.85	20.95	20.72	13.85	17.60	18.90	26.65	17.63	16.50	17.00	15.00	14.00	17.00	14.00	13.60	19.00	43.80	33.00	29.75	43.00	22.80
June	15.35	21.85	19.85	13.70	17.00	18.54	26.60	17.73	16.50	16.75	15.00	14.50	16.62	13.69	13.00	19.00	51.00	33.00	29.75	43.40	20.75
July	15.35	21.60	18.25	13.60	17.47	18.60	25.65	17.65	17.00	16.50	14.87	14.70	14.70	13.75	13.00	19.00	55.00	33.00	29.75	45.25	19.00
August	15.35	22.10	17.22	13.60	16.60	19.45	24.85	17.35	17.13	16.50	14.50	15.37	15.00	13.69	13.44	18.40	55.00	33.00	29.75	46.00	19.55
September	15.35	23.35	16.41	13.85	16.60	20.16	24.10	17.05	18.70	16.40	14.50	16.00	16.00	13.25	13.60	18.18	54.67	33.00	29.75	46.00	21.75
October	15.35	23.35	16.70	14.10	17.66	21.48	22.45	18.65	19.00	16.00	14.46	17.00	16.00	12.94	14.63	19.63	33.00	34.00	27.75	44.50	21.00
November	15.23	23.35	15.10	18.98	19.15	24.70	20.66	17.10	19.00	16.00	14.08	17.75	14.67	12.66	17.13	25.10	33.00	34.00	31.00	39.40	20.60
December	15.85	23.35	14.81	16.95	19.60	25.85	18.80	17.35	19.00	16.00	14.00	18.00	14.30	13.00	18.10	29.50	33.00	24.00	35.75	34.50	19.65
Average	15.38	16.87	19.25	14.37	17.05	18.43	24.60	17.57	17.49	17.09	14.85	15.35	15.85	13.50	14.01	20.26	31.41	33.55	30.16	34.53	23.95

Gray Forge Pig Iron, Philadelphia and Vicinity, Gross Ton

	1901	1902	1903	1904	1905	1906	1907	1908	1909	1910	1911	1912	1913	1914	1915	1916	1917	1918	1919	1920	1921
January	\$14.50	\$15.75	\$21.75	\$13.50	\$10.25	\$15.75	\$23.50	\$16.50	\$18.25	\$17.25	\$14.25	\$14.25	\$17.05	\$14.00	\$13.50	\$18.44	\$28.38	\$32.00	\$33.90	\$40.28	\$33.78
February	14.50	15.75	21.25	13.50	15.75	17.00	23.50	16.50	18.25	17.50	14.25	14.25	17.31	14.00	13.44	19.00	29.78	32.00	33.90	40.50	30.90
March	14.00	17.50	20.00	12.75	16.25	16.75	23.50	16.50	15.50	16.00	14.75	14.37	16.50	14.00	13.25	19.13	31.94	32.00	32.84	43.00	26.56
April	14.37	19.25	25.00	13.75	16.25	16.75	23.00	16.00	15.00	16.02	14.75	14.37	16.50	14.00	13.25	19.25	38.50	32.00	29.65	43.00	25.26
May	14.37	19.00	19.50	13.75	16.00	16.50	23.25	16.00	15.00	16.00	14.70	14.50	16.81	13.81	13.25	19.50	40.40	32.00	29.21	43.00	25.26
June	14.37	19.25	18.25	13.50	15.75	16.25	23.00	15.25	16.25	15.65	14.80	14.02	16.87	13.75	13.25	18.50	44.31	32.00	28.25	43.00	24.69
July	14.12	21.75	18.12	13.25	14.50	16.10	22.80	15.25	15.50	15.37	14.80	14.87	14.85	13.75	13.25	18.50	49.56	33.00	26.60	45.48	21.20
August	14.00	21.00	18.50	12.50	15.00	16.50	20.50	15.25	16.25	15.00	14.45	15.87	11.56	13.75	15.13	18.50	41.25	32.00	27.00	47.10	20.00
September	14.00	21.00	14.75	13.00	15.00	17.75	19.50	19.50	17.00	14.75	14.45	15.87	15.00	13.62	15.25	19.35	32.20	36.80	28.69	47.10	20.50
October	14.12	21.00	14.50	12.75	15.75	18.25	18.75	15.50	17.50	14.80	14.25	16.87	14.75	13.50	16.05	23.75	32.00	36.60	32.40	44.64	22.50
November	14.37	22.00	14.00	14.00	16.25	20.00	17.00	15.75	18.00	14.37	14.25	17.62	14.75	13.50	17.63	27.69	32.00	36.90	36.10	38.74	21.69
December	14.87	22.25	14.00	15.50	16.50	22.00	16.75	16.00	18.00	14.25	14.25	17.75	14.58	13.50	17.63	27.69	32.00	36.90	36.10	38.74	21.69
Average	14.80	19.84	17.04	13.48	16.77	17.55	21.83	16.83	19.29	15.67	14.42	15.58	16.67	13.79	14.81	20.06	37.78	35.18	30.21	43.83	24.81

Malleable Pig-Iron at Chicago, Dollars per Gross Ton

	1903	1904	1905	1906	1907	1908	1909	1910	1911	1912	1913	1914	1915	1916	1917	1918	1919	1920	1921
January	\$23.24	\$14.50	\$17.50	\$19.37	\$20.00	\$18.00	\$17.09	\$19.00	\$15.50	\$14.35	\$17.00	\$13.88	\$13.00	\$19.00	\$30.94	\$33.50	\$31.50	\$40.50	\$32.00
February	23.00	11.60	17.50	19.19	26.00	18.25	16.75	19.00	15.50	14.14	17.31	13.94	13.00	19.00	31.75	33.50	31.50	42.75	29.38
March	22.87	14.00	17.50	19.00	26.25	17.50	16.50	18.40	15.50	14.00	17.25	14.25	13.00	19.40	35.40	33.50	30.44	43.50	25.80
April	21.82	14.00	17.50	18.77	26.50	17.50	16.50	17.50	15.25	14.00	17.05	14.25	13.00	19.00	39.00	33.50	27.25	43.50	24.00
May	20.77	14.00	17.37	18.35	26.40	17.50	16.66	17.05	15.00	14.40	16.00	14.06	13.00	19.60	43.00	33.50	27.25	43.50	23.00
June	19.50	13.85	16.65	18.00	26.25	17.37	16.50	16.75	15.00	14.50	16.82	13.88	13.00	19.50	50.25	33.50	27.25	43.50	21.50
July	18.66	13.75	16.37	18.37	25.62	17.50	16.00	16.56	15.00	14.50	14.65	14.00	13.00	19.50	55.00	33.50	27.25	43.50	19.00
August	17.59	13.75	16.50	18.95	24.80	17.50	17.12	16.50	14.80	15.10	15.00	14.00	13.44	19.00	55.00	33.50	27.25	43.50	19.00
September	18.94	13.50	16.56	20.12	24.40	17.25	18.50	16.40	14.50	16.25	15.00	13.25	14.30	19.00	54.75	33.50	27.25	43.50	21.75
October	16.25	13.75	17.37	21.32	22.40	17.00	18.50	16.06	14.50	17.10	15.20	13.00	15.25	19.88	33.50	34.50	28.25	45.75	21.00
November	15.00	15.87	19.00	24.16	20.25	17.00	19.00	16.00	14.35	17.87	14.87	12.88	17.13	25.80	33.50	34.50	31.50	39.90	20.60
December	14.50	16.50	19.50	26.00	18.75	17.00	19.00	16.00	14.35	18.00	14.63	12.90	18.20	20.50	33.50	34.50	39.60	35.00	19.63
Average	19.18	14.33	17.44	20.13	24.49	17.50	17.48	17.10	14.94	15.56	16.87	13.60	14.11	20.78	41.56	35.76	29.68	43.01	23.11

*From this time on the prices are given as at furnace near Chicago, and 35c. to 50c. per ton should be added to get the price delivered to Chicago foundries.

Lake Superior Charcoal Pig-Iron at Chicago, Gross Ton

	1901	1902	1903	1904	1905	1906	1907	1908	1909	1910	1911	1912	1913	1914	1915	1916	1917	1918	1919	1920	1921
January	\$19.00	\$19.25	\$25.50	\$10.62	\$18.50	\$20.40	\$26.80	\$22.50	\$19.50	\$19.50	\$17.87	\$16.00	\$18.15	\$15.25	\$15.75	\$19.50	\$31.75	\$37.50	\$38.85	\$48.75	\$42.50
February	17.50	20.25	26.50	15.87	18.50	20.13	27.00	21.38	19.50	19.50	17.50	15.95	18.00	15.25	15.75	19.75	33.75	37.50	38.85	58.38	39.50
March	17.50	20.65	26.50	15.00	18.50	19.75	26.75	21.25	19.50	19.30	17.50	15.75	18.00	15.25	15.75	19.75	36.75	37.50	38.85	58.20	38.50
April	18.00	21.50	25.50	15.19	18.50	19.44	26.50	20.30	19.00	19.00	17.50	15.75	18.00	15.45	15.75	19.75	40.25	37.50	31.75	57.25	38.50
May	17.67	22.80	24.12	15.00	17.75	19.05	27.40	20.00	19.50	18.02	17.25	15.75	18.00	15.75	15.75	19.75	48.15	37.50	31.75	57.50	37.50
June	17.00	22.50	22.20	14.50	16.50	18.00	27.50	20.00	19.50	18.50	16.80	16.75	18.81	15.75	15.75	19.75	52.88	37.02	31.75	57.50	37.50
July	17.00	25.00	22.20	14.50	16.50	18.00	27.50	20.00	19.50	18.50	16.50	16.25	15.65	15.75	15.75	19.75	52.88	37.02	31.75	57.50	37.50
August	17.00	25.75	20.62	11.87	16.40	19.35	27.20	20.00	19.50	18.50	16.50	16.25	14.60	15.75	15.75	19.75	58.00	31.75	57.50	56.37	37.50
September	17.00	26.00	19.00	14.75	16.87	20.13	27.00	19.50	19.50	18.40	16.50	17.12	15.25	15.75	15.75	19.75	58.00	39.00	32.75	58.50	31.50
October	17.00	26.00	18.10	15.31	18.25	21.60	26.20	19.50	19.50	18.12	16.50	16.65	15.25	15.75	15.75	20.25	37.50	38.00	33.44	58.50	31.50
November	17.50	26.00	17.12	16.37	19.20	24.63	25.12	19.50	19.50	18.00	16.50	16.65	15.25	15.75	17.00	26.44	37.50	38.70	38.50	55.75	31.50
December	18.00	25.25	16.50	17.80	20.00	26.13	24.25	19.50	19.50	18.00	16.37	18.75	15.25	15.75	18.05	31.75	37.50	38.70	43.00	49.13	31.50
Average	17.60	23.50	22.13	16.60	18.00	20.71	26.56	20.24	19.60	18.60	16.94	16.78	16.63	15.60	16.13	21.53	44.16	37.88	36.50	58.22	35.99

THE IRON AGE Composite Iron and Steel Prices

Composite Pig Iron Price

Average of THE IRON AGE quotations on foundry and basic pig irons; basic iron at Valley furnace; foundry iron an average of Chicago, Birmingham and Philadelphia. Quoted in dollars per gross ton.

	1904	1905	1906	1907	1908	1909	1910	1911	1912	1913	1914	1915	1916	1917	1918	1919	1920	1921
January		\$15.95	\$17.30	\$23.21	\$16.84	\$15.68	\$17.12	\$13.63	\$12.65	\$10.46	\$12.76	\$12.38	\$17.81	\$29.88	\$33.21	\$31.36	\$30.08	\$31.18
February		15.84	17.10	23.33	16.30	15.35	16.77	13.83	12.61	10.31	13.18	12.28	17.78	29.75	33.21	31.36	32.35	28.45
March		15.98	17.10	21.02	15.97	15.03	16.29	13.88	12.93	10.74	13.16	12.84	18.06	32.18	33.21	30.10	42.17	25.18
April		15.68	17.03	23.03	15.55	14.38	15.97	13.79	13.09	15.74	13.13	12.37	18.15	38.56	32.71	27.11	43.93	23.73
May		15.63	17.07	23.97	15.18	11.38	15.27	13.53	13.27	11.93	13.06	12.37	18.08	41.87	32.71	26.91	43.64	22.78
June		15.04	16.91	23.47	15.35	11.71	11.90	13.27	13.36	14.35	12.97	12.45	17.91	47.95	32.71	26.46	44.09	21.73
July	\$11.84	14.37	16.96	22.51	11.91	15.19	14.72	13.21	13.68	13.99	12.92	12.55	17.79	52.11	32.73	26.37	45.44	20.32
August	12.07	14.64	17.93	21.82	15.05	15.52	11.39	13.12	14.15	13.93	13.91	13.55	17.83	51.43	32.73	26.37	47.38	18.97
September	12.07	14.94	19.59	20.55	15.03	16.41	14.17	12.99	14.71	13.97	12.83	14.25	17.82	46.93	32.73	27.11	47.83	18.99
October	12.67	15.61	19.52	19.84	14.79	17.23	13.79	12.84	16.01	13.93	12.67	14.61	19.18	33.21	34.31	27.52	48.05	19.97
November	14.37	17.01	22.17	19.66	15.21	17.46	13.74	12.71	16.52	13.39	12.42	15.82	24.36	33.21	34.36	30.34	38.65	19.79
December	15.77	17.10	22.42	17.52	15.73	17.48	13.75	12.59	15.63	13.06	12.39	17.84	28.63	33.21	34.26	30.13	34.51	19.11
Average		15.66	18.30	21.75	15.49	15.78	16.08	15.38	14.14	14.68	13.87	13.54	19.43	30.11	33.24	33.97	40.70	28.53

Composite Price of Finished Steel

Compiled from THE IRON AGE quotations on steel bars, beams, tank plates, plain wire, open-hearth rails, black pipe and black sheets. Quoted in cents per pound.

Billets and Finished Steel

Bessemer Steel Billets at Pittsburgh, Dollars per Gross Ton

	1901	1902	1903	1904	1905	1906	1907	1908	1909	1910	1911	1912	1913	1914	1915	1916	1917	1918	1919	1920	1921
January...	\$19.75	\$27.50	\$39.60	\$33.00	\$22.75	\$26.25	\$29.40	\$25.00	\$25.00	\$27.50	\$23.00	\$20.00	\$28.50	\$20.13	\$19.25	\$32.00	\$43.00	\$47.50	\$43.50	\$48.00	\$48.50
February...	20.21	29.37	29.87	23.00	23.50	26.50	29.50	25.00	25.00	27.50	23.00	20.00	28.50	21.00	19.50	33.50	55.00	47.50	43.50	55.25	42.25
March.....	22.88	31.25	30.62	23.00	24.00	26.70	29.00	28.00	23.00	27.50	23.00	18.75	28.50	21.00	19.70	42.40	66.25	47.50	42.25	60.00	38.40
April.....	21.00	31.50	30.25	23.00	24.00	27.00	30.12	28.00	23.00	26.75	23.00	20.00	28.50	20.80	20.00	45.00	73.75	47.50	38.50	60.00	37.50
May.....	21.00	32.37	30.37	23.00	23.50	26.40	30.30	28.00	23.00	26.12	22.80	20.80	27.37	20.00	20.00	45.00	88.00	47.50	38.50	60.00	37.00
June.....	24.38	32.37	28.87	23.00	22.00	26.63	29.62	25.75	23.00	25.30	21.00	20.87	26.50	19.50	20.50	43.50	88.75	47.50	38.50	61.00	37.00
July.....	21.00	31.75	27.60	23.00	22.00	27.25	30.00	25.00	23.50	21.00	21.00	21.50	26.80	19.00	21.38	41.00	100.00	47.50	38.50	62.50	32.25
August.....	21.20	31.06	27.00	23.00	21.00	27.80	29.25	25.00	24.13	24.63	21.00	22.12	26.00	20.25	23.13	44.20	88.00	47.50	38.50	61.00	39.00
September..	24.88	29.50	27.00	20.00	25.00	28.00	29.37	25.00	25.00	24.40	20.75	23.62	24.87	21.00	24.10	45.00	66.25	47.50	38.50	58.74	26.00
October.....	26.70	29.70	27.00	19.50	25.62	28.00	28.20	25.00	26.25	23.75	20.00	26.00	23.30	20.00	24.63	46.25	49.38	47.50	38.50	55.00	30.00
November..	27.00	28.50	24.00	20.25	26.00	28.88	23.00	25.00	27.13	23.30	19.50	27.00	21.00	19.25	26.50	52.00	47.50	47.80	41.38	46.70	26.00
December..	27.50	29.12	23.00	21.20	26.00	29.50	28.00	25.00	27.50	23.00	19.25	27.00	20.00	19.00	30.60	57.50	47.50	45.50	46.00	43.50	26.00
Average ..	24.18	30.38	27.95	22.08	24.05	27.41	29.23	25.31	24.81	26.40	21.43	22.39	25.79	20.08	22.44	43.95	70.78	47.33	40.51	56.22	34.45

Soft Steel Bars at Pittsburgh, Cents per Pound

	1901	1902	1903	1904	1905	1906	1907	1908	1909	1910	1911	1912	1913	1914	1915	1916	1917	1918	1919	1920	1921
January...	1.25	1.50	1.69	1.30	1.45	1.50	1.60	1.00	1.40	1.50	1.40	1.15	1.70	1.20	1.10	2.03	3.15	2.90	2.70	2.75	2.35
February...	1.30	1.51	1.60	1.30	1.40	1.50	1.60	1.00	1.35	1.50	1.40	1.12	1.70	1.20	1.10	2.31	3.25	2.90	2.70	2.80	2.15
March.....	1.40	1.60	1.60	1.35	1.50	1.50	1.60	1.00	1.20	1.45	1.40	1.10	1.85	1.20	1.15	2.65	3.63	2.90	2.61	3.63	2.00
April.....	1.47	1.60	1.60	1.35	1.50	1.50	1.60	1.00	1.15	1.45	1.40	1.10	1.81	1.15	1.20	2.88	3.75	2.90	2.55	3.75	2.05
May.....	1.41	1.60	1.60	1.35	1.50	1.50	1.60	1.00	1.19	1.45	1.37	1.20	1.70	1.14	1.20	3.00	4.00	2.90	2.35	3.63	2.05
June.....	1.40	1.60	1.60	1.35	1.45	1.50	1.60	1.45	1.20	1.45	1.25	1.20	1.60	1.11	1.21	2.73	4.25	2.90	2.35	3.50	2.05
July.....	1.40	1.60	1.60	1.35	1.50	1.50	1.60	1.40	1.27	1.45	1.23	1.25	1.50	1.12	1.25	2.63	4.50	2.90	2.35	3.50	1.84
August.....	1.44	1.60	1.60	1.35	1.50	1.50	1.60	1.40	1.33	1.40	1.20	1.30	1.40	1.10	1.30	2.66	4.30	2.90	2.35	3.25	1.74
September..	1.50	1.60	1.60	1.31	1.50	1.50	1.60	1.40	1.31	1.40	1.19	1.37	1.40	1.20	1.34	2.60	4.00	2.90	2.35	3.25	1.63
October.....	1.53	1.60	1.60	1.30	1.50	1.50	1.60	1.40	1.59	1.40	1.12	1.45	1.39	1.15	1.44	2.75	2.90	2.90	2.35	3.13	1.88
November..	1.50	1.60	1.37	1.31	1.50	1.54	1.60	1.40	1.50	1.40	1.08	1.55	1.29	1.10	1.62	2.83	2.90	2.90	2.60	2.87	1.50
December..	1.50	1.60	1.30	1.34	1.50	1.60	1.60	1.40	1.50	1.40	1.12	1.66	1.21	1.07	1.81	3.00	2.90	2.90	2.75	2.35	1.50
Average ..	1.43	1.45	1.56	1.33	1.43	1.51	1.60	1.40	1.33	1.44	1.26	1.29	1.55	1.15	1.31	2.67	3.63	2.89	2.60	2.82	1.87

Tank Plates at Pittsburgh, Cents per Pound

	1901	1902	1903	1904	1905	1906	1907	1908	1909	1910	1911	1912	1913	1914	1915	1916	1917	1918	1919	1920	1921
January...	1.40	1.60	1.75	1.60	1.50	1.60	1.70	1.70	1.60	1.55	1.40	1.15	1.75	1.20	1.10	2.25	4.45	3.25	3.00	2.72	2.65
February...	1.40	1.60	1.60	1.60	1.50	1.60	1.70	1.70	1.62	1.55	1.40	1.11	1.71	1.20	1.10	2.56	4.88	3.25	3.00	2.60	2.23
March.....	1.47	1.60	1.60	1.60	1.60	1.60	1.70	1.70	1.30	1.55	1.40	1.12	1.70	1.18	1.10	3.10	5.25	3.25	2.91	2.63	2.04
April.....	1.57	1.60	1.60	1.60	1.60	1.60	1.70	1.70	1.27	1.55	1.40	1.21	1.68	1.15	1.15	3.55	5.88	3.25	2.65	2.75	2.10
May.....	1.60	1.60	1.60	1.60	1.60	1.60	1.70	1.70	1.29	1.51	1.39	1.25	1.60	1.12	1.15	3.75	6.60	3.25	2.65	2.75	2.20
June.....	1.60	1.60	1.60	1.60	1.60	1.60	1.70	1.70	1.25	1.48	1.35	1.25	1.45	1.10	1.16	3.63	6.00	3.25	2.65	2.55	1.95
July.....	1.60	1.75	1.60	1.60	1.60	1.60	1.70	1.60	1.33	1.41	1.35	1.30	1.45	1.10	1.22	3.44	9.00	3.25	2.65	2.38	1.88
August.....	1.60	1.75	1.60	1.60	1.60	1.60	1.70	1.60	1.40	1.40	1.34	1.35	1.44	1.18	1.26	3.70	8.80	3.25	2.65	2.35	1.78
September..	1.60	1.75	1.60	1.44	1.60	1.60	1.70	1.60	1.46	1.40	1.29	1.47	1.40	1.20	1.34	4.00	8.00	3.25	2.53	2.25	1.64
October.....	1.60	1.84	1.60	1.40	1.60	1.60	1.70	1.60	1.50	1.40	1.17	1.53	1.36	1.14	1.44	4.00	3.25	3.25	2.61	2.80	1.60
November..	1.60	1.82	1.60	1.40	1.60	1.62	1.70	1.60	1.54	1.40	1.13	1.59	1.26	1.08	1.65	4.15	3.25	3.25	2.65	2.81	1.54
December..	1.60	1.82	1.60	1.45	1.60	1.70	1.70	1.60	1.55	1.40	1.15	1.60	1.20	1.05	2.04	4.25	3.25	3.13	2.65	2.65	1.50
Average ..	1.56	1.70	1.61	1.54	1.68	1.61	1.70	1.64	1.48	1.47	1.31	1.33	1.60	1.14	1.31	3.53	5.88	3.84	3.78	3.28	1.93

Beams at Pittsburgh, Cents per Pound

	1901	1902	1903	1904	1905	1906	1907	1908	1909	1910	1911	1912	1913	1914	1915	1916	1917	1918	1919	1920	1921
January...	1.53	1.60	1.80	1.60	1.50	1.70	1.70	1.70	1.60	1.55	1.40	1.15	1.75	1.20	1.10	1.90	3.25	3.00	2.80	2.47	2.45
February...	1.50	1.60	1.60	1.60	1.50	1.70	1.70	1.70	1.52	1.51	1.40	1.11	1.71	1.20	1.10	2.06	3.25	3.00	2.80	2.70	2.26
March.....	1.52	1.70	1.60	1.60	1.60	1.70	1.70	1.70	1.30	1.50	1.40	1.15	1.70	1.19	1.10	2.40	3.84	3.00	2.71	3.13	2.08
April.....	1.60	1.70	1.60	1.60	1.60	1.70	1.70	1.70	1.27	1.50	1.40	1.21	1.68	1.15	1.15	2.55	3.88	3.00	2.45	3.25	2.10
May.....	1.60	1.60	1.60	1.60	1.60	1.70	1.70	1.70	1.27	1.50	1.39	1.25	1.60	1.14	1.20	2.80	4.00	3.00	2.45	3.10	2.20
June.....	1.60	1.60	1.60	1.60	1.60	1.70	1.70	1.70	1.25	1.48	1.35	1.25	1.45	1.11	1.20	2.83	4.31	3.00	2.45	3.10	2.10
July.....	1.60	1.84	1.60	1.60	1.60	1.70	1.70	1.60	1.33	1.41	1.35	1.30	1.45	1.12	1.25	2.50	4.50	3.00	2.45	3.10	1.93
August.....	1.60	2.00	1.60	1.60	1.63	1.70	1.70	1.60	1.40	1.40	1.35	1.35	1.45	1.19	1.20	2.62	4.30	3.00	2.45	3.10	1.82
September..	1.60	2.00	1.60	1.44	1.70	1.70	1.70	1.60	1.46	1.40	1.34	1.42	1.41	1.20	1.35	2.64	4.00	3.00	2.45	3.10	1.64
October.....	1.60	2.07	1.60	1.40	1.70	1.70	1.70	1.60	1.50	1.40	1.21	1.48	1.37	1.15	1.44	2.75	3.80	3.00	2.45	3.05	1.60
November..	1.60	2.05	1.60	1.40	1.70	1.70	1.70	1.60	1.54	1.40	1.13	1.57	1.20	1.10	1.60	2.85	3.00	3.00	2.45	2.89	1.84
December..	1.60	2.00	1.60	1.44	1.70	1.70	1.70	1.60	1.55	1.40	1.15	1.60	1.25	1.07	1.78	3.25	3.00	2.90	2.45	2.45	1.60
Average ..	1.58	1.81	1.68	1.54	1.68	1.70	1.70	1.64	1.48	1.45	1.32	1.38	1.60	1.15	1.30	2.85	3.67	3.09	2.53	2.86	1.94

Wire Nails at Pittsburgh, Dollars per Keg of 100 Lb.

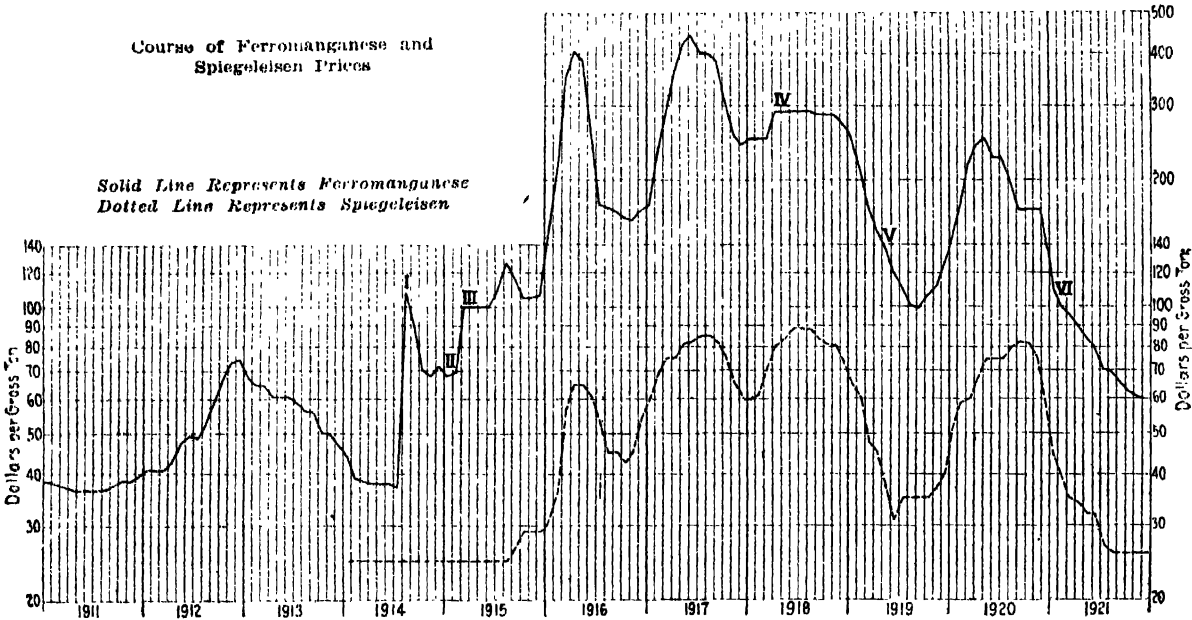
	1911	1912	1913	1914	1915	1916	1917	1918	1919	1920	1921										
January.....	\$2.22	\$1.99	\$1.83	\$1.89	\$1.75	\$1.85	\$2.00	\$2.08	\$1.95	\$1.85	\$1.71	\$1.57	\$1.75	\$1.54	\$1.54	\$2.13	\$3.00	\$3.50	\$3.50	\$4.50	\$3.50
February.....	2.30	2.05	1.92	1.90	1.80	1.85	2.00	2.05	1.95	1.85	1.75	1.60	1.75	1.60	1.57	2.25	3.00	3.50	3.50	4.50	3.50
March.....	2.30	2.05	2.00	1.90	1.80	1.85	2.00	2.05	1.95	1.85	1.70	1.60	1.75	1.60	1.60	2.40	3.20	3.50	3.50	4.40	3.50
April.....	2.30	2.05	2.00	1.90	1.80	1.85	2.00	2.05	1.87	1.85	1.80	1.60	1.80	1.60	1.56	2.40	3.28	3.50	3.25	4.00	3.13
May.....	2.30	2.05	2.00	1.90	1.80	1.85	2.00	2.05	1.65	1.82	1.80	1.60	1.80	1.58	1.55	2.50	3.50	3.50	3.25	4.00	3.05
June.....	2.30	2.05	2.00	1.90	1.74	1.85	2.00	1.97	1.70	1.80	1.75	1.60	1.80	1.50	1.55	2.50	3.75	3.50	3.25	4.00	3.00
July.....	2.30	2.05	2.00	1.89	1.70	1.84	2.00	1.95	1.72	1.75	1.70	1.62	1.70	1.52	1.60	2.50	4.00	3.50	3.25	4.00	2.81
August.....	2.30	2.05	2.00	1.71	1.70	1.82	2.00	1.95	1.80	1.70	1.69	1.66	1.65	1.50	1.61	2.58	4.00	3.50	3.25	4.25	2.76
September.....	2.30	2.03	2.00	1.60	1.74	1.86	2.05	1.95	1.80	1.70	1.65	1.70	1.65	1.60	1.69	2.60	4.00	3.50	3.25	4.25	2.88
October.....	2.28	1.80	2.00	1.60	1.80	1.85	2.05	1.95	1.80	1.70	1.61	1.70	1.63	1.60	1.80	2.63	.....	3.50	3.31	4.25	2.90
November.....	2.17	1.85	1.97	1.62	1.80	1.88	2.05	1.95	1.80	1.70	1.55	1.70	1.69	1.50	1.87	2.85	3.50	3.50	3.80	4.05	2.84
December.....	1.99	1.85	1.87	1.73	1.80	2.00	2.05	1.95	1.85	1.70	1.63	1.72	1.55	1.51	2.04	3.00	3.50	3.50	3.80	4.12	2.69
Average.....	2.86	2.00	1.97	1.79	1.77	1.86	2.02	1.99	1.82	1.77	1.70	1.64	1.70	1.58	1.67	2.63	3.52	3.50	3.40	4.09	2.90

Monthly Averages of Ferromanganese Quotations

KEY TO CHART ON FERROMANGANESE PRICES

- I. August 6, 1914, the first week of the World War, saw German shipments cut off and British deliveries uncertain; ferromanganese sold as high as \$150 per ton spot. The average shown is for three weeks.
- II. During February, 1915, "married contracts" were made by consumers of British ferromanganese holding contracts at \$38 per ton, which were averaged with the new \$68 quotations. Spot sales were made as high as \$90 per ton.
- III. Hereafter quotations are based on spot domestic prices.

- British shipments were uncertain and prices were based on \$63 per ton or on "married contracts."
- IV. In April, 1918, the standard of ferromanganese was reduced from 80 to 70 per cent with adjustment of \$4 per unit from the \$250 per ton quotation. We quote 80 per cent.
- V. From May 22, 1919, until November 13, 1919, we quote British ferromanganese, which dominated the market at from \$5 to \$10 below domestic prices.
- VI. These quotations are all on a delivered basis.



Ferromanganese Prices in Dollars per Gross Ton											
	1911	1912	1913	1914	1915	1916	1917	1918	1919	1920	1921
January	\$38.01	\$41.00	\$48.00	\$44.40	\$88.00	\$150.00	\$175.00	\$250.00	\$255.00	\$146.00	\$112.50
February	37.89	41.00	65.00	39.25	60.75	207.80	231.25	250.00	215.00	172.50	100.00
March	37.10	41.00	65.00	38.50	100.00	349.60	260.00	250.00	175.00	216.25	96.00
April	38.75	43.00	61.00	38.00	100.00	406.25	362.50	290.00	150.00	240.00	90.00
May	36.50	47.50	61.00	38.00	100.00	387.50	420.50	290.00	139.40	250.00	85.00
June	36.50	49.25	61.00	38.00	100.00	270.00	443.75	290.00	121.00	225.00	80.00
July	36.50	48.88	69.00	37.20	109.00	175.00	406.25	290.00	111.00	225.00	70.00
August	36.70	52.40	66.38	108.38	127.25	172.00	400.00	290.00	101.25	198.75	70.00
September	37.75	59.63	56.00	90.00	117.00	199.75	387.50	255.00	98.75	170.00	65.80
October	38.50	57.80	50.10	70.40	105.00	182.25	310.00	255.00	105.00	170.00	63.00
November	38.40	73.75	50.00	68.00	195.00	190.80	256.00	255.00	112.50	170.00	61.50
December	39.75	78.00	47.00	72.20	108.00	169.75	243.75	275.00	122.50	138.00	60.00
Average	57.51	58.85	68.20	60.86	105.83	\$31.70	\$87.81	\$77.60	148.18	195.81	79.53

Wire Rod Prices at Pittsburgh for Nineteen Years

Bessemer wire rods, per gross ton. The quotations for November and December, 1917, and all of 1918, are Government prices and apply also to open-hearth rods.

	1903	1904	1905	1906	1907	1908	1909	1910	1911	1912	1913	1914	1915	1916	1917	1918	1919	1920	1921
January	\$34.70	\$30.00	\$31.00	\$33.75	\$37.00	\$31.30	\$33.00	\$33.00	\$28.00	\$21.37	\$30.00	\$25.50	\$20.00	\$43.00	\$75.00	\$57.00	\$57.00	\$60.00	\$57.00
February	35.75	30.00	31.00	31.00	37.00	35.00	35.00	33.00	28.75	25.00	30.00	26.38	25.00	46.00	77.50	57.00	57.00	63.75	54.50
March	36.62	30.80	31.70	31.00	37.00	35.00	33.00	33.00	29.00	25.00	30.00	26.50	25.00	54.80	81.00	57.00	55.75	70.00	52.00
April	37.00	31.00	31.00	34.12	37.00	35.00	29.06	32.50	29.00	25.00	30.00	26.00	25.00	60.00	85.00	57.00	52.00	70.00	49.00
May	37.00	30.50	31.00	31.40	37.00	35.00	27.50	32.00	20.00	25.00	30.00	25.50	25.00	60.00	86.00	57.00	52.00	72.50	48.00
June	36.62	29.20	33.30	31.00	37.12	33.50	27.50	30.80	28.25	25.00	29.50	24.50	25.00	53.75	92.50	57.00	52.00	75.00	48.00
July	35.80	28.00	31.87	31.00	36.50	33.00	29.40	29.25	27.00	25.00	28.30	21.50	25.63	53.75	96.25	57.00	52.00	75.00	43.00
August	35.00	28.00	32.10	31.00	36.10	33.25	31.00	28.25	27.00	25.80	28.00	25.00	25.00	55.00	94.00	57.00	52.00	75.00	41.80
September	31.75	27.00	31.12	31.00	36.00	33.00	31.50	28.00	27.00	27.00	27.37	26.20	29.40	55.00	88.75	57.00	52.00	75.00	39.50
October	34.00	26.00	31.75	31.50	35.40	33.00	31.47	28.50	26.00	28.50	26.60	25.88	31.75	55.00	77.25	57.00	52.00	75.00	40.50
November	31.62	26.75	32.10	35.50	31.00	33.00	32.50	28.12	25.30	29.75	25.87	25.25	36.25	63.00	57.00	57.00	54.50	66.40	40.00
December	30.50	29.80	32.50	37.00	34.00	33.00	33.00	28.00	24.50	30.00	25.17	25.00	39.50	68.75	57.00	57.00	59.50	57.00	38.00
Average	34.96	\$4.93	\$2.20	\$4.44	\$6.18	\$3.84	\$1.08	\$0.57	\$7.40	\$6.23	\$8.40	\$5.52	\$8.29	\$5.84	79.77	67.00	55.98	69.55	45.94

Hot-Rolled and Cold-Rolled Strip Steel

Quoted in cents per pound, at Pittsburgh

	COLD-ROLLED STRIP STEEL					HOT-ROLLED STRIP STEEL				
	1917	1918	1919	1920	1921	1917	1918	1919	1920	1921
January	7.00	6.50	6.25	6.00	6.25	4.50	4.50	3.30	3.45	3.30
February	7.25	6.50	6.25	7.00	6.06	4.50	4.50	3.30	4.03	3.11
March	7.63	6.50	6.10	7.00	5.83	4.50	4.50	3.30	5.00	2.93
April	7.31	6.50	5.65	7.75	5.84	4.50	4.50	3.30	5.25	2.76
May	7.60	6.50	5.05	8.50	4.98	4.25	4.25	3.30	5.50	2.53
June	8.63	6.50	5.65	8.50	4.88	3.50	3.50	3.05	5.50	2.50
July	9.00	6.50	5.65	8.50	4.25	3.50	3.50	3.05	5.50	2.46
August	9.00	6.50	5.65	8.50	3.90	3.50	3.50	3.31	5.50	2.23
September	9.00	6.50	5.65	8.50	3.78	3.50	3.50	3.30	5.50	2.00
October	9.00	6.50	5.65	8.25	3.75	3.50	3.50	3.30	5.25	2.00
November	6.75	6.50	5.65	8.00	3.75	4.50	3.50	3.30	4.70	2.00
December	6.50	6.35	5.93	6.63	3.75	4.50	3.50	3.30	3.65	2.00
Average	7.89	6.49	5.81	7.76	4.73	5.90	5.20	4.86	5.40	2.40

Wrought Iron and Steel Pipe Prices

Computed from discounts as per list, for carload lots; price for base size pipe, ¾ to 3-in.

Wrought Iron Pipe, per Gross Ton																					
	1901	1902	1903	1904	1905	1906	1907	1908	1909	1910	1911	1912	1913	1914	1915	1916	1917	1918	1919	1920	1921
January	\$67.20	\$67.20	\$53.76	\$49.28	\$55.67	\$49.28	\$58.83	\$67.20	\$62.72	\$63.76	\$56.00	\$56.00	\$60.48	\$62.72	\$62.72	\$72.08	\$103.04	\$150.08	\$143.36	\$146.72	\$166.68
February	67.20	67.20	53.76	49.28	54.88	49.28	67.20	67.20	62.72	63.76	56.00	56.00	60.48	62.72	62.72	77.40	105.44	150.08	143.36	146.72	166.68
March	67.20	71.90	63.76	52.95	56.00	49.28	67.20	67.20	49.28	52.76	56.00	56.00	60.48	62.72	62.72	82.09	111.42	150.08	140.58	146.72	167.68
April	67.20	73.92	63.76	53.76	56.41	49.28	67.20	67.20	49.28	53.76	56.00	56.00	60.48	62.72	62.72	86.61	125.01	150.08	135.52	146.72	168.64
May	67.20	73.92	63.76	53.76	57.12	49.28	67.20	67.20	49.28	53.76	56.00	56.00	60.48	62.72	62.72	84.96	125.58	150.08	135.52	146.72	168.64
June	67.20	73.92	63.76	54.53	57.12	49.28	70.34	64.06	49.28	53.76	56.00	56.00	62.66	62.72	62.72	84.96	125.58	150.08	135.52	146.72	168.64
July	67.20	73.92	63.76	51.12	57.12	49.28	71.08	62.72	49.28	53.76	56.00	56.00	62.72	62.72	62.72	84.96	125.58	150.08	135.52	146.72	168.64
August	67.20	73.92	63.76	51.12	57.12	49.28	71.08	62.72	53.76	53.76	56.00	56.00	62.72	62.72	62.72	84.96	125.58	150.08	135.52	146.72	168.64
September	67.20	73.92	63.76	51.12	57.12	49.28	71.08	62.72	53.76	53.76	56.00	56.00	62.72	62.72	62.72	84.96	125.58	150.08	135.52	146.72	168.64
October	67.20	73.92	63.76	51.12	49.84	52.17	70.35	62.72	53.76	56.00	56.00	56.24	62.72	62.72	62.72	84.96	125.58	150.08	135.52	146.72	168.64
November	67.20	61.15	63.76	51.12	49.28	53.76	67.20	62.72	53.76	56.00	56.00	60.48	62.72	62.72	62.72	84.96	125.58	150.08	135.52	146.72	168.64
December	67.20	63.76	63.62	51.12	49.28	55.06	67.20	62.72	53.76	56.00	56.00	60.48	62.72	62.72	62.72	84.96	125.58	150.08	135.52	146.72	168.64
Average	67.20	69.89	63.76	51.44	54.58	50.88	68.45	64.70	58.96	54.38	56.00	57.11	61.68	62.72	64.59	67.68	108.00	160.08	137.85	147.16	161.88

Steel Pipe, per Gross Ton																						
	1901	1902	1903	1904	1905	1906	1907	1908	1909	1910	1911	1912	1913	1914	1915	1916	1917	1918	1919	1920	1921	
January	\$67.20	\$67.20	\$56.00	\$51.52	\$51.70	\$47.04	\$56.58	\$62.72	\$55.34	\$49.28	\$44.80	\$40.32	\$44.80	\$44.80	\$42.56	\$52.17	\$80.04	\$109.76	\$103.04	\$95.20	\$95.20	
February	67.20	67.20	56.00	53.76	53.76	47.04	58.24	62.72	54.24	49.28	44.80	40.32	44.80	45.88	44.16	55.00	83.04	109.76	103.04	95.20	95.20	
March	67.20	71.80	56.00	55.00	54.88	47.04	60.84	62.72	47.04	49.28	44.80	40.32	44.80	45.92	44.80	59.09	89.02	109.76	100.51	95.20	95.20	
April	67.20	73.92	56.00	56.00	55.39	47.04	62.72	62.72	47.04	49.28	44.80	40.32	45.51	45.51	44.80	64.21	100.43	109.76	95.20	95.20	95.48	
May	67.20	73.92	56.00	56.00	56.00	47.04	62.72	62.72	47.04	49.28	44.80	40.32	46.10	44.80	47.04	67.20	100.80	109.76	95.20	95.20	95.48	
June	67.20	73.92	56.00	53.76	56.00	47.04	62.72	59.58	47.04	49.28	44.80	42.56	47.04	44.80	47.04	67.20	100.80	109.76	95.20	95.20	95.48	
July	67.20	73.92	56.00	48.16	56.00	47.04	62.72	58.24	47.04	49.28	44.80	43.14	47.04	44.80	47.04	67.20	100.80	109.76	95.20	95.20	95.48	
August	67.20	73.92	56.00	48.16	56.00	47.04	62.72	58.24	47.04	49.28	44.80	44.80	45.31	44.80	47.04	67.20	100.80	109.76	95.20	95.20	95.48	
September	67.20	73.92	56.00	47.11	56.00	47.04	62.72	58.24	47.04	49.28	44.80	45.37	44.80	44.80	47.04	68.96	100.80	109.76	95.20	95.20	95.48	
October	67.20	73.92	56.00	47.98	47.33	49.93	62.72	58.24	49.28	44.80	42.56	47.04	44.80	44.80	47.04	69.44	100.80	109.76	95.20	95.20	95.48	
November	67.20	62.55	56.00	51.52	47.04	51.52	62.72	58.24	49.28	44.80	42.56	47.04	44.80	42.56	49.28	70.63	108.27	109.76	95.20	95.20	95.48	
December	67.20	56.00	56.00	51.52	47.04	54.41	62.72	58.24	49.28	44.80	40.32	47.04	44.80	42.56	49.28	76.45	109.76	105.64	95.20	95.20	95.48	
Average	67.80	70.18	56.00	51.79	53.09	48.33	61.98	60.28	49.13	48.16	44.08	43.30	45.38	44.68	46.43	65.45	106.40	109.48	96.95	95.80	88.89	

Cast-Iron Pipe Prices, 1901 to 1921

At New York, 6-Inch, per Net Ton

	1901	1902	1903	1904	1905	1906	1907	1908	1909	1910	1911	1912	1913	1914	1915	1916	1917	1918	1919	1920	1921
January	\$21.75	\$24.50	\$29.25	\$24.50	\$28.00	\$20.75	\$31.25	\$27.00	\$24.50	\$25.50	\$22.00	\$23.00	\$25.00	\$22.00	\$20.00	\$29.00	\$41.50	\$55.35	\$65.70	\$66.30	\$63.80
February	21.50	26.00	30.25	24.25	28.50	29.50	34.25	28.75	24.25	25.50	21.50	22.00	24.75	22.00	20.00	29.33	41.50	55.35	62.70	70.80	63.80
March	21.50	26.00	30.75	24.25	28.50	30.50	34.25	28.75	25.25	25.50	21.00	22.00	23.87	22.00	20.00	29.75	43.10	55.35	62.70	71.30	63.80
April	22.00	26.00	31.00	24.25	28.50	27.25	31.00	28.25	25.25	25.50	21.00	21.25	23.50	22.00	21.00	30.60	50.88	55.35	62.70	73.90	63.80
May	22.25	27.75	30.75	24.00	28.50	27.75	33.50	28.25	25.25	25.50	21.00	21.00	23.00	20.88	22.00	30.60	50.88	55.35	62.70	76.30	62.08
June	23.00	28.00	30.75	23.50	27.25	32.50	33.50	25.75	25.00	25.25	21.00	21.00	23.00	20.88	22.00	30.60	50.88	55.35	62.70	76.30	62.08
July	23.75	28.50	30.75	23.50	27.25	30.25	34.00	25.75	25.25	24.00	21.00	21.00	23.00	20.88	22.00	30.60	50.88	55.35	62.70	76.30	62.08
August	23.75	29.00	30.75	23.50	27.75	30.50	32.50	25.25	26.00	23.50	21.00	22.00	23.00	20.88	22.00	30.60	50.88	55.35	62.70	76.30	62.08
September	23.50	29.00	30.75	23.00	27.25	31.00	33.00	25.75	25.75	23.50	21.00	23.12	23.00	20.40	24.37	30.83	65.50	61.75	64.80	77.22	46.30
October	24.00	29.00	30.75	23.25	28.25	33.00	33.50	25.75	25.50	23.00	21.00	24.80	23.00	20.00	25.25	31.50	61.00	67.70	65.30	77.22	47.30
November	24.50	30.75	24.50	26.00	29.00	33.25	28.50	25.00	25.87	22.12	21.40	24.13	23.00	20.00	26.50	35.50	54.50	67.70	58.90	77.22	47.30
December	23.75	29.25	24.25	27.00	29.25	35.50	28.00	25.50	25.70	22.00	22.00	24.62	22.33	20.00	27.60	41.00	56.50	67.70	61.30	68.87	47.30
Average	\$5.00	\$7.88	\$8.81	\$4.17	\$7.79	\$1.98	\$8.77	\$5.94	\$5.44	\$4.24	\$1.84	\$2.48	\$3.57	\$0.90	\$2.94	\$1.08	\$5.31	\$6.05	\$7.87	\$7.98	\$4.68

Connellsville Coke Prices for Nineteen Years

We present below tables showing monthly prices of prompt shipment Connellsville furnace and foundry coke for 19 years, 1903 to 1921, inclusive, averaged from weekly quotations in THE IRON AGE.

Average Prices of Prompt Connellsville Furnace Coke, per Net Ton at Oven																			
	1903	1904	1905	1906	1907	1908	1909	1910	1911	1912	1913	1914	1915	1916	1917	1918	1919	1920	1921
January	\$5.00	\$1.60	\$2.46	\$2.02	\$3.53	\$1.92	\$1.59	\$2.55	\$1.45	\$1.82	\$3.38	\$1.85	\$1.50	\$2.94	\$9.50	\$5.00	\$5.65	\$6.00	\$5.06
February	5.00	1.52	2.56	2.14	3.50	1.86	1.59	2.12	1.45	1.78	2.52	1.85	1.50	3.38	9.62	6.00	4.44	6.00	4.50
March	5.00	1.65	2.43	2.24	3.02	1.72	1.60	2.00	1.55	2.12	2.40	1.90	1.50	3.47	9.60	6.00	4.06	6.00	4.35
April	4.20	1.60	2.07	2.45	2.72	1.57	1.60	1.77	1.59	2.39	2.15	1.86	1.50	2.41	7.38	6.00	3.65	9.60	3.50
May	3.50	1.60	1.87	2.46	2.16	1.50	1.57	1.66	1.50	2.28	2.13	1.77	1.50	2.30	7.80	6.00	3.69	12.00	3.25
June	3.00	1.45	1.82	2.32	1.89	1.55	1.52	1.65	1.42	2.02	2.11	1.75	1.56	2.49	11.25	6.00	4.00	15.00	3.00
July	2.50	1.45	1.81	2.51	2.40	1.87	1.58	1.59	1.44	2.21	2.45	1.75	1.64	2.75	12.75	6.00	4.07	17.20	2.81
August	2.25	1.45	1.80	2.76	2.62	1.50	1.66	1.57	1.46	2.21	2.50	1.70	1.50	2.80	13.60	6.00	4.31	17.75	2.75
September	2.20	1.45	2.10	2.85	2.82	1.50	2.39	1.60	1.50	2.37	2.29	1.65	1.61	2.94	11.12	6.00	4.56	10.70	3.15
October	1.90	1.47	2.61	2.84	2.85	1.53	2.76	1.59	1.50	3.41	2.98	1.60	2.03	4.88	6.00	6.00	4.82	15.12	3.28
November	1.75	2.04	2.95	3.13	2.41	1.72	2.74	1.50	1.52	3.94	1.82	1.82	2.28	6.90	6.00	6.00	5.87	8.26	3.08
December	1.62	2.12	2.79	3.52	2.06	1.82	2.67	1.44	1.60	4.00	1.75	1.50	2.64	8.38	6.00	6.00	6.12	6.20	2.75
Average	3.16	1.61	2.37	2.65	2.67	1.65	1.64	1.76	1.49	2.55	2.43	1.75	1.73	2.80	9.88	6.00	4.68	11.58	3.45

Scrap Prices at Chicago 1905 to 1921

These Prices Are Averaged from Weekly Quotations in THE IRON AGE

	1905	1906	1907	1908	1909	1910	1911	1912	1913	1914	1915	1916	1917	1918	1919	1920	1921
January	\$14.88	\$14.95	\$18.80	\$11.05	\$13.94	\$19.00	\$11.75	\$10.75	\$12.60	\$9.85	\$9.19	\$15.50	\$21.12	\$30.00	\$17.40	\$24.50	\$15.13
February	14.13	13.63	15.75	12.50	13.56	15.50	12.06	10.75	12.13	10.50	9.56	14.75	21.50	30.25	15.06	25.00	15.13
March	14.45	13.00	16.00	11.44	12.13	15.00	12.15	10.94	12.08	9.81	9.63	16.50	23.70	29.87	15.68	24.25	12.50
April	14.38	13.50	15.75	11.05	12.35	14.44	11.75	11.56	12.50	9.80	9.15	16.50	27.00	28.75	16.41	23.75	11.00
May	12.65	13.70	15.00	10.62	13.44	13.56	10.50	12.05	11.25	9.99	9.37	15.94	25.70	28.80	15.62	23.00	11.50
June	11.95	13.13	16.25	11.62	14.50	13.15	10.38	12.12	10.44	9.75	9.44	14.90	26.50	29.00	16.69	23.95	10.81
July	12.75	13.13	16.12	11.75	14.06	12.38	10.99	11.69	10.50	9.75	10.40	14.50	23.00	29.00	19.40	24.13	10.00
August	13.15	14.10	15.10	12.88	15.00	12.25	11.05	12.25	10.56	9.99	11.56	15.25	29.60	29.00	20.88	25.35	10.60
September	14.38	16.50	14.75	13.00	16.00	12.25	10.70	12.81	10.06	9.19	11.75	16.06	31.25	29.00	19.10	24.81	11.51
October	14.50	16.00	14.70	13.45	16.43	12.25	10.00	13.95	10.06	8.50	11.75	16.81	26.00	29.00	18.25	21.50	13.44
November	15.20	17.50	12.93	14.88	16.00	12.25	9.75	13.99	9.56	8.06	13.44	20.60	27.00	28.50	20.88	18.45	12.25
December	16.25	17.13	11.50	15.17	16.00	12.10	10.25	12.98	9.00	8.43	15.63	23.00	28.37	22.75	21.80	16.20	11.13
Average	13.98	14.74	15.08	11.57	14.45	13.43	10.99	12.12	10.89	9.38	10.91	16.68	27.66	28.68	18.09	23.88	11.98

	1905	1906	1907	1908	1909	1910	1911	1912	1913	1914	1915	1916	1917	1918	1919	1920	1921
January	\$16.00	\$16.50	\$19.00	\$12.30	\$15.81	\$18.00	\$13.69	\$13.00	\$16.15	\$11.10	\$9.62	\$17.06	\$27.00	\$35.00	\$22.10	\$34.25	\$15.63
February	15.13	16.25	19.00	13.00	15.12	18.00	13.63	12.80	15.50	11.81	9.87	17.06	27.00	35.00	16.44	34.88	15.50
March	15.30	15.70	19.00	12.19	13.06	17.80	13.65	12.75	15.00	11.56	10.25	17.65	28.00	34.75	16.38	32.30	13.30
April	15.44	15.75	18.50	12.60	13.20	17.09	13.44	12.88	14.63	11.50	10.25	18.00	32.62	33.50	17.55	32.13	12.63
May	14.06	16.00	18.00	12.94	14.44	17.12	13.49	13.50	13.95	11.21	10.25	17.38	36.50	34.00	17.75	31.75	13.40
June	12.95	15.88	18.94	13.94	15.50	16.50	12.38	13.50	12.69	11.50	10.25	15.85	46.90	34.00	18.75	32.65	12.94
July	13.56	15.50	18.00	14.50	15.40	16.88	12.25	13.50	12.25	11.50	10.30	15.25	45.19	34.00	20.15	35.00	12.25
August	14.35	15.90	17.00	15.63	16.12	15.21	12.65	14.00	12.12	11.50	12.25	15.80	39.20	34.00	20.50	38.00	12.48
September	15.25	17.63	16.75	16.18	17.15	15.25	12.75	15.00	12.25	10.75	13.35	17.00	39.75	34.00	20.80	38.13	13.13
October	15.63	18.63	17.15	15.80	18.00	15.25	12.44	14.30	12.15	10.00	13.31	18.81	34.75	34.00	27.19	33.44	14.00
November	16.30	21.15	15.06	17.19	18.00	15.06	12.30	16.50	12.00	9.50	14.44	24.50	34.80	33.50	21.25	22.90	13.50
December	16.50	21.00	12.94	16.95	18.00	14.20	12.50	16.50	11.38	9.50	16.63	28.63	35.25	27.50	21.00	16.90	12.63
Average	16.04	17.16	17.60	14.44	16.82	15.34	12.93	14.19	13.34	10.96	11.73	18.69	35.68	33.60	23.40	31.60	13.47

	1905	1906	1907	1908	1909	1910	1911	1912	1913	1914	1915	1916	1917	1918	1919	1920	1921
January	\$18.19	\$17.30	\$16.35	\$11.20	\$13.81	\$14.88	\$11.75	\$11.63	\$12.70	\$8.70	\$8.69	\$15.68	\$23.50	\$31.25	\$19.10	\$26.00	\$13.63
February	17.00	15.88	15.50	12.44	12.88	14.69	12.00	11.30	12.19	9.50	8.87	14.94	23.75	31.25	15.13	27.00	13.50
March	16.40	14.88	15.25	11.25	11.43	14.45	12.80	11.44	12.13	9.06	9.00	16.20	25.00	30.75	15.68	27.10	11.60
April	16.00	14.50	15.25	11.00	11.90	14.19	11.69	12.31	12.38	9.00	8.65	17.00	30.35	30.20	16.55	27.25	10.00
May	14.19	14.50	15.45	10.75	12.81	12.87	11.38	12.75	11.25	9.00	8.94	16.50	32.60	29.75	15.99	26.38	10.40
June	13.50	13.50	16.06	11.69	13.38	12.75	11.25	12.57	10.56	9.00	9.00	16.20	41.00	29.75	16.87	25.25	9.63
July	14.13	13.50	15.06	12.15	13.16	12.44	11.00	12.06	10.55	9.00	9.15	14.94	37.75	29.75	18.00	24.88	9.25
August	15.45	14.50	14.40	12.69	14.44	11.94	11.10	12.50	10.62	8.94	10.44	15.30	33.70	29.75	20.75	24.75	10.45
September	16.31	16.13	14.38	13.44	15.35	11.94	10.94	13.13	10.19	8.37	11.00	16.38	35.50	29.75	19.50	23.88	11.50
October	17.00	17.50	14.60	13.60	15.94	11.75	10.44	14.25	9.60	7.87	11.19	17.50	28.75	30.38	19.38	20.25	13.80
November	17.50	18.00	12.32	14.38	15.31	11.94	10.20	13.50	9.00	7.66	12.94	21.00	30.80	28.68	22.88	16.85	12.20
December	18.00	17.25	11.00	14.83	14.75	11.65	10.75	13.06	8.50	7.00	15.38	25.13	31.25	24.62	24.10	14.60	10.44
Average	16.14	15.62	14.94	12.45	13.76	12.96	11.23	12.64	10.81	8.96	10.87	17.16	31.25	29.66	18.06	23.68	11.30

	1905	1906	1907	1908	1909	1910	1911	1912	1913	1914	1915	1916	1917	1918	1919	1920	1921
January	\$13.81	\$14.70	\$17.80	\$12.95	\$13.06	\$14.88	\$12.19	\$11.25	\$12.90	\$10.20	\$9.19	\$13.31	\$15.50	\$25.00	\$22.95	\$37.25	\$17.25
February	13.13	13.50	18.25	13.00	12.75	14.88	12.13	11.25	12.69	10.87	9.00	12.81	15.37	26.00	20.00	38.88	18.00
March	13.40	12.75	19.50	12.12	12.19	14.50	12.25	11.31	12.50	10.37	9.00	13.45	16.90	27.25	21.63	37.85	14.90
April	13.51	12.94	18.88	12.05	12.60	13.69	11.81	12.06	12.44	10.25	9.00	12.88	20.43	27.12	21.45	37.25	13.25
May	12.80	13.40	18.58	11.50	13.31	13.13	11.00	12.20	11.00	10.06	9.00	12.56	23.20	26.70	20.12	37.38	13.60
June	12.40	13.50	18.94	12.00	13.81	13.00	10.75	11.81	10.63	9.75	9.00	11.75	30.00	27.12	20.75	36.30	12.75
July	13.38	13.50	18.44	12.15	13.44	13.00	10.50	11.75	10.70	9.65	9.25	11.50	29.25	26.66	23.30	36.50	12.25
August	13.20	11.00	16.75	12.75	14.06	12.75	10.55	12.15	10.67	9.50	9.62	11.50	24.20	29.10	24.50	36.20	12.60
September	13.38	15.38	16.81	12.88	14.75	12.75	10.10	12.81	10.82	9.19	10.10	12.13	23.75	30.00	24.20	34.00	13.44
October	13.63	15.90	16.25	13.25	15.63	12.50	10.25	14.20	10.40	9.00	10.50	13.50	20.50	30.36	25.00	28.75	13.88
November	14.30	17.50	14.00	13.75	15.12	12.50	10.35	13.50	10.06	8.56	12.13	15.55	22.00	28.87	28.12	23.00	13.50
December	15.00	17.50	13.00	13.92	14.75	12.30	11.00	13.25	9.83	8.00	13.75	16.25	23.50	25.75	32.35	18.70	12.63
Average	13.50	14.55	17.26	12.69	13.79	13.52	11.07	12.30	11.87	9.70	9.99	13.10	22.05	27.69	23.70	33.51	14.00

	Railroad Malleable Scrap, per Net Ton																
	1905	1906	1907	1908	1909	1910	1911	1912	1913	1914	1915	1916	1917	1918	1919	1920	1921
January	\$14.06	\$15.00	\$17.20	\$10.40	\$12.88	\$15.00	\$10.94	\$10.88	\$13.40	\$9.25	\$8.13	\$13.81	\$17.75	\$26.80	\$17.00	\$29.00	\$14.75
February	13.69	14.25	16.00	11.31	12.38	14.60	10.50	10.30	13.00	10.38	8.00	13.33	17.31	26.80	14.87	29.94	15.50
March	13.41	13.00	16.25	10.00	11.50	14.60	11.00	10.44	13.00	9.56	7.94	13.95	17.95	27.89	16.13	28.50	13.80
April	13.25	13.38	16.38	10.10	11.25	13.69	11.00	11.19	13.10	9.15	8.00	13.99	20.37	25.25	15.80	27.63	12.13
May	12.38	13.50	16.25	9.61	12.33	12.94	10.38	11.65	12.10	9.13	8.14	13.44	23.80	25.50	15.80	27.63	12.13
June	11.90	13.50	17.50	10.25	12.94	12.20	10.10	11.75	11.06	9.00	8.13	11.73	31.62	29.50	16.00	25.65	11.50
July	12.31	13.38	16.75	11.40	12.75	11.25	10.00	11.75	10.60	9.00	8.00	11.63	30.12	29.71	18.70	27.00	11.19
August	13.15	13.60	16.00	12.06	13.69	11.00	10.05	12.05	10.38	8.88	10.00	11.25	29.70	30.36	20.50	28.75	12.00
September	11.19	15.00	16.00	12.38	15.15	11.20	10.00	12.58	10.19	8.25	10.25	11.50	30.75	30.38	18.95	27.63	13.08
October	14.25	15.13	16.20	12.45	15.25	11.00	9.69	13.75	9.65	7.90	10.25	12.38	25.25	30.36	19.02	23.50	13.50
November	11.55	17.30	12.20	13.44	15.13	11.25	9.50	13.56	9.31	7.78	11.88	16.00	25.60	29.18	23.12	19.45	11.44
December	15.00	18.00	10.60	13.70	14.95	11.25	10.06	13.50	9.00	7.95	12.75	15.00	27.35	22.75	16.70	15.00	11.44
Average	13.51	14.59	15.51	11.44	13.35	12.50	10.97	11.94	12.41	8.85	8.41	15.41	24.75	28.44	18.47	25.71	13.58

Philadelphia Scrap Prices, 1901 to 1921

These Prices, Delivered Eastern Pennsylvania, Are Averaged from Weekly Quotations in THE IRON AGE

Heavy Melting Steel Scrap—Per Gross Ton

	1901	1902	1903	1904	1905	1906	1907	1908	1909	1910	1911	1912	1913	1914	1915	1916	1917	1918	1919	1920	1921
January	\$14.90	\$18.30	\$20.00	\$11.56	\$17.44	\$17.33	\$18.61	\$11.70	\$16.94	\$17.00	\$12.80	\$12.19	\$14.40	\$10.40	\$10.00	\$16.38	\$21.70	\$20.00	\$17.50	\$24.75	\$14.80
February	15.82	19.00	20.19	12.56	17.37	16.62	18.60	14.25	15.58	16.62	13.60	11.70	12.87	11.00	10.00	16.80	20.83	20.00	14.75	25.62	14.25
March	16.00	20.12	20.75	14.00	17.63	15.80	18.87	13.12	13.50	16.50	14.05	11.80	13.25	11.31	10.80	16.90	23.50	20.00	14.19	25.20	13.00
April	16.75	20.87	20.75	14.09	17.86	16.69	18.75	12.75	13.25	16.12	13.31	12.94	13.44	10.95	11.00	17.88	24.98	28.00	15.50	24.12	11.25
May	16.55	21.00	20.66	12.50	16.94	16.30	18.95	12.81	14.75	14.75	13.00	13.50	12.10	10.63	11.25	16.80	25.40	29.00	15.00	28.37	11.80
June	15.75	20.94	20.50	11.35	14.55	15.75	18.15	12.25	15.81	14.45	13.00	13.50	11.75	10.50	11.10	15.31	34.13	29.00	16.12	22.60	11.25
July	15.81	21.00	19.00	11.12	15.16	15.87	17.62	13.80	15.80	14.12	13.19	13.50	11.35	10.30	12.06	14.94	35.20	29.00	15.80	22.62	11.90
August	16.70	20.50	17.37	11.75	15.55	16.75	16.85	14.50	16.87	13.75	13.15	13.65	11.43	10.19	13.75	14.75	31.98	29.00	16.37	25.00	11.40
September	16.44	20.50	15.87	11.90	15.69	17.94	10.50	15.19	17.40	13.85	12.50	14.50	11.62	10.09	15.00	14.75	30.25	29.00	16.62	25.62	11.90
October	17.50	20.55	13.85	12.87	16.86	18.12	15.35	16.00	18.00	13.81	11.94	15.10	11.15	9.95	14.75	16.63	25.00	29.00	19.10	22.75	12.00
November	17.19	20.50	11.87	14.75	17.55	18.70	12.94	15.75	18.00	13.50	11.65	15.60	10.19	9.25	14.65	20.13	26.00	28.00	20.62	19.00	11.87
December	17.81	20.25	11.25	16.20	17.50	19.60	11.60	17.10	17.50	12.68	12.08	15.25	10.00	9.40	15.81	23.75	28.20	26.00	22.50	15.25	11.50
Average	16.18	20.29	17.66	12.94	16.54	17.11	16.95	14.10	16.12	14.76	13.31	13.69	11.96	10.88	12.61	16.66	27.83	28.67	17.68	22.99	12.12

Heavy Cast Scrap—Per Gross Ton

	1901	1902	1903	1904	1905	1906	1907	1908	1909	1910	1911	1912	1913	1914	1915	1916	1917	1918	1919	1920	1921
January	\$14.50	\$14.40	\$19.75	\$12.75	\$16.00	\$16.00	\$17.70	\$15.30	\$15.87	\$17.03	\$14.00	\$13.42	\$14.50	\$12.00	\$12.00	\$17.00	\$20.20	\$30.00	\$23.50	\$36.00	\$23.25
February	14.00	14.81	19.81	12.81	15.62	15.87	22.00	15.00	15.00	16.10	14.38	13.00	14.37	12.88	12.00	17.00	20.00	30.00	23.00	40.00	23.00
March	14.00	16.00	20.00	13.30	15.75	15.50	22.25	15.00	14.00	16.00	14.40	13.12	14.00	13.00	12.00	17.00	21.75	30.00	21.25	39.20	19.00
April	14.00	17.06	20.00	13.37	16.00	15.50	21.25	15.00	14.10	15.87	13.40	13.63	13.94	13.00	11.75	17.88	26.63	20.00	22.00	35.00	18.00
May	13.95	17.70	19.25	12.50	15.19	15.40	20.80	14.87	14.69	15.06	13.13	13.75	13.60	12.25	12.15	15.50	29.00	29.00	21.50	37.75	18.00
June	13.82	18.25	18.37	11.60	14.20	15.37	20.75	14.25	15.00	15.00	13.75	13.25	12.12	12.35	12.35	16.50	33.50	29.00	22.00	37.00	17.37
July	13.62	17.75	17.50	11.25	14.00	15.12	19.25	14.00	14.85	14.94	13.06	13.75	13.00	12.00	12.38	16.00	36.30	29.00	22.10	37.50	16.00
August	13.75	18.25	15.87	11.50	14.40	16.30	18.60	14.25	15.37	14.25	13.20	13.75	12.87	12.00	13.30	16.00	33.25	29.00	24.75	39.00	17.00
September	13.75	19.00	14.75	11.50	15.12	17.44	18.00	15.25	15.90	14.00	12.69	14.96	12.81	12.00	14.00	16.00	31.00	29.00	25.00	38.25	17.00
October	13.75	19.50	13.90	12.37	15.75	17.37	17.80	15.25	16.94	14.00	12.44	14.50	13.50	11.40	14.00	16.15	28.00	29.00	25.20	38.75	17.12
November	14.00	19.50	12.87	13.75	16.00	19.20	16.50	15.44	17.50	14.00	12.25	14.75	12.62	11.00	14.50	18.50	30.00	29.00	27.62	33.80	17.50
December	14.00	19.50	12.50	14.90	16.00	21.12	15.80	16.00	17.50	14.00	13.00	15.00	12.17	11.30	16.06	20.75	30.00	29.00	30.75	24.50	16.63
Average	13.90	17.64	17.05	12.93	15.34	16.43	19.58	14.97	15.66	15.08	13.25	13.95	13.39	12.07	13.03	17.10	28.35	29.85	24.08	36.73	18.49

Machine Shop Turnings—Per Gross Ton

	1901	1902	1903	1904	1905	1906	1907	1908	1909	1910	1911	1912	1913	1914	1915	1916	1917	1918	1919	1920	1921
January	\$9.85	\$12.95	\$16.00	\$8.94	\$14.50	\$14.50	\$16.05	\$9.00	\$13.63	\$14.38	\$8.12	\$9.00	\$11.20	\$7.30	\$8.00	\$11.13	\$12.90	\$10.00	\$12.60	\$18.75	\$13.00
February	10.00	13.50	16.00	9.12	15.75	13.81	16.25	9.87	12.00	13.50	9.19	9.25	10.37	9.00	8.00	9.98	12.38	18.63	10.25	21.00	12.62
March	10.80	14.44	16.50	9.45	15.19	13.55	16.75	9.62	10.08	12.80	10.00	8.80	10.12	8.75	8.13	10.25	14.13	18.25	11.00	20.50	10.30
April	12.00	16.37	16.50	10.12	14.75	13.81	16.55	8.40	10.10	11.44	8.81	9.60	10.31	7.90	8.25	11.00	15.25	18.50	11.80	19.00	8.50
May	12.00	16.20	15.75	9.60	13.50	13.19	16.95	9.12	11.62	9.94	8.25	10.40	9.20	7.50	8.44	11.75	16.00	18.50	10.62	18.40	8.50
June	11.56	16.00	15.12	8.20	11.00	12.31	16.94	9.50	12.50	9.65	8.40	10.31	8.00	7.60	8.50	8.63	20.25	18.50	11.75	18.50	8.00
July	11.50	16.50	14.40	7.94	10.66	11.69	15.37	9.80	12.45	9.62	9.00	10.50	7.85	7.75	8.63	8.50	23.70	18.50	13.50	18.12	7.50
August	11.50	16.12	13.00	8.56	12.90	12.65	14.30	10.75	13.50	8.81	9.30	10.65	8.00	7.94	9.80	8.05	20.75	18.50	15.00	18.37	7.90
September	11.56	16.00	11.00	8.75	13.62	13.75	14.00	11.50	14.35	8.75	8.19	10.94	8.00	8.55	10.56	7.44	20.38	18.75	15.00	19.87	8.00
October	11.75	16.00	10.50	9.00	14.25	14.25	12.85	11.80	15.50	8.62	8.00	11.40	7.85	7.90	10.13	13.18	18.00	19.00	15.10	18.25	8.60
November	12.25	16.00	9.75	9.62	14.40	13.85	10.50	12.94	15.06	8.60	8.00	11.50	7.00	7.50	10.25	13.38	18.00	19.00	17.00	16.20	9.62
December	12.75	16.00	9.19	12.50	14.50	15.94	9.00	12.90	14.15	8.15	8.91	11.00	7.08	7.65	11.00	10.50	18.20	18.00	18.50	13.75	9.00
Average	11.47	15.61	13.64	9.31	13.75	13.61	14.63	10.58	12.91	10.35	8.88	10.39	8.75	7.95	9.14	10.05	17.60	18.60	13.51	18.39	8.88

Cast Borings—Per Gross Ton

January	\$7.94	\$8.00	\$10.00	\$6.50	\$11.19	\$11.00	\$13.55	\$7.00	\$12.62	\$12.22	\$8.12	\$8.31	\$10.85	\$7.80	\$8.00	\$11.50	\$13.94	\$17.00	\$11.00	\$22.50	\$14.75
February	8.00	8.00	10.09	7.00	11.25	10.31	14.50	8.37	11.00	11.50	8.81	8.00	10.37	9.19	8.00	11.00	13.38	17.38	9.50	23.87	12.25
March	8.00	8.62	11.12	7.35	11.31	9.85	16.37	7.75	8.17	11.20	9.60	8.50	10.06	8.94	8.00	11.00	15.00	17.50	9.50	22.10	10.00
April	8.37	10.00	11.55	7.66	11.25	10.25	15.69	7.60	8.65	10.38	8.25	9.37	10.25	8.30	8.00	11.38	15.03	17.50	13.30	20.00	9.00
May	8.75	10.05	11.06	6.75	9.87	9.50	16.00	8.12	8.87	9.84	7.75	9.60	9.17	8.00	8.00	12.75	16.10	17.50	12.50	20.00	9.00
June	8.00	10.37	10.31	6.35	8.00	9.37	16.12	8.75	10.50	8.80	7.90	9.50	8.25	8.00	8.10	10.00	21.50	17.03	12.75	20.00	9.12
July	7.81	10.50	9.40	6.12	7.83	9.31	14.37	9.00	10.40	9.50	8.63	9.56	7.85	8.00	8.10	10.00	25.00	18.00	13.80	20.00	8.62
August	7.25	10.12	8.31	6.50	9.20	10.25	13.50	10.00	11.44	9.31	8.80	9.75	7.94	8.50	8.50	9.50	22.25	18.38	14.62	20.60	9.30
September	7.31	10.00	7.50	6.75	9.87	11.25	12.81	11.00	12.45	8.25	7.69	10.06	8.18	8.56	10.44	9.13	22.00	18.75	15.25	23.62	9.12
October	7.50	10.00	7.15	7.11	9.87	11.37	11.20	11.25	13.37	9.06	7.60	10.65	7.90	8.00	10.25	10.10	19.20	19.00	17.00	22.00	10.00
November	7.87	10.19	6.81	7.75	10.60	12.50	8.37	12.00	13.19	8.50	7.50	11.37	7.50	7.50	10.05	11.63	20.00	19.00	16.62	20.60	11.37
December	8.00	10.00	6.44	9.80	10.50	13.00	7.00	12.75	12.10	8.15	8.00	10.83	7.17	7.65	11.00	14.50	20.00	17.00	21.75	16.25	11.50
Average	7.90	9.65	8.80	7.15	10.06	11.01	13.21	9.46	11.15	9.81	8.89	9.41	8.79	8.80	9.01	11.04	18.67	17.89	14.84	20.96	10.43

Metals, Tin Plate and Sheets for Twenty-One Years

Lake Copper, at New York, Cents per Pound

	1901	1902	1903	1904	1905	1906	1907	1908	1909	1910	1911	1912	1913	1914	1915	1916	1917	1918	1919	1920	1921
January...	16.00	17.45	12.13	12.62	15.19	19.78	24.41	13.90	14.56	11.00	12.81	14.50	16.08	14.85	14.02	24.39	29.78	23.60	20.48	19.82	13.38
February...	16.07	19.47	12.80	12.31	15.25	17.91	25.10	11.13	13.37	13.78	12.75	14.11	15.55	15.00	15.21	26.85	34.90	23.60	17.80	19.36	13.36
March...	17.00	19.12	14.31	12.67	15.25	19.57	27.39	12.85	13.90	13.75	12.58	14.88	15.05	14.79	15.75	27.10	35.85	23.60	15.40	19.07	12.64
April...	17.00	11.87	14.85	11.19	15.19	19.62	21.62	19.09	12.94	13.31	12.41	16.00	15.67	14.75	18.90	28.27	31.67	23.60	15.58	19.36	12.77
May...	17.00	12.10	14.75	12.29	15.07	19.70	21.10	12.89	13.21	13.06	12.33	16.30	15.61	14.40	21.00	28.89	31.42	23.60	16.18	19.06	12.66
June...	17.00	12.22	14.56	12.74	15.07	19.63	23.04	13.03	13.50	12.89	12.71	17.53	15.43	14.12	23.38	27.62	32.48	25.80	17.95	19.00	12.81
July...	16.97	11.94	12.73	12.62	15.07	19.47	21.95	13.00	13.34	12.66	12.78	17.54	14.78	12.70	21.98	25.84	28.78	25.80	22.07	19.00	12.60
August...	16.50	11.50	12.85	12.50	15.07	19.65	18.94	13.71	13.36	12.93	12.75	17.73	15.89	12.85	19.33	26.95	27.34	26.00	22.16	19.00	12.00
September...	16.50	11.69	12.80	12.67	15.12	19.31	18.41	13.80	13.60	12.81	12.65	17.77	16.77	13.66	17.97	26.08	24.60	26.00	22.16	19.00	12.00
October...	16.50	11.71	12.43	13.09	16.82	21.81	13.80	13.81	13.19	12.84	12.53	17.80	16.85	11.73	17.89	25.45	25.50	26.00	22.16	19.00	12.00
November...	16.52	11.44	12.35	14.22	16.90	22.50	13.94	14.44	13.44	12.98	12.80	17.70	16.16	12.00	18.92	22.32	23.50	26.00	22.16	19.00	12.00
December...	14.71	11.61	12.30	14.87	18.75	23.08	13.48	14.53	13.80	13.00	13.84	17.69	14.88	13.35	20.24	25.85	25.50	26.40	18.90	13.90	13.77
Average...	16.67	11.38	12.69	12.06	15.38	19.59	20.84	13.51	13.44	13.17	12.75	16.65	15.38	15.68	15.78	22.19	25.96	24.68	19.43	18.06	12.89

Spelter, at New York, Cents per Pound

	1901	1902	1903	1904	1905	1906	1907	1908	1909	1910	1911	1912	1913	1914	1915	1916	1917	1918	1919	1920	1921
January...	4.08	4.28	4.82	4.95	6.17	6.48	6.90	4.61	5.15	6.26	5.55	6.52	7.15	5.29	6.59	18.19	9.94	7.88	7.38	9.02	5.83
February...	3.91	4.18	5.00	4.95	6.12	6.09	7.03	4.78	4.99	5.89	5.66	6.71	6.45	5.40	8.84	20.13	10.48	7.99	6.70	9.14	5.36
March...	3.89	4.29	5.26	5.05	6.08	5.96	6.92	4.76	4.81	5.72	5.55	6.98	6.26	5.28	9.20	18.40	10.77	7.64	6.82	8.93	5.30
April...	3.91	4.41	5.85	5.22	5.97	6.05	6.81	4.68	4.94	5.60	5.61	6.88	5.77	5.18	11.22	18.58	9.65	7.01	6.51	8.03	5.24
May...	3.97	4.50	5.75	5.14	5.55	5.95	6.51	4.60	5.12	5.30	5.80	6.88	5.47	5.06	16.14	15.96	9.46	7.32	6.46	8.68	5.28
June...	3.95	4.89	6.00	4.79	5.32	6.14	6.45	4.56	5.39	5.19	5.63	6.99	5.18	5.09	22.18	13.75	9.63	8.01	6.93	7.92	4.95
July...	3.90	5.23	5.85	4.85	5.39	5.99	6.15	4.46	5.35	5.20	5.79	7.26	5.38	5.02	30.59	9.83	8.95	8.00	7.90	8.18	4.77
August...	3.92	5.48	5.94	4.85	5.66	6.08	5.71	4.71	5.74	5.25	6.04	7.19	5.75	5.60	14.11	8.98	8.89	8.96	7.84	8.21	4.69
September...	4.02	5.45	6.00	5.08	5.93	6.19	5.23	4.76	5.85	5.53	6.03	7.53	5.82	5.50	14.16	8.82	8.84	9.60	7.87	7.82	4.74
October...	4.20	5.48	6.05	5.17	6.05	6.18	5.45	4.81	6.09	5.69	6.20	7.57	5.43	4.97	13.99	9.98	8.24	9.11	7.83	7.51	5.10
November...	4.32	5.29	5.89	5.19	6.17	6.35	5.10	5.03	6.22	5.95	6.00	7.43	5.29	5.12	17.15	11.90	7.95	8.70	8.14	6.84	5.18
December...	4.35	4.91	5.15	5.80	6.53	6.62	4.39	5.17	6.35	5.80	6.44	7.33	5.18	5.71	16.09	11.13	7.84	8.45	8.59	6.70	5.25
Average...	4.04	4.86	5.21	5.11	5.80	6.17	6.08	4.74	5.51	5.61	6.28	7.11	5.78	5.87	14.24	15.66	9.18	8.33	7.89	7.67	5.15

Lead, at New York, Cents per Pound

	1901	1902	1903	1904	1905	1906	1907	1908	1909	1910	1911	1912	1913	1914	1915	1916	1917	1918	1919	1920	1921
January...	4.37	4.02	4.10	4.39	4.56	5.86	6.30	3.73	4.10	4.70	4.50	4.41	4.35	4.11	3.74	8.93	7.99	6.87	5.85	8.67	5.00
February...	4.37	4.19	4.10	4.40	4.53	5.59	6.31	3.75	4.07	4.63	4.48	4.00	4.35	4.06	3.82	6.22	9.13	7.04	5.08	8.95	4.84
March...	4.37	4.10	4.44	4.50	4.55	5.75	6.31	3.89	4.02	4.51	4.41	4.08	4.35	3.97	4.04	7.43	9.47	7.24	5.23	9.21	4.68
April...	4.37	4.10	4.50	4.50	4.59	5.79	6.18	4.02	4.19	4.40	4.44	4.20	4.40	3.82	4.20	7.79	9.43	6.95	6.03	8.95	4.33
May...	4.37	4.10	4.57	4.48	4.50	5.90	6.02	4.26	4.32	4.47	4.40	4.20	4.37	3.90	4.25	7.45	11.00	6.85	6.05	8.55	4.59
June...	4.37	4.10	4.25	4.22	4.51	5.91	5.75	4.45	4.36	4.38	4.46	4.50	4.35	3.90	4.59	6.87	11.68	7.55	6.54	8.48	4.56
July...	4.37	4.10	4.12	4.17	4.59	5.89	5.21	4.50	4.35	4.40	4.50	4.67	4.37	3.90	4.59	6.87	10.72	7.04	6.58	8.67	4.40
August...	4.37	4.10	4.12	4.15	4.61	5.78	5.12	4.59	4.36	4.40	4.50	4.64	4.37	3.87	4.68	6.26	10.72	7.05	6.77	8.98	4.40
September...	4.37	4.10	4.36	4.20	4.85	5.92	4.81	4.54	4.39	4.40	4.49	5.04	4.73	3.86	4.62	6.88	8.84	8.05	6.12	8.11	4.60
October...	4.37	4.10	4.40	4.20	5.07	5.94	4.61	4.34	4.39	4.40	4.31	5.08	4.52	3.82	4.60	7.00	6.77	8.05	6.45	7.24	4.70
November...	4.37	4.10	4.25	4.51	5.19	5.97	4.45	4.39	4.40	4.44	4.31	4.66	4.33	3.68	5.16	7.13	6.44	8.05	6.78	6.33	4.70
December...	4.19	4.10	4.19	4.60	5.96	6.19	4.76	4.24	4.56	4.50	4.45	4.32	4.06	3.80	5.33	7.60	6.48	6.71	7.03	6.40	4.70
Average...	4.36	4.09	4.27	4.36	4.80	5.80	5.41	4.88	4.80	4.46	4.44	4.47	4.40	3.87	4.68	6.90	9.08	7.40	5.76	8.07	4.68

Straits Tin, at New York, Cents per Pound

	1901	1902	1903	1904	1905	1906	1907	1908	1909	1910	1911	1912	1913	1914	1915	1916	1917	1918	1919	1920	1921
January...	26.69	23.38	27.76	28.75	23.19	35.39	42.14	27.33	29.19	33.61	41.20	41.51	50.34	39.12	31.13	41.76	44.10	85.13	71.50	62.74	35.94
February...	26.85	21.73	29.14	27.98	29.19	33.19	42.16	23.74	29.41	32.05	41.34	43.58	48.71	39.82	37.25	42.60	41.47	85.00	72.45	59.87	32.18
March...	25.95	26.16	30.06	26.19	28.21	31.63	41.29	30.40	28.75	32.61	41.10	42.76	49.03	34.03	48.73	50.53	58.38	85.00	72.50	61.93	28.79
April...	25.91	27.10	29.06	27.98	31.01	41.98	43.81	31.74	29.07	32.83	42.05	43.08	49.04	36.10	47.04	51.51	55.82	88.53	72.50	62.12	30.36
May...	26.82	28.26	28.26	27.70	31.01	41.98	43.81	31.74	29.07	32.83	42.05	43.08	49.04	36.10	47.04	51.51	55.82	88.53	72.50	62.12	30.36
June...	26.22	28.26	28.26	27.70	31.01	41.98	43.81	31.74	29.07	32.83	42.05	43.08	49.04	36.10	47.04	51.51	55.82	88.53	72.50	62.12	30.36
July...	27.41	28.26	28.26	27.70	31.01	41.98	43.81	31.74	29.07	32.83	42.05	43.08	49.04	36.10	47.04	51.51	55.82	88.53	72.50	62.12	30.36
August...	26.90	28.14	28.00	28.74	32.95	39.97	37.35	20.09	29.99	33.92	43.58	45.88	41.63	45.34	34.37	38.83	62.53	91.33	62.50	47.60	26.35
September...	26.04	28.65	27.06	27.97	32.91	40.72	37.22	29.01	30.90	35.17	39.69	40.16	42.63	31.12	32.13	38.53	61.64	80.40	67.70	44.43	26.70
October...	21.62	25.76	25.83	26.53	32.47	42.90	32.33	29.44	30.41	36.76	41.23	50.07	40.38	30.25	33.05	41.10	62.24	78.52	54.82	40.47	27.70
November...	27.47	25.43	25.35	29.30	31.46	42.70	30.81	30.13	30.74	37.39	43.08	49.87	39.75	33.28	39.50	44.12	74.18	73.67	54.17	36.97	28.93
December...	21.36	25.33	27.53	29.27	35.84	43.63	27.92	29.13	32.91	38.21	45.03	49.85	37.12	34.01	38.53	42.55	84.74	71.51	63.80	34.04	32.41
Average...	26.58	26.65	28.80	27.69	31.44	39.67	38.84	29.44	29.68	34.24	42.74	46.48	44.33	38.80	38.68	43.43	61.80	82.88	66.68	60.25	29.91

Tin Plate, at Pittsburgh, Dollars per Box

Metals,

	1901	1902	19
January...	16.00	11.45	11
February...	16.97	12.47	12
March.....	17.00	12.12	14
April.....	17.00	11.97	14
May.....	17.00	12.10	14
June.....	17.00	12.22	14
July.....	16.97	11.94	12
August.....	16.80	11.80	12
September...	16.80	11.80	12
October...	16.71	11.71	12
November...	16.82	11.44	12
December...	14.71	11.61	12
Average...	16.67	11.64	11

	1901	1902	19
January...	4.09	4.28	4.
February...	3.91	4.18	5.
March.....	3.89	4.29	5.
April.....	3.91	4.41	5.
May.....	3.97	4.50	5.
June.....	3.98	4.55	5.
July.....	3.90	5.23	5.
August....	3.92	5.48	5.
September...	4.02	5.48	5.
October...	4.20	5.43	5.
November...	4.32	5.29	5.
December...	4.35	4.91	5.
Average...	4.04	4.69	4

	1901	1902	16
January...	4.37	4.02	4.
February...	4.37	4.10	4.
March.....	4.37	4.10	4.
April.....	4.37	4.10	4.
May.....	4.37	4.10	4.
June.....	4.37	4.10	4.
July.....	4.37	4.10	4.
August....	4.37	4.10	4.
September...	4.37	4.10	4.
October...	4.37	4.10	4.
November...	4.37	4.10	4.
December...	4.19	4.10	4.
Average...	4.36	4.09	4

	1901	1902	19
January...	26.67	21.38	27
February...	26.55	21.73	29
March.....	25.95	26.10	30
April.....	25.94	27.29	29
May.....	26.82	29.26	29
June.....	28.22	29.29	28
July.....	27.41	29.28	27
August....	28.90	28.14	28
September...	25.04	26.55	27
October...	21.69	25.76	25
November...	27.47	25.43	25
December...	24.30	25.33	27
Average...	26.38	26.02	26

	1901	1902	19
January...	\$1.00	\$1.00	\$3.
February...	4.00	4.00	3.
March.....	4.00	4.00	3.
April.....	4.00	4.00	3.
May.....	4.00	4.00	3.
June.....	4.00	4.00	3.
July.....	4.00	4.00	3.
August....	4.00	4.00	3.
September...	4.00	4.00	3.
October...	4.00	4.00	3.
November...	4.00	3.60	3.
December...	4.00	3.60	3.
Average...	4.00	3.98	3

	1901	1902	19
January...	2.90	3.03	2.
February...	2.94	3.10	2.
March.....	3.23	3.10	2.
April.....	3.35	3.13	2.
May.....	3.30	3.10	2.
June.....	3.30	3.05	2.
July.....	3.10	3.00	2.
August....	3.41	3.05	2.
September...	3.78	2.98	2.
October...	3.23	2.79	2.
November...	3.10	2.75	2.
December...	3.10	2.75	2.
Average...	3.23	2.99	2

	1901	1902	16
January...	4.36	4.04	3
February...	4.36	4.36	3
March.....	4.84	4.36	3
April.....	4.84	4.36	3
May.....	4.74	4.36	3
June.....	4.80	4.36	3
July.....	4.48	4.36	3
August....	4.74	4.19	3
September...	4.78	3.99	3
October...	4.85	3.87	3
November...	4.84	3.85	3
December...	4.84	3.78	3
Average...	4.68	4.19	3

(Continued from page 56)

car builders did not become a factor until relatively late in the year, when heavy railroad car orders were placed. The automobile industry was a small buyer this year, although it did account for the movement of some iron during two relatively short periods. During April and May, some of the foundries serving the automobile industry became more active, but this activity consisted principally of the shipment of finished castings on which they had not yet received releases from the car manufacturers. In the latter part of July, August and September, there was a fair amount of buying of iron by foundries of this class. The most prominent purchasers of the year were manufacturers of sanitary ware, plumbing goods, heating apparatus and other household appurtenances. The American Radiator Co., the Standard Sanitary Mfg. Co., United States Radiator Co. and Kohler and Rundle in Wisconsin were among the companies of this class which bought frequently throughout the year. This activity was accounted for by dwelling house construction, which was stimulated by high rents.

From the first of the year until Aug. 1 there was a steady reduction in pig iron production in the Chicago district and out. It did not again start to increase until early in October.

Resale iron was a factor in this market in January and February, but by the end of the first quarter had largely been absorbed. While the decline in prices was uninterrupted until early in August, there was a moderate revival in business in March, April and May. The leading merchants, Pickands, Brown & Co., reported that their shipments in March were 30 per cent larger than in February, that April shipments were 30 per cent greater than those of March and that May shipments were 40 per cent larger than April. June and July, however, were exceedingly dull months. When the last Pickands, Brown furnace went out, the Inland Steel Co., which had been selling merchant iron throughout the year, advanced its prices and considerable business was closed at the old quotations on the eve of the advance. At the end of August, Inland again advanced its prices to \$21, forcing in considerable business at the old quotation of \$20. Early in September, it made a third advance to \$22, but this was not effective. The first break in the market resulted from the unloading of speculative tonnage bought by a broker at the old price of \$21. By Nov. 15

the price had dropped still lower to \$20 base and in December there was a further recession to \$19.

Average Monthly Pig Iron Prices, f.o.b. Valley Furnace, Per Gross Ton, 1921

	Bessemer	Basic	No. 2 Foundry	Gray Forge
January ...	\$32.00	\$30.00	\$31.875	\$30.875
February ...	29.00	27.50	28.00	27.00
March	26.20	24.20	25.70	24.70
April	25.00	22.875	24.75	23.75
May	24.20	22.00	23.40	22.40
June	22.75	20.75	21.875	20.875
July	20.875	19.375	20.125	19.125
August	20.00	18.20	19.90	18.90
September...	20.00	19.125	21.00	20.00
October	20.00	19.1875	21.00	20.00
November...	20.00	19.00	20.70	19.70

Average Monthly Prices of Pig Iron Delivered Philadelphia or Vicinity in 1921

	Basic Del'd Eastern Pa.	Standard Low Phos.	Gray Forge	Virginia XX
January ...	\$33.51	\$42.62	\$32.77	\$40.49
February ...	30.65	41.50	31.15	37.24
March	26.15	41.50	26.66	34.59
April	25.00	38.75	25.36	32.99
May	25.00	38.00	25.28	32.99
June	24.62	38.00	24.69	32.99
July	22.37	38.00	22.50	31.86
August	19.70	36.80	21.20	29.94
September...	19.19	36.50	20.00	28.49
October	20.50	36.50	20.50	28.24
November...	20.70	36.50	22.50	28.24
December...	20.62	34.37	21.69	28.24

Buffalo Iron Down to \$19.50

In the twelve months just closed Buffalo prices sagged from \$32.50 base—the ruling quotation Jan. 1, 1921—to \$19.50, the present market. Furnace operation picked up materially in the closing weeks of the year. The minimum operation was touched in July, when only three stacks were in blast out of a complement of 22. Nine stacks are now going. The lowest price the Buffalo market reached was \$18.50, but this concession was only in special instances when radiator interests came into the market for unusually large tonnages.

Foundry and Scrap Prices, Cincinnati, 1921

	Southern Foundry No. 2	Northern (No. Ohio) Foundry No. 2	No. 1 R.R. Wrought (Net Ton)	No. 1 Machinery Cast (Net Ton)
January ...	\$36.50	\$33.77	\$11.50	\$17.75
February ...	32.63	32.02	11.50	15.50
March	29.80	29.92	11.10	13.90
April	28.50	28.27	10.00	13.50
May	27.00	27.02	10.00	13.50
June	26.20	25.72	9.60	13.10
July	24.88	23.92	8.50	12.00
August	23.50	22.52	8.50	12.00
September...	23.50	23.12	8.50	12.80
October	23.50	23.52	9.00	14.00
November...	22.90	22.72	9.00	14.00

Coke Reverses Preceding Year's Record

Light Demand, Low Prices and Small Production Natural Results of Reduced Operation of Blast Furnaces

THE coke market in 1921 reversed its 1920 course. Instead of a demand well in excess of supply, which carried prices to the highest levels attained since coke production began on a commercial scale, there was always a sufficient supply and prices descended to the most reasonable bases in several years. The coke business usually is either a feast or a famine with the Connellsville producers. They enjoyed a "feast" in 1920, but in 1921 they had to put up with very lean times. Not a factor which contributed to the 1920 conditions remained in 1921. Steel companies operating their own by-product coke plants were not forced in 1921, as they were in the previous year, to depend on the beehive ovens, for a goodly part of their coke requirements, due to Fuel Commission regulations, which made it difficult to secure coal for their by-products plants; nor in the year just ended did the steel companies have transportation difficulties to defeat their coke producing efforts, and export demands were lacking as an excuse for pushing up the price of coal.

As a matter of fact, the coke requirements of the steel companies were moderate in the extreme last year, because of the subnormal demand for steel and

some of them having by-product plants actually became commercial producers of coke, not having a sufficient number of blast furnaces in operation to absorb the production. Merchant producers of pig iron were not pressed for tonnages and the number of such furnaces in blast rarely in recent years has averaged as low as in the past year. Only one merchant furnace in the Pittsburgh and nearby districts was in blast throughout the entire year, and this stack, one of the two operated by the American Manganese Co., Dunbar, Pa., oddly enough, runs on by-product coke, that company operating a Semet-Solvay installation. In late June, not a merchant blast furnace in the Mahoning and Shenango valleys was in blast and at the end of the year only three of the 14 merchant furnaces in that district were making iron. Operations of furnaces in other districts usually served from Connellsville ovens, also were low last year.

Greatly Reduced Production

The records, as compiled by *The Connellsville Courier*, indicated a production for 1921 of less than 3,400,000 net tons, or less than one-third of the output of the previous year and the ton value of last year's

production was less than one-third of that of the previous year, calculating on the average price for the whole year. The average price of spot or prompt Connellsville furnace coke for 1921, based on the weekly prices of THE IRON AGE, was \$8.32 per net ton at ovens. The highest price of the year, which was made early in January, was \$5.50. The 1920 average price of this grade was \$11.32, while the peak price was \$19. The descent in foundry coke prices in 1921 was in like ratio, although the demand for this grade relatively was better than that for furnace fuel, because the foundries averaged a slightly better relative operation than did the blast furnaces. The average price for spot or prompt Connellsville foundry coke for 1921, was \$4.63 per net ton at ovens, which compared with \$13.10, the 1920 average, while the top price in 1921 was \$7, as compared with \$20 in 1920.

Wage Reductions

There were several wage reductions during the year which materially reduced the costs of the Connellsville mine and oven operators, but they did not avail much in producing profits because never during the year was there very full mine or coke oven operations. The wage scale now in effect is that posted by the H. C. Frick Coke Co., effective Aug. 1, last. This schedule is the same as that of Nov. 10, 1917, of the same company. Independent operators for a time were paying a lower scale, but the threat of a strike and possible unionization of the district resulted in their adoption of the Frick scale, which, as compared with those unionized coal mining districts, gives the Connellsville operators a decided advantage as to costs. It is because of this advantage that the results for 1921 were not worse than they were, since it permitted the naming of prices on coal with which operators of union mines could not compete, and Connellsville coal moved to a number of markets not usually reached.

Not a Prosperous Year

Last year was not a prosperous one either for the by-product coke oven operators. Most of the steel companies having such plants operated at as low a rate as possible, without injury to the ovens, for they did not need much coke with many blast furnaces idle.

Commercial by-product plants had to keep going to meet gas requirements and the coke had to be sold cheaply, if at all. In the East, Connellsville coke was available usually at a delivered price well below that quoted by the by-product coke plants, which were at a decided disadvantage by reason of the high freight rates on coal.

There was a little change during the year in the relative standing of the by-product and beehive oven capacity. Few beehive ovens have been abandoned, while costs did not decline sufficiently to encourage additions to the number of modern coking plants. There are built and building in this country, 11,628 by-product coke ovens capable of producing annually 44,000,000 net tons of coke. Such a tonnage would have exceeded the total 1921 requirements and it also is patent what a large percentage of the country's needs now can be supplied from by-products plants when it is recalled that the maximum production in one year of both by-product and beehive oven coke was 56,000,000 net tons. This considerably exceeds the country's normal annual requirements, which, if it became necessary, probably could be accommodated by the by-product plants alone.

Improving demand for pig iron during the past few weeks gives rise to hopes of the early blowing-in of a number of blast furnaces, but there were no indications of such developments in the coke market in the closing weeks of 1921. Only a few contracts, for furnace coke, were under negotiation and these were for the first quarter requirements of furnaces now in blast. The gain in active blast furnaces since the low point of last July assures production to meet such increase in demand as has lately developed.

Connellsville Coke Prices for 18 Years

1921	Prompt Furnace	Prompt Fo
January	5.0625	6.375
February	4.50	5.625
March	4.35	5.45
April	3.50	4.75
May	3.25	4.50
June	3.00	4.45
July	2.8125	4.0625
August	2.75	3.75
September	3.15	4.15
October	3.275	1.375
November	3.03	4.19
December	2.75	3.8125

Safe Prices for Semi-Finished Steel

Lack of Activity in Bars Affects Adversely Consumption of Billets-- Large Spread Between Billets and Rods

SHEET bars stood out last year as the most active form of semi-finished steel in a market which, generally, was decidedly subnormal in respect to demand, in keeping with the market for finished products. Not a few users of bars have the facilities for rolling them from billets and in ordinary times find it cheaper to buy the billets than the bars. Similarly, not a few makers of tubular goods, lacking the facilities for making steel, are equipped to convert slabs into skelp, and as a rule buy the slabs. Over much of the past year bars and skelp have been available at rather less money than they could have been made for at the prices which ruled for billets and slabs. A slow and uninteresting market in these forms of steel, therefore, has been an altogether natural condition. Since most commercial producers of semi-finished steel also have finishing capacity, it is also natural that they should have tried to secure as much business in finished products as possible, not only to secure the finishing profit, but to avoid the condition of being obliged to sell the semi-finished material so cheaply as to have this recoil against them in the shape of competition on the finished products. The situation with regard to sheet bars differs from that in billets and slabs in that the makers of sheets and tin plate, lacking steel making capacity, have no intermediate product to draw on as bolt and spike manufacturers or the makers of tubular goods.

That sheet bars should have shown the lead in activity, therefore, is not surprising.

Little Buying of Bars

The lack of real activity in merchant mill products such as hot-rolled flats—hoops, bands, cotton ties and strips—affected adversely the consumption of billets, but the heaviest loss in billet tonnage is directly chargeable to the very low ebb to which the buying of merchant steel bars fell in the past year. There was only limited buying by the agricultural implement manufacturers who felt heavily the contraction in buying by the farmers, who in 1921 were not better off financially than they were the year before. Railroad buying of bars amounted to little and the automobile industry was less a factor than before in several years. The automobile makers carried over rather heavy tonnages from 1920 into 1921 and even when these stocks were used up, they were careful to gage purchases by requirements. Demands upon the makers of cold-finished steel bars and shafting were light throughout the year and this affected the consumption of hot-rolled bars and, in turn, billets. Inactivity in slabs reflected the relatively light demand, taking the year as a whole, in pipe and plates. If it were not for a brisk rally in the fall in the price of crude oil, consumption of slabs would necessarily have been smaller than it was, for

the appreciation in oil prices brought out late in the year some rather good orders for line pipe and for oil storage tanks. Trading in forging steel was limited and sporadic. The automobile industry was a sparing buyer of forgings; there was little business from the implement manufacturers or the railroads and the low rate of shipyard activities also told heavily on the demand.

Demand for Wire Rods Curtailed

Every use to which wire rods are put was restricted in 1921. Wire products suffered by reason of the light demand from the agricultural regions, which usually take 50 per cent or more of the total output of the mills. Chain makers were not crowded with business, nor were the makers of screw stock or rivets.

Prices of semi-finished steel were soft throughout the year and attempts to either stem the downward movement or to establish an advance proved even more futile than did those in finished materials. This was because producers did not always have orders sufficient to absorb production and the non-integrated manufacturers exerted a good deal of pressure on prices to get the unfinished steel cheaply enough to be able to compete in the market in finished products. Sheet bars declined from \$47 in January to \$29 in September and the latter price was not exceeded on much tonnage during the remainder of the year. In the September effort at price stabilization, when sheet prices were advanced \$5 a ton, the quotation on sheet bars was put up to \$32, but just as the consumers of sheets were allowed to enter orders at the old prices, sheet makers who buy their bars were given a chance to cover their requirements at the old basis. Another advance in sheets was attempted in early October and at the same time an effort made to put sheet bars to \$34, but the

effort was a dismal failure and since it was followed by a decline in sheets to even below the early September bases, the price ideas of buyers of sheet bars declined accordingly.

The market at the end of the year was \$29 to \$30, Pittsburgh or Youngstown, this price showing a decline for the year of \$17 to \$18 per ton or about 38 per cent. Soft billets dropped from \$43.50 in January to \$29, and the latter was the basis of such business as was done in the closing weeks of the year. This was a decline of about 35 per cent for the year. Forging billets fell from \$48.50 to \$32 or about 34 per cent and wire rods from \$57 for the base size to \$38, a decline of \$19 a ton, or one-third of their January, 1921, value. As compared with 1913, the last normal year prior to the war, soft billets now show an advance of only \$3.21 per ton on the average price of that year, while rods at \$38 are \$9.60 per ton above the 1913 average. The spread between billets, and rods in the 1913 average was \$2.61 per ton; to-day it is \$9 and this presents a condition that sooner or later must find correction.

Average Monthly Prices on Semi-finished Steel, 1921
Pittsburgh

	Billets		Sheet Bars		Wire Rods
	Bessemer	Open-Hearth	Bessemer	Open-Hearth	
January	\$43.50	\$43.50	\$47.00	\$47.00	\$57.00
February	41.00	41.00	44.50	44.50	54.50
March	38.40	38.40	39.70	39.70	52.00
April	37.50	37.50	38.50	38.50	49.00
May	37.00	37.00	39.00	39.00	48.00
June	37.00	37.00	34.25	34.25	48.00
July	32.25	32.25	31.20	31.20	42.75
August	29.60	29.60	30.00	30.00	41.60
September	29.00	29.00	30.00	30.00	39.50
October	29.00	29.00	30.00	30.00	40.50
November	29.00	29.00	30.00	30.00	40.00
December	29.00	29.00	30.00	30.00	38.00

Plates, Shapes and Bars Dull

General Disposition to Abandon Pittsburgh Basing Point—Reduced Operations of Many Consumers

THE steel industry last year had its first taste of the effects of the war time expansion in capacity for rolling the heavy tonnage products, and is hoping fervently that 1922 is not going to repeat the dose. With capacity for caring for very much greater tonnages of plates, shapes and bars than were wanted, it is merely stating the obvious, in observing that competition for business constantly waxed keener, not only between mills in the several producing centers, but actually between the centers themselves. In the latter part of the year, there was an open abandonment of the Pittsburgh base in the quotations of mills, both East and West, and indeed, on the part of at least one Pittsburgh company, which undertook the delivery of steel products by the inland waterways and took orders on a delivered instead of an f.o.b. Pittsburgh base, with an idea of offsetting the freight rate advantages enjoyed by Western mills on Western and Southwestern business, when the latter began billing f.o.b. mill or f.o.b. Chicago. Buffalo mills, while the New York State barge canal was open to navigation, largely controlled the Eastern market by quoting delivered prices, New York, which, because of the low canal freight rate, were well below those named by mills, either in Pittsburgh or observing the Pittsburgh base. In passing, attention should be drawn to the fact that manufacturers using the inland waterways for shipments wisely quoted a delivered price instead of a mill base, and adding the water freight rate. To have adopted the latter plan instantly would have focussed the attention of the railroads on the question and possibly might have resulted in an upward revision of the water rates. The competitive conditions of the year, of which the use of the waterways was one result, accomplished what Western consumers of steel for several years have been agitating, the abolition by law of Pittsburgh as a sole basing point of steel prices. As a matter of fact, there is never, except when it will best serve their purposes, very rigid

observance by the manufacturers outside of Pittsburgh of the Pittsburgh base, but non-adherence is not usually as open as it was during the latter part of 1921. While the tendency to quote an f.o.b. mill or a delivered price embraced almost all steel products, it was more pronounced in plates, shapes and bars than in the other lines.

Previous Period of Stagnation

With regard to the demand for these major steel products, it is necessary to go back to that period of stagnation which ruled just before and after the beginning of the world war, as the last previous time when manufacturers experienced such lean times as they did last year. The early part of 1919, following the signing of the armistice, was dull, but there was a recovery which was broad and rapid in that year, while in 1921 business was good only for a period of about eight or ten weeks, roughly, from about the first of September until the middle of November. During the first eight months of the year, consumers were chiefly concerned in reducing the large stocks carried over from 1920, and since this process was slow and laborious, new buying was both sporadic and small. There was very little industrial construction, because expansion in this direction during the war was so great that the country's requirements for the next few years at least, had been anticipated. The obstinate position of the building trades in refusing to go along with the economic and industrial readjustment, while it did not entirely stop new office and other structural work, undoubtedly prevented the placing of much more work of this sort than actually was placed. It was not the cost of the steel, its fabrication or erection, that prevented the placing of structural work, for steel prices declined 40 per cent during the year and even more as compared with the 1919 peak prices, while there were projects in several parts of the country against which the fabricating shops contracted to furnish, fabricate and erect the steel

at prices around \$60 per ton, which was approximately the price for work of a like character before the war.

Work of Fabricators

According to the compilations of the Bridge Builders and Structural Society, all of the fabricating shops of the country for the 11 months ended Nov. 30, had taken orders aggregating 686,800 tons. With the country's fabricating capacity over 180,000 tons a month, the business for the 11 months would have been sufficient to keep the shops running full for less than four months. These facts bracketed with the large stocks carried over from 1920, picture graphically the causes for the lowest operation structural mills have had in a number of years. Structural beams started the year at 2.45c., Pittsburgh, and ended at 1.50c., and this price not infrequently at mill instead of Pittsburgh. While attractive tonnages usually were stipulated, it became the practice of mills toward the end of the year to regard orders for 400 or 500 tons as "attractive."

Railroads Repair Rather Than Build

The railroads were not important factors in the demand for structural material. They repaired rather than built new bridges. They were not directly, or indirectly, heavy buyers of plates and bars at any time during the year, although they did create some business for the plate mills in the repairs to equipment they started after the July 1 wage cut became effective, and later provided a fair amount of plate business by ordering some new cars, the details of which are given elsewhere in this issue. It was the oil industry, through its pretty constant orders for storage tanks, which provided the best outlet of plates during the year. Incidentally, the fabricating in transit privilege was freely exercised in connection with tank orders and this resulted in an abnormal placing of the plate orders. Mills located much further away from the fabricating plant frequently were able to underquote nearby mills by reason of having a lower through rate to ultimate destination. Demand of the shipbuilding industry for plates were small to the point of being trifling. There was no Government building of merchant steamships during the year and little private construction on either the coast or the lakes. The largest order that came out in Cleveland was 3200 tons and this was for repair work. Warship building brought no new business and much tonnage ordered now may be cancelled in the event the

naval construction holiday is approved by the various nations represented at the disarmament conference in Washington. Plate mill capacity expanded more than any other class of mills during the war and this contributed in no small measure to the weakness of prices during the year. Plates were quoted at the beginning of 1921 at 2.65c. Pittsburgh. At the close of the year they could be bought at 1.50c. f.o.b. Pittsburgh, f.o.b. Chicago or f.o.b. mills. Plate mill operations in all parts of the country were low during most of the year but because of the increase in number it is possible the output may show well by comparison with pre-war records on a fewer number of units.

Limited Buying of Bars

Steel bars suffered in demand because of the sub-normal requirements of the agricultural implement makers, the railroads and the automotive industry, which ordinarily account for the great bulk of consumption. The automobile makers carried over large stocks and though they enjoyed a couple of spurts of good business, they got along without finding it necessary to make big purchases. Railroads waited until labor became more reasonable before doing any buying and then they bought sparingly. The implement makers again were confronted with the problem of trying to find business among buyers without money. Two successive years of low prices for farm products made the financial position of the farmers so bad they simply had to make their old tools do. A Chicago hard steel bar plant, dependent almost entirely upon the implement industry, was shut down in December, 1920, and since has not turned a wheel. Bar mill activities like those in plates and shapes, rarely were good during the year, and the competition for business was so keen that, like plates and shapes, bar prices drifted away from a Pittsburgh base. The common price in Pittsburgh, Chicago, Cleveland, Buffalo and other points of production at the end of the year, was 1.50c. At that price f.o.b. Pittsburgh, bars were below the 1913 average and if prices in other markets are reduced to the Pittsburgh equivalent, there is a price as low as 1.12c., deducting the freight of 38c. per 100-lb. from Pittsburgh to Chicago. That is very close to the extreme low point of pre-war times. If pre-war prices are the ultimate goal of buyers, bars have not far to go and as bearing on the future course of the market it must be noted that bars are more fully deflated than probably any other steel product.

Lean Year for Wire Products

Low Prices of Farm Products Have Marked Effect—Efforts to Stimulate Business

HISTORY was made last year in wire products. For the first time on record, an attempt to advance prices by means of the usually successful formula of first intimating an early advance and then allowing buyers to cover for 60 or 90 days at the prevailing prices, was a dismal failure. This happened early in November, when the American Steel & Wire Co. and some of the independents notified their customers of an impending advance, but expressed a willingness to take contracts for two or three months at the "regular" quotations of \$2.90 base per keg, Pittsburgh, for nails and \$2.60 base per 100-lb., Pittsburgh, for plain wire. In September such an effort had been fairly, but not wholly, successful. In August, business, which previously, since the beginning of the year, had grown progressively worse, began to increase and with orders, notably from jobbers, coming in fairly freely, the time was considered ripe to attempt a price stabilizing effort. Accordingly most of the manufacturers advised the trade that as of Sept. 12, there would be an advance from \$2.75 per keg for nails to \$2.90 and in plain wire from \$2.50 to \$2.60; in cement coated nails from \$2.35 per count keg to \$2.45 and in galvanized wire from \$2.95 to \$3.10, and galvanized barbed wire from \$3.40 to \$3.55. The American Steel & Wire Co., which

initiated the movement, secured more than 300,000 tons of business as a result of the lifting of quotations and a number of the independents also secured substantial contracts covering the ensuing 60 and 90 days. All makers of wire products did not follow the advance, the Youngstown Sheet & Tube Co. being one of them, and some of those who made the advance failed to get many contracts.

Inasmuch as the business secured on the drive was at the old and lower levels, and that some companies never departed from these prices, the new quotations were the basis of little or no business. This is easily understood when it is repeated that all companies did not share alike in the business which came out in September and the customers of those that had the lightest bookings would be put at a disadvantage with those of the more successful manufacturers if obliged to pay the new prices. Moreover, there still remained the companies which did not make the advance. All that resulted from the advance was that distributors were able to get a larger profit, since they, of course, based resale prices on the new mill bases, although covered on supplies at the old prices.

It was to give basis to the quotations \$2.90 for nails and \$2.60 for wire that the November drive for orders

was started. With steel prices generally showing a downward slant at that time, jobbers and consumers could not see the justification in an advance in wire products and accordingly failed to respond. Some contracts were made at \$2.90 for nails and \$2.60 for wire, but being on the basis of an advance which was to follow, they became only "scraps of paper" when the advance did not take place. If there were any shipments against these contracts, they did not carry higher prices than \$2.75 for nails or \$2.50 for wire and in a broad way those were the maximum prices obtained during the last half of the year. The market grew weak in December, when wire dropped to \$2.25 base per 100-lb. and there was considerable shading of \$2.75 for nails, forced by the action of some of the smaller makers in quoting on a mill instead of a Pittsburgh base, and thus giving buyers the advantage of savings in freight. On Dec. 15, prices were dropped \$5, making wire nails \$2.50 and plain wire \$2.25.

As was true of almost all steel products, there were several attempts during the first half of 1921 to stabilize prices of wire and wire products, but it invariably happened that no sooner were prices set up as "regular" than that they were toppled over by some makers who needed orders. In the April stabilization movement when the Steel Corporation lowered its prices and independent prices were advanced, nails were put at \$3.25 base per keg, Pittsburgh, and wire at \$3 base per 100-lb., Pittsburgh, but these prices were not long

maintained and a drop of \$5 per ton, which came a few weeks later, was followed by another of the same amount, before business began to pick up in August.

It was a lean year both in business and profits. Prices over most of the year were soft and this fact, as usual, made for cautious buying, while financial distress in the agricultural regions largely cut off the most important outlet for wire products. The farmers did not have the money to buy fence or wire because there was no money in their crops in 1921 and following the disastrous results of 1920, their credit with the banks was impaired. The makers of fence did everything possible to stimulate business. As early as July they were giving November datings on orders and later they gave guarantees against a decline in prices, running up to the spring of 1922. But neither effort helped much. Nails were the most active wire product, and they, as far as profits go, are to manufacturers as sugar is to the corner grocer. There are hopes that 1922 is going to be much better than 1921, but few expect better business until the second quarter, because the farming population hardly will be buyers before then, while nails, being essentially a building necessity, can not well move freely until the weather is open enough to permit such work. As compared with other steel products, excepting only sheets, wire products at current prices have made relatively less progress back to normal pre-war prices and this may have some bearing on the 1922 demands.

Decreased Demand for Sheets and Tin Plate

Automobile Industry Not as Important a Factor as in 1920—Many Tin Plate Mills Idle

THE story of the sheet market in 1921 does not vary much from that in other steel products. Independent manufacturers, who in 1920 enjoyed highly prosperous times, with a large production sold at high prices, in 1921 experienced neither a large business nor profits. Indeed, if the estimates of producing costs have either value or basis, the prices which prevailed during most of the year must have forced incursions into the surplus accounts built up in 1920. A number of mills, notably those of the American Sheet & Tin Plate Co., were kept fairly busy by a pretty constant demand for light gage black sheets from Japan and some demand for this kind of stock also came from European countries. It was not particularly satisfactory business, since it was of the tin mill gages and dimensions and it was so costly to produce that several makers who shared in the business later regretted that they had. However, the business was something of a backlog and helped to keep some capacity going when domestic business was light and hard to get.

Domestic business was considerably below normal, taking the year as a whole, and it was really small by comparison with that of 1920. There was a good demand for sheets used for building purposes and those engaged in the building of railroad cars were relatively good buyers of corrugated galvanized sheets for car roofs and ends. The latter demand, however, was less in connection with new cars than in the repairs to old ones. The automobile industry was not nearly the factor in the market in 1921 it was in the year before, but the tonnage that industry purchased in 1920, as has been pointed out frequently before, was greatly magnified by the fact that there are so few manufacturers who can make sheets of the kind used in automobile bodies, fenders, cowls, hoods, etc., and also because the desire for rush shipments created a stir far greater than warranted by the actual business placed. It was an even lighter year for the makers of such sheets than it was in the automotive industry itself, for the reason that the automobile makers almost without exception, carried over pretty big supplies and in those periods when business was good they did not have to make many or large new purchases. Electrical sheets were dull throughout the year, not only because the slump in the demands upon makers of automobile starting and lighting systems but because it was a dull year

for the makers of motors generally. Jobbers evidently carried over pretty large stocks from 1920, because they evinced little interest in the market until late in the year.

Declining Price Tendency

The tendency of prices throughout the greater part of the year was down and until the last month or so efforts to check the decline or to stabilize prices met with little success. The beginning of the year found all makers quoting a uniform basis of 4.35c. for black, 5.70c. for galvanized and 3.55c. for blue annealed sheets. These were the prices which the Steel Corporation subsidiary had observed throughout 1920, and indeed from March 21, 1919. The independents found it impossible late in 1920 to do business at above these bases and they found out early in 1921 that they could not get business at those prices. The Steel Corporation enjoyed a business in January that permitted it to keep 90 per cent of its mills running. With independents averaging less than a third of the rate, it was only natural that such an uneven division of the business should have aroused them to action. And it did. Early February saw price cutting by the independents to secure orders and thereafter until September prices were weak under open market competition. Even in September, when prices were advanced \$5 a ton or from 2.75c. to 3c. for black, 3.75c. to 4c. for galvanized, the gain to the mills was in orders rather than in money returns, for preceding the advance buyers were given ample time to cover at the old prices. When another advance of \$5 per ton was attempted in early October, it not only failed but was followed by a fresh decline, carrying prices even lower than they had been prior to the September advance. The October attempt at putting up prices failed because so many requirements were filled on the September drive and also because it came before the September advance was established.

From Nov. 25, when the American Sheet & Tin Plate Co. opened its books for first quarter and first half of 1922 business, and named 3c. base for black, 4c. base for galvanized and 2.25c. base for blue annealed, on first quarter business, the market showed marked firmness on those bases. Business was slow but all makers seemed tired of taking business at a loss and these prices were well observed. The American

Sheet & Tin Plate Co., which profited none by the high prices of 1920, had to go along with the decline in 1921 to hold its trade, but it did have the satisfaction of having a relatively better average operation of its mills than the independents, and also of turning out a higher proportion of its potential capacity than the outside companies.

There were only trifling additions to sheet mill capacity during the year, and these were entirely by the independents, who made a net gain of about 20 mills, counting 8 new mills of the Republic Iron & Steel Co., at Niles, Ohio, and 10 new mills at the new plant of Follansbee Bros. Co., at Toronto, Ohio. The Apollo Steel Co., Apollo, Pa., added to its capacity, but there was some dismantling of units by others.

Tin Plate Market Was Disappointing

The tin plate market for 1921 was a disappointment, as following two light years, last year was expected to be good. If production was as much as 50 per cent of normal capacity, it will be a big surprise. There was not the demand in the first place and secondly, labor troubles kept a number of plants idle for several months, and in one instance for the entire year. These troubles affected mills which previously had been operated under an agreement with the Amalgamated Association of Iron, Steel and Tin Workers, and came

as a result of an effort to establish "open shop" working conditions. Three of the five companies finally signed up with the association and got going in the fall after being down since June 1, while the other elected to fight out the issue.

The demand for tin plate for perishable food was good in connection with the pack of peas and for condensed milk, which got fairly well back from the distressful conditions of 1920, where the over-production of the war time period was bearing down heavily on the industry. The pack of tomatoes and other vegetables was low and there was almost no pack of salmon, although 1921 was a year of a good run of these fish. Oil can and general line requirements were good but could have been better. Packers generally underestimated their requirements and there were a good many hurry-up orders after the vegetable packing season had started. The mills, lacking production orders, made up a good deal of tin plate and this put the market on more of a spot than a contract basis over a good deal of the year.

Prices began the year at \$7 per base box, dropped to \$6.25 in April, to \$5.75 in July and to \$5.25 in August, to \$5 in October and finally to \$4.75 in November, this latter price being the official quotation of the American Sheet & Tin Plate Co., effective Nov. 3, and applying to all shipments after that date.

Oil Well Demand for Pipe

New Field in Texas is Developed—Year Begins and Ends With Cuts in Steel

THE year began, and it might almost be said, ended with a price reduction in steel pipe, for on Dec. 15, the National Tube Co. issued new cards which lowered the price of standard or merchant pipe \$5 per ton, oil country tubular goods by a like amount and line pipe \$6 per ton. The first day of the year 1921 saw the issuance by several independent makers of steel pipe, of new cards, which reduced their prices to the levels which the leading interest steadily had observed from March 21, 1919. Throughout 1920, the independent cards had shown advances of \$7 to \$10 per ton over the National Tube Co. quotations, but the actual sales prices during most of that year had only remote relation to the card quotations. High prices in 1920 were largely, if not wholly, due to the demands of the oil industry. The collapse of the oil market late in that year cut sharply into the demands upon all makers, but hit the independents hardest since the bulk of their bookings was at prices well above those of the National Tube Co. Shrinkage of independent order books forced the revision in independent prices back to the level of the leading producer and this change came on or about Jan. 1, 1921. Four other changes, all reductions, came during the year, with the National Tube Co. usually taking the lead in putting out new cards, but only because its cards, though always adopted by the independents, soon after issue became obsolete, as selling bases, owing to the competition for business.

First Change in April

The first change in steel pipe discount cards came April 8, when the Mark Mfg. Co. issued a card increasing the discount 5 points, thus cutting the price \$10 per ton, putting the base size of black butt weld pipe at 62½ per cent off list. This reduction was not met by other independents or the National Tube Co. and the card was withdrawn, when as of April 13, the latter issued its first new card since March 21, 1919. This card made reductions of from \$4 to \$10 a ton in black butt weld standard pipe, and \$4 to \$12 a ton in galvanized butt weld in the sizes ¼-in. and larger and of \$8 to \$10 per ton in lap weld standard pipe. Corresponding reductions were made in oil country and line pipe. This card also made some changes in size groupings, ½ in. being set up as a separate size; formerly it had been bracketed at the same discount as ¼-in. pipe, and the base sizes of butt weld pipe, previously, from ¼-in. to 3-in. were changed to 1-in. to 3-in. This

new card was part of an effort at steel price stabilization, which crystallized in uniform quotations by both the independents and the Steel Corporation on all steel products, this move bearing a date of April 12.

Cards Disregarded

Observance of the April 13 steel pipe card soon grew lax, and on July 7 it was supplanted by a new one, which lowered standard pipe \$2 to \$4 per ton on the butt weld sizes and \$4 to \$6 a ton on lap weld sizes, while oil country pipe was lowered \$4 to \$7 a ton. This change merely affirmed publicly prices which previously had been made quietly. The July 7 cards remained effective for an even shorter period than the preceding one, for on Sept. 16 new schedules appeared, which made a cut almost as deep as that of April 13. The Sept. 16 cards reduced butt weld sizes of standard and line pipe \$8 a ton and lap weld sizes \$8 to \$10, with oil country goods declining to about the same extent. This card also changed the size brackets on large diameter lap weld pipe; previously 7-in. to 12-in. pipe took the same discount, while in the Sept. 16 card 7-in. to 8-in. pipe and 9-in. to 12-in. pipe were set up at separate discounts. Business in steel pipe, which had steadily declined during the first seven months of the year, improved in August along with other steel products, but not nearly to the extent of providing all manufacturers with more than part capacity operations. The upward slant of demand continued during the remainder of the year, with real activity appearing in line pipe, due to a rally in the price of oil and the opening up of the new Mexia field about 75 miles southwest of Dallas, Tex. Despite the improvement in business, however, there still was not enough to go around and there continued to be application of the stimulant of concessions from the established or regular prices. Price cuts in line pipe were particularly severe, sales of 4-in. pipe being made in November as low as \$44 per net ton, Pittsburgh, at a time when merchant pipe of the same size was quoted at around \$70 per net ton.

Disparity in Prices

On the ground of producing costs there is little excuse for such a disparity. The actual cost difference size to size, between merchant and line pipe, largely is in the fact that the coupling for line pipe must be heavier and stronger than the merchant pipe coupling.

and consequently more costly. But there is usually more tonnage per order of line pipe than in merchant pipe and the former being more desirable from the manufacturers' standpoint, there naturally is keener competition for business. The cutting of regular prices was not confined to line pipe, however, there being instances where the supplementary discounts, on merchant pipe, to large jobbers instead of the regular one point and 5 and 2½ per cent off, went as high as two full points, or 70½ per cent off list for the base sizes. This condition forced the new card, dated Dec. 15, previously referred to.

The end of the year found the card discount on the base sizes of merchant steel pipe at 71 per cent off list, as against 57½ per cent as of Jan. 1, a rise in the discount of 13½ points, the equivalent of a reduction of \$27 per ton. The year, as a whole, was an unsatisfactory one, especially when contrasted with 1920, when the market purely was a sellers' affair, while last year the advantage was with the buyer. Caution was the keynote with buyers throughout 1921, but this augurs well for 1922, since it means relatively light stocks in jobbers' and consumers' hands. This year gives promise of considerable oil well development, since oil prices are back upon a profitable basis and it also promises well for merchant pipe because there remains a shortage of housing to be partly made good in the next twelve months.

Welded Iron Pipe

The story about wrought iron pipe with respect to business is similar to that of steel pipe. There was the same transition from stout to lean order books in

the early part of the year and a gradual gain in the last four or five months. Price revisions in wrought iron pipe have been as frequent as in steel pipe, there being one March 1, another April 13, another July 7, and the last one Sept. 1. The first change was a cut by the Reading Iron Co., which canceled about one-half of the advance made by that company in December, 1920. This change put the principal makers of iron pipe on the same basis of prices. The April 13 reduction was \$6 to \$12 a ton on standard black pipe, and \$6 to \$14 a ton on galvanized. In July iron pipe prices were cut \$8 to \$12 per ton, or just double the reduction made at that time in steel pipe. On Sept. 1 came another cut, this time of \$10. The base discount on black wrought iron pipe stood at 25½ per cent off list Jan. 1; on Dec. 31 it was 44½ per cent, this being equivalent to a drop of \$36 a ton for the year.

Spread Between Iron and Steel

There has been very little narrowing of the spread between steel and wrought iron pipe during the year. It was a matter of \$64 a ton in favor of steel at the beginning of the year, and at the end of the year amounted to \$63 a ton, these figures being calculated on the base sizes of black butt weld pipe. This price advantage for steel pipe is a real hardship for makers of wrought iron pipe, in competition with steel pipe, and apparently there is little likelihood of a change in the price relation of the two kinds, because the manufacture of iron pipe involves much hand labor which does not gain in efficiency or cheapness, as do the mechanical means employed to an ever-increasing extent in the manufacture of steel pipe.

Uneventful Year in Old Material

Low Rate of Operations at Metal Working Plants Reflected in Dull Market for Scrap

IN a year in which iron and steel production was at the lowest point in many years, the demand for scrap was also at a minimum. The year was uneventful in every respect. Price tendencies were downward, with the exception of brief periods in May and again in the early fall when a slight gain in operations among steel plants, foundries, iron rolling mills, etc., created a better demand and an upward movement in prices.

While the net decline in the price of heavy melting steel, delivered in the Pittsburgh district, was only a little over \$1 a ton during the year, other grades declined much more. For example, No. 1 cast at Pittsburgh dropped from \$25 to \$16. In other districts, there were similar declines. Heavy melting steel for delivery at eastern Pennsylvania steel plants was quoted at \$14.50 early in January and at \$11.50 in late December.

During the year, production of scrap naturally fell off because of the low rate of operations at most metal-working plants and much of the scrap offered for sale came from the railroads. In the monthly sales of railroad scrap, the bids put in by consumers were frequently higher than those quoted by dealers and brokers, hence a good deal of the railroad material passed directly into the hands of its users.

The low prices reached in mid-year attracted the speculative interest of both dealers and consumers and considerable scrap was accumulated. Some steel plants have sufficient stocks in storage to last for two or three months, at least, even though a better rate of operations is reached in the first quarter of the year than has been possible during 1921. Scrap dealers have accumulated old material at varying prices, some having started to buy speculatively before the bottom of prices had been reached. The effect of this will be to withhold these accumulations from sale until prices have reached a point where a good profit can be had. Some dealers have heavy melting steel in their yards which has cost them about \$15 or more a ton and obviously will not dispose of it until prices have reached what to them is a profitable basis.

The Pittsburgh scrap market showed its greatest

weakness in April, June and July. In April, dealers seemed to tire of guessing where the bottom was and, having tied up a good deal of money in yard stocks, withdrew from the market. Steel orders, accumulated on the price stabilization effort of April 12, caused some improvement in scrap demand in May, but it was short-lived and the market turned weak in June and July. Improvement in the steel business and in steel works' activities after the middle of July filtered through to the scrap market in August, and thereafter until about the middle of November there was fairly well-sustained buying of the steel works grades. The steel mills of the Pittsburgh district had a fairly good run of business between Sept. 1 and Nov. 15, but as it was low-priced, effort was put forth to keep down costs of production, and this was largely achieved by increasing the melt of scrap. The highest prices paid for steel scrap came early in the year. Steel companies figured more heavily in the tonnages bought than foundries, few of which, with the exception of those making castings for sanitary ware, were at all well engaged. The end of the year found many yard dealers carrying large stocks, bought at prices which would net a loss if sold below \$17. While railroad lists were fairly heavy each month, offerings of industrial scrap were light. The automotive industry was a relatively small producer of scrap in 1921.

Eastern Pennsylvania Market Inactive

During a greater part of the year the demand for scrap from eastern Pennsylvania steel plants, and likewise from other metalworking industries which melt scrap, was very small. Many consumers took advantage of the situation to pick up their requirements from offers which in the terms of the trade are classed as "forced sales," and one steel company, though not operating its plate mills for a considerable part of the year, accumulated a large store of steel in small lots and this scrap it still has in readiness for the time when an increased steel production requires its use. Two or three plants which run entirely or very largely on a scrap mixture were fairly consistent buyers

throughout the year, but the grades they use are chiefly stove plate, railroad grate bars, borings and turnings. Only during a short time in the fall was there a fairly active scrap market in the Philadelphia district, and after that show of strength the market lapsed into weakness which continued up to the end of the year. If any point is worthy of special emphasis regarding the 1921 scrap market, it is that production of scrap as well as consumption fell far below normal. Scrap dealers regard the available supply as inadequate for any quick revival in steel production. Since the low prices were reached six months or so ago, dealers have been bullishly inclined and strongly of the opinion that prices will advance with some rapidity on the first dependable showing of improved business conditions in the iron and steel industry.

Much of the supply of borings and turnings naturally flows from New England to the Pittsburgh and eastern Pennsylvania steel-making districts, but during 1921, production in metalworking plants was so low that the supply of borings and turnings was exceedingly limited, this causing spurts of strength in these grades at various times during the year.

Cleveland Scrap Market

The Cleveland scrap market probably suffered more from the depression during 1921 than any other consuming center in the country, owing to the very limited operation of Cleveland mills. From being an important consuming center of scrap from outside producing points, Cleveland had to find an outside market for much of its scrap, a large share of which went to Valley mills, Canton, Weirton, and the Pittsburgh district. Previously, Cleveland mills had consumed much of the scrap produced at the Detroit automobile plants, but other outlets had to be found for the Detroit scrap, much of it going to Valley mills. The absence of a local demand resulted in unusually low scrap prices in Cleveland, as scrap sold for outside shipment had to carry a freight rate, and the lowest freight rate to an outside consuming point was \$2.10. The activity during the year was confined largely to heavy melting steel and blast furnace borings and turnings. Cleveland iron rolling mills bought no scrap during the year and sales of cast scrap were very light.

One Cleveland mill purchased considerable heavy

melting steel to lay down in its yard and little of this has, as yet, been consumed. Some of this was bought at \$10, delivered, and the highest price paid was \$13. Prices on heavy melting steel ranged from \$14 to \$14.75 at the opening of the year, but settled down to about \$10.50 to \$11 in June, and in December had worked up to \$11.50 to \$12.

Chicago Scrap Market in 1921

During 1921 there were four speculative advances by Chicago scrap dealers, only one of which, however, was of long duration. Toward the end of January dealers bought railroad material freely and advanced their prices, but this boom quickly burst early in February, following which there was a continued drop in prices until the end of April, when dealers again commenced to bid against each other for railroad material and laid in stocks in their yards in anticipation of subsequent buying by consumers. This advance continued until the end of May, when the market broke again. Declines proceeded throughout June and July, prices reaching the low point of the year in July. In the last week of July the dealers again took heart as a result of two good-sized steel purchases by mills. All through August, September and October the dealers continued to lay in stocks at advancing prices and sold some material to consumers at the rising quotation. Toward the end of October, however, the prospect of a railroad strike tended to weaken the market and distress tonnage was sold at reduced prices. During the middle of November the market advanced again, but soon broke, and at the end of 1921 prices were again declining.

Average Monthly Prices for Leading Grades of Scrap,
Per Gross Ton, Delivered, Pittsburgh

1921	Heavy Melting Steel	No. 1 Cast Cupola	Bundled Sheets	Machine Shop Turnings	Cast Iron Borings
January	\$15.50	\$25.00	\$11.00	\$10.00	\$13.00
February	16.00	22.75	11.00	10.00	12.00
March	14.00	21.20	10.30	9.40	11.45
April	12.625	18.00	9.00	8.125	9.375
May	13.30	18.00	9.00	8.70	9.70
June	12.6875	16.625	8.25	7.5625	8.375
July	12.00	16.00	8.00	7.00	7.625
August	12.70	16.20	8.60	7.85	8.30
September	13.625	16.875	9.375	9.0625	9.00
October	14.125	17.50	10.375	9.5625	10.125
November	14.30	17.10	10.80	9.85	10.40
December	14.25	16.13	10.50	8.88	9.25

Postponed Buying of Cast-Iron Pipe in 1921

Municipalities Frequently Re-advertised Because of Declining Market
—More Sales Than in 1920

THE rapid liquidation of cast-iron pipe prices during 1921 caused a year of unusual uncertainty for both producers and buyers. Municipalities continually advertised for bids, only to reject them and re-advertise later, when the chances were they would receive lower offers. Prices declined approximately 33 1/3 per cent during the year—more specifically, 25 per cent in the East; 33 per cent in the Chicago district; and 38 per cent in the Birmingham district. Gray forge pig iron fell about 31 per cent in the same period.

The first of the year saw general reductions in pipe foundry labor, averaging 20 per cent; pig iron began a gradual descent; however, pipe prices did not respond to the lower making costs until the middle of the year when the drop came suddenly. From the middle of May until the last of August, prices in New York fell from \$63.30 to \$42.30 for the 6-in. size. Two weeks later, they were raised about \$5 a ton and continued at that level the remainder of the year.

Compared with other iron and steel industries, the year for the pipe makers was excellent. Only one line of iron and steel manufacture rivaled it—those engaged in the manufacture of heating equipment, such as radiators, stoves and boilers. It was reported from Chicago at the middle of November that the "tonnage booked to date this year compares favorably with that taken during the entire previous year." Figures from two thirds of the plants of the United States show total bookings up to Dec. 1, 1921, of close to

280,000 tons as compared with 285,000 tons for the entire year of 1920.

Such a heavy demand was natural. During the war the price of pipe had been so high and labor so scarce that municipalities and private companies had postponed, where possible, the making of pipe line extensions. The past year witnessed not only greatly reduced prices, but a super-abundance of labor. Much of the pipe bought in 1921 was largely to give work to the unemployed in the various communities. Hindrances to sales were the high freight rates, the difficulties of some municipalities to float bonds and the receding prices which caused a postponement. One city in the Central South signed a contract for the purchase of 6000 tons of pipe. When it realized the freight was \$30 per ton, it canceled the order. Heavy tonnages were shipped by boat to the Pacific Coast by Southern makers out of Mobile, the freight rate being \$14.13, as compared with an all-rail rate of \$31.70. A delivery was made from a New Jersey shop to Texas by water more cheaply than it could have been made by rail from a Birmingham district shop.

There were practically no irregularities in the operation of the railroads, such as the embargoes of the year before. The only approach to transportation trouble was the threatened railroad strike in November which caused a deluge of rush shipment orders on the part of purchasers, as well as the bringing in of a few fresh orders in anticipation of a railroad tie-up.

The high freight rates encouraged the use of wooden or steel pipe, which came into competition more keenly than usual. For instance, a Missouri city purchased wood pipe; a city in Michigan asked for 5000 tons of pipe, inviting bids on wood and steel, and eventually buying 1000 tons of steel and the remainder, cast-iron; in December an up-New York State city considered seriously the purchase of 6000 tons of steel pipe, which was lower-priced, but decided on cast-iron. Cast-iron pipe, as compared to wood, is an exceedingly heavy commodity per foot, as is observed when the freight is paid.

At the first of the year we reported that: "Business has fallen very flat. Plants with old orders are running at perhaps 25 per cent capacity; other plants are shut down completely. Buyers of pipe are waiting for pig iron market to become stabilized." About the first of

February many of the shut-down plants had re-opened. Operations continued in increasing volume and at the middle of April we reported that "Pipe is the one commodity in the iron and steel industry for which there is a full-fledged demand." In December the demand was still considerable, being greater than normal for that season of the year.

Present momentum will carry the buying movement well into 1922. Many pipe laying jobs are being planned for the spring. At the close of the year, the oil companies, liberal purchasers but for some time dormant, came into the market again for flanged pipe and will continue in 1922. To keep pace with the building movement water systems will be extended; smaller pipe will have to be replaced with larger sizes; municipalities that postponed purchases will finally close. The year ahead appears promising.

Non-Ferrous Group Marking Time Most of the Year

Copper Strong at the Close—Sharp Liquidation in Tin—Steady Demand for Lead—Zinc at Pre-War Levels

AFTER a year of readjustment, lagging demand and curtailment in output—a year generally acknowledged as one of the worst on record—the major non-ferrous markets enter the new year strong in sentiment and firm in prices. The last two months of 1921 were the bright spots in a very drab year, for in those months buying was the largest of the year and the price tendency decidedly higher.

Eventful Year in Copper

The year just closed has been one of the most eventful in copper annals. Aside from the depression, which has been one of the most pronounced on record, there were three developments of marked importance: Closing down of the mines, financing of stocks of refined copper for export and foreign demand, particularly from Germany.

Late in March came the decision of the porphyry mining companies and the Anaconda Copper Mining Co., as well as others, to curtail operations completely or to the vanishing point. It was recognized that costs of operation were suicidal and that nothing else was left to be done. This resulted in a reduction of mining to about 40,000,000 lb. per month. By December active preparations had been made to resume mining on a much larger scale.

About the middle of February there was announced the successful financing of large stocks of copper, involving the sale of debentures up to \$40,000,000 against 400,000,000 lb. of copper, all to be held for export and not sold at less than 12.50c. per lb. The market price of electrolytic copper at that time was 13.25c. delivered.

In foreign demand the year was phenomenal, with Germany the leading purchaser, followed by France, Great Britain and Japan in the order named. To Nov. 1 Germany had bought more copper than the other three countries combined and had taken over 40 per cent of the total exports.

The year's price trend was not erratic. Opening at 12.75c., New York or refinery, electrolytic copper fell to 11.37½c., refinery, on Aug. 26, rising intermittently after that to 13.62½c., refinery, at the close of the year, or the year's highest, with prospects of a continued advance. Buying, as well as inquiry, for the metal from domestic sources was active in the later weeks and the year closed with the market firm and statistically and technically strong.

Severe Drop in Straits Tin

Straits tin sank to the lowest levels in many years when it was quoted at 25.50c., spot delivery, New York, on Aug. 25. The high for the year was 38.75c. in January. From the low point there was a gradual advance to the end of the year, when the market closed strong and moderately active around 33c.

The principal feature of the year was the complete liquidation that took place, probably the most severe of

any of these markets. A comparison with other years will demonstrate this. The average price of spot Straits tin, New York, in 1913 and 1914 was 44.33c. and 35.80c. respectively, and in 1920 it was 50.23c. The low point for 1921 was therefore down to half of the 1920 average, with the year's closing price of about 33c. under the 1914 average. To find a lower average it is necessary to go back to 1909, when it was 29.68c.

The year as a whole was a quiet one, with sales the lowest in many years. Not until late in the year was there any active interest from consumers. In November there were periods of old-time active buying, caused largely by the increased operations in the tin plate industry, due to an unusual demand for tin plate and depleted stocks of the metal in consumers' hands. Imports of tin were the lowest in many years.

Lead a Steady Market at Pre-War Levels

The lead market has been the most consistently strong and steady of any of the markets. There have been no features of any description. The prominent fact has been that demand has been moderate but fully equal to production and that they have about balanced each other throughout the year.

In prices the metal has ranged practically between 4c. and 5c., New York, or virtually at pre-war levels. The year's high was 5.12½c., New York, in January, and the low at 4c. in March. The 1920 average price was 8.07c., while that of 1913 was 4.40c. At the end of 1921 the price was 4.70c., New York, where it had remained since late in September. Price liquidation in 1921 was complete and the market placed on a substantial, normal basis. There were prospects of a scarcity of lead in England, with exports from this country a probability in 1922.

A Very Lean Year for Zinc

Two features characterized the zinc market in 1921. One was the import of foreign zinc in the early part of the year and the other the drastic decline in foreign demand as contrasted with war and previous years.

Early in the year 10,000 tons of German zinc was purchased for consumption in this country and there were also re-shipments to this country from England of American zinc sold to British consumers. These imports were a factor only in the early months of the year.

In exports the year 1921 was a sharp contrast to previous ones. To Nov. 1, the latest available data, only 3,733,959 lb. had been exported as against 204,178,991 lb. to Nov. 1, 1920, and 211,518,470 lb. to Nov. 1, 1919. The feature of the 1921 exports was the sales to Japan. Of the total to Nov. 1 Japan bought 2,533,310 lb., or 68 per cent. France and England, the heavy buyers in 1919 and 1920, had bought none up to that time.

Price liquidation was completed in 1921; it had not been finished in 1920. The high for the year for prime Western zinc was 6.10c., New York, in January, with

the low at 4.62½c., New York, at the end of August. At the close of the year the price was 5.15c. to 5.20c., New York. That liquidation has been thorough the citation of previous prices shows convincingly. In 1920 the average New York price was 8.08c. and in 1913 and 1914 it was 5.76c. and 5.27c. respectively. The closing

price of 1921 is therefore almost a parity with that of 1914.

Buying of zinc throughout the year was largely of the hand-to-mouth order, excepting a few cases, and the year closed with demand light but with prospects for better business in 1922.

No Serious Labor Troubles

Many Threats But Few Strikes, Except in Building Trades—Cause of Collapse of Railroad Tie-up

TRANSPORTATION and labor troubles as they affected the iron and steel industry in 1920, were largely of the barking-dog variety; they threatened, but usually failed to occur. There was a threat of trouble in the forming by the American Federation of Labor of a new committee for organizing the iron and steel industry, but it proved to be nothing more than a threat. Having learned by the experiences of the disastrous strike of the fall of 1919 that unionization of the plants was possible only by first conquering the Steel Corporation, the plans of the new committee called for a concerted and exclusive drive on the plants of that interest. The Steel Corporation, it was figured, would be the first to cut wages as it had been first to advance them, and the union leaders contemplated using the wage reductions as an argument why the men should organize. The Corporation, however, was the last to cut wages and the union hopes thereby were blasted. There was a country-wide disturbance among the building trades following attempts to revise downward the wage scales of those crafts, and these troubles exerted considerable influence upon the iron and steel industry in that the resumption of building operations following such disputes left wages of this class of labor largely unliquidated and this phase stopped a good deal of construction which might have gone forward if wages had gone down in keeping with the costs of materials.

Old Transportation Troubles

Transportation troubles entirely were absent last year, in sharp contrast with 1920, when they were a pretty constant source of annoyance, and more so to the iron and steel industry than any other, since fuel and grain took preference over iron and steel in the allocation of freight cars. It was November before the iron and steel makers finally were freed from the exacting and oppressive restrictions as to the use of cars in 1920. This condition grew out of the coal miners' strike late in 1919, the walkout of the railroad yardmen in the spring of 1920, the impairment of the efficiency of railroad employees, brought about by the fact that under such an impersonal "boss" as Uncle Sam there could not be the discipline to be looked for under a Willard, a Hill, a Rea or a Cassatt. On top of these conditions was the post-war business boom of 1920 with its huge demands upon the transportation facilities.

Changed Conditions in 1921

The picture for 1921 is quite a different one. The reaction in business from the feverish activity of 1920 was even more pronounced and rapid than the recovery from the stagnant period in early 1919, following the signing of the armistice, and demands upon the railroads, notably from the iron and steel industry and the coal and ore industries, which provide so much of the bulk freight, declined in keeping with business. There was not a time during the entire 12 months that the railroads could not handle every pound of freight offered and provide service that, as compared with 1920 and, indeed, with several previous years, was vastly superior. Throughout the year there was a surplus of freight cars, which during the height of the business depression in mid-summer reached a total in excess of 500,000.

Threatened Strike

The 12 per cent reduction in railroad wages made by the Railroad Labor Board, effective July 1, did not rest

well with the several railroad brotherhoods and unions and a strike ballot was taken, which the brotherhood and union leaders said was overwhelmingly in favor of a strike. Leaders of the steel plant strike of late 1919 also said the vote of the workmen was overwhelmingly in favor of a strike, but they never produced the tally sheets or any other evidence to support such claims, and the public had only their word for it. The same thing is true of the strike vote of the railroad employees last summer. The leaders said they had the authority to call a strike from the men of their organizations and accordingly the strike orders went forth which were destined to completely stop the operation of the railroads of the country between Oct. 31 and Nov. 5.

Numerous and feverish conferences were held in Washington and Chicago, with much noise from both points and from both sides of the controversy, but suddenly just a few days before all business was to be brought to a standstill by the suspension of railroad operations, the strike order was rescinded. There was some disposition at the time to ascribe the calling off of the strike to a vague promise said to have been made by a member of the Railroad Labor Board that further wage reductions would not be considered until after the board had completed its revision of working conditions, and since this was to take considerable time, the men thereby were assured of the July 1 scales for some time to come. This made good newspaper copy, but the real reason the strike was called off was that the union leaders discovered that the strike entirely lacked public sympathy; that the railroad management actually wanted a strike because there were so many thousands of men, who had secured railroad experience during the period of Government control and later let out, who were idle and would have been glad to be taken back and given high places in the seniority lists which those who struck would have sacrificed; and that to have gone through with the strike would have meant the end of the brotherhoods and unions and the undoing of the years of effort in their upbuilding. Self-preservation is the first law of nature and the union leaders wisely decided that it was better to go along with the economic and industrial readjustment than to take a chance on being dashed to pieces on the rocks of an unpopular strike. A strike occurred on some of the Texas roads late in October, but it was neither general nor of long duration. There were suggestions in the fall of a shortage of coal cars, but this turned out to be nothing more than a cutting down of car placements at mines which had been using cars for storage purposes.

Reductions in Steel Plants

Labor troubles within the iron and steel industry were practically unknown despite rather frequent wage reductions which carried the base or common labor rate from 46c. per hr. with time and a half for work in excess of eight hours back to 30c. an hour, with no overtime payments at the plants of the Steel Corporation and of independent companies having works in the same centers as the Corporation, and to as low as 25c. and even 20c. an hour in some centers. Moreover, the iron and steel industry did not average 50 per cent operations for the year and since during the first eight months of the year the average was nearer 30 per cent, recourse to part time schedules and to a distribution of work, in order that all might have a share, was necessary.

The industry was more disturbed from labor troubles from without than within. Chief of these was the trouble among the building trades, growing out of the efforts of employers to put wages on a basis more in keeping with economic and industrial changes following the collapse of the business boom, and price inflation during the latter part of 1920. The stubborn refusal of the building trades unions to either accept a reduction in wages or to modify working rules and conditions which would have increased production without decrease in rates, precipitated strikes in practically all of the large cities of the country during the year.

Building Interrupted

These disputes interfered seriously with building activities not only physically, but because they caused the postponement of many projects by investors, who, despite the decline in the cost of materials, still were confronted by a relatively high total cost because of the demands of labor. If the building trades had been willing to go along in the readjustment, it is safe to say new construction easily would have been double what it actually was during the year. The lack of houses has been a crying need for the past few years and if labor had been reasonable, two houses probably would have gone up where only one actually has been built. The need of new hotels and office buildings has been only slightly less pressing than new housing and that has been only a slight correction of the shortage may be charged, not against the cost of materials, which all, notably steel, have come down materially in price, but because it has been little, if any, cheaper to have a ton of steel set in place or 1000 brick laid.

Boston suffered first from a building trades strike,

which came Jan. 19, as a result of a reduction in skilled labor rates from \$1 to 90c. per hour and in unskilled labor scales from 65c. to 70c. to 55c. to 60c. per hour, effective Jan. 20. Then followed a period of three months during which employers, and union leaders, were closeted with city and State officials in an effort to bring about a settlement. The conferences failed because of the obstinacy of the union leaders, who would neither accept a wage cut nor modify working conditions to the extent of granting "a fair day's work, for a fair day's pay." The upshot of the Boston affair was a declaration by the employers of the "open shop," the application of which brought results where conferences had failed. Other New England cities had similar troubles. Cleveland had a strike starting May 1, which virtually tied up all building work for a period of five weeks. Pittsburgh had a strike which was fairly effective for a time but which faded out and finally was settled in early fall by the acceptance by the men of reduced scales. Chicago had a siege beginning in May, which was not fully adjusted at the end of the year. If there is a big city in the country which escaped a building trades dispute, the fact is pretty well concealed.

The effect of the building trades disputes upon the demand for steel may be gaged by the reports of the Bridge Builders and Structural Society, which for the 11 months ended Nov. 30, show that the average of fabricated structural steel orders was only 34.6 per cent of the total shop capacity of the country and this despite a drop of 40 per cent in the cost of plain material, which was fully reflected in fabricated material prices. The average price of plates, bars and shapes, which as of Jan 1 was 2.50c. was down to 1.50c. at the end of the year.

Reduced Earnings of Many Companies

Past Year Makes a Decidedly Unfavorable Showing Compared with Prosperity of 1920

From the viewpoint of earnings, 1921 will go down in the history of the steel industry as a decidedly unprofitable year. But, in this respect, the plight of the steel companies is somewhat magnified in the reflection of a series of preceding prosperous years. Even earnings for 1919, a year of serious labor disturbances, now appear favorable in the light of those for the past twelve months.

During the preceding prosperous years, the older steel companies materially added to their surplus accounts, as well as to physical properties. The younger corporations, as well as those starting business in the war years, absorbed a large share of current earnings in plant development. Naturally the last two classes of industry have suffered more keenly than the first.

Small and relatively unimportant steel companies, unable to stand up under rapidly dwindling cash and marketable resources, have been forced into bankruptcy or the management of their affairs dominated by banking interests for the purpose of protecting funds invested in these properties. And yet 1921 was comparatively free from increases in share capitalization and bonded indebtedness. The Bethlehem Steel Co. actually anticipated \$7,500,000 7 per cent notes due in July next. The Lackawanna Steel Co. has materially lessened its liabilities, and the final 1921 balance sheets of other large properties should disclose sound fundamental conditions, notwithstanding decreased earnings records for the year.

According to those quarterly earnings statements issued by the independent steel companies, most of them fared worse than the United States Steel Corporation because of its varied earnings power. The Lackawanna Steel Co. for the first nine months showed a deficit after taxes and ordinary charges amounting to \$1,208,275, after having stopped dividends, whereas for the same period in 1920 there was a \$4,714,370 profit with dividends. The Republic Iron & Steel Co., because of limited operations, ran into large deficits early in 1921, and will make an unsatisfactory annual

statement of earnings. The Midvale Steel & Ordnance Co. experienced one quarterly deficit after allowing for taxes, and its 1921 earnings report will also compare unfavorably with that for 1920. Penn Seaboard Steel's consolidated income account for the first nine months showed larger expenses than gross sales, with a resulting net loss of \$152,365. After allowing for interest charges, its sinking fund, an adjustment of inventory and other items, there was a deficit of \$571,817. And so it goes down the line.

A study of industries over a period of years shows that, after a time when earnings shrink, as a result of a pronounced business depression, a linking up of properties follows in the interest of reduced operating costs. There is no reason to anticipate 1922 will prove an exception. In fact, consolidations of steel, copper and oil properties already are known to be under consideration by banking interests. As regards steel mergers, definite developments will probably be recorded early in the new year. Naturally following 1921 will be a period of years of competition for business and for the refinement of products, when capitalizations, book and liquid assets must combine to yield even a moderate return upon the money invested.

Engineering Standards Discussed at Cleveland

A reception for Dean Dexter S. Kimball, Cornell University, the new president of the American Society of Mechanical Engineers, was given by the Cleveland section of the society Dec. 29. Following a dinner Dean Kimball led in an open discussion on the subject of the general welfare of the engineer. E. C. Peck, Cleveland, chairman of the national committee of standards, spoke on the desirability of establishing standards and outlined the work that has already been done by his committee. He said that 15 standards have already been established and 75 others are being started by the committee.

The Year in Iron and Steel Metallurgy

Developments in Electric Steel—New Features in Open-Hearth Practice—Alloy Iron and Steel—New Theory of Hardness

BY JOHN HOWE HALL*

DURING 1921 continued progress has been made in the development of the concentrating and sintering plant of the Mesabi Iron Co., which is developing a large tract of low-grade iron ore in the Eastern Mesabi district of Minnesota. A very large tract of land containing the ore body is being developed. The ore is a magnetic taconite and is crushed, concentrated on magnetic concentrators and sintered. The first unit of the sintering plant, with a capacity of 1000 tons of sinter per day, is nearly complete, making the first step in a development which contemplates ultimately a production of 30,000 tons of sintered products every 24 hr. It is expected also that eventually a low phosphorus ore may be produced. The product of the plant is already on the market in quantity.

Experiments have been carried out in Canada on the blast furnace smelting of titaniferous iron ores on an entirely different principle from that followed in all previous trials. Heretofore the titanite oxide has been considered as an acid in the slag, and limestone has been used as a flux. In the experiments recently conducted, advantage was taken of the fact that titanite oxide is chemically amphoteric, i.e. it will act either as an acid or as a base, depending upon which is in excess in the slag. Silica was used as a flux instead of limestone and the slags are said to have been entirely satisfactory and the results of the trial most encouraging. Should further work demonstrate the feasibility of this method, a large field will be opened up in the use of titaniferous iron ores, including those which carry a considerable percentage of silica.

Electrolytic Iron Tubes

Experiments are being made on a considerable scale in the production of iron tubes by electrolytic deposition on a rotating mandrel using an insoluble anode. This process has already been developed in France using hot ferrous chloride solution as an electrolyte. It has been found recently in the work done in this country that the solution can be made to greater advantage from iron ore. The metal of the tubes produced runs from 99.97 to 99.99 per cent iron. The tubes when removed from the mandrels are annealed to eliminate the brittleness characteristic of electrolytic iron as deposited. The French metallurgists who have developed the process claim that they are already in a position to compete with other processes for thin tubing.

Blast Furnace and Cupola Iron for Castings

In the new Ford foundry, which is to have a final capacity of 2500 tons of castings per day, four cupolas are now in operation of the 24 which will eventually constitute the complete plant. This is probably the first foundry to undertake the use of direct metal from the blast furnace on a large scale. The iron produced by the blast furnace has run very uniform in analysis, and castings have already been produced on a commercial basis with as high as 80 per cent direct blast furnace iron and 20 per cent cupola metal. This very high percentage of direct iron will probably not be used except in rare cases and probably a 50-50 ratio will be the average. So far most of the castings made have

been poured from a mixture varying between 40 per cent direct to 60 per cent cupola metal, and 60 per cent direct to 40 per cent cupola metal.

The cupolas are mechanically charged by means of cars which dump the stock into chutes of which there are two for each cupola, so that the iron can be charged from both sides. The hot metal from the blast furnaces is brought to the foundry in 75-ton ladle cars, whence it is poured into 20-ton mixer ladles, where it is incorporated with the cupola iron. From the mixer ladles it is poured into regular foundry ladles for distributing to the pouring floors.

High and Low Voltage for Electric Furnaces

A report by the Electric Furnace Association calls attention to the consensus of opinion as to the relative advantages of high and low voltage in electric furnace work. Apparently it is felt that voltages up to 140 are satisfactory, but there seems to be a feeling that voltages of 160 to 250 are not desirable, as the long arc produced by such current is hard on the brick work of the furnace and is supposed to have a deleterious effect on the metal. While it is believed that the harmful effect on the steel can be corrected by lengthening the final refining period, yet most operators consider it better policy to use a lower voltage, which has no bad effect on the metal at any time, rather than first doing harm to the steel for the sake of saving time in melting, and afterward trying to undo this harm in the refining period. It will be interesting to see how far these conclusions are borne out in future practice.

Government Electric Steel Plant

The outstanding achievement of the year in electric furnace practice has been the successful starting up of the two 40-ton Heroult electric furnaces in the Government Armor Plate plant, Charleston, W. Va. These furnaces, which are of the usual circular cross-section, have a shell 18 ft. in diameter and 8 ft. high, are lined 18 in. thick in the side walls and provided with three electrodes, 24 in. in diameter in the case of amorphous carbon and 14 in. in diameter for graphite. The furnaces are, of course, arranged to tilt up for pouring in the usual manner.

Two 75-ton basic open-hearth furnaces are used in the plant to provide hot metal for the electric furnaces. In the open-hearth furnaces the phosphorus is reduced to about 0.015 per cent and the finished steel from the electric furnaces runs a little over this figure on account of slight rephosphorizing from the small amount of open-hearth slag which gets into the furnaces with the metal. The sulphur of the steel so far produced has varied from 0.008 to 0.015 per cent and, of course, the metal has been very thoroughly deoxidized and of the highest quality.

The plant is thus equipped to pour ingots of electric furnace steel up to 80 tons weight and open-hearth ingots up to 150 tons. By mixing the two kinds of metal, of course, even larger masses could be cast.

The successful operation of a plant producing steel of the very highest grade on such a large scale is a land-mark in the already rapid development of electric furnaces, and the designing skill shown in building these large units is worthy of the highest praise. We

*Metallurgical engineer Taylor-Wharton Iron & Steel Co., High Bridge, N. J.

are informed that even larger furnaces are contemplated and that the 100-ton electric furnace will be here much sooner than could possibly have been anticipated a few years ago.

New Induction Furnace

Somewhat to the surprise of electric furnace operators in this country, an attempt is again being made to develop the induction furnace on a commercial scale. In the type being tried out, the primary winding is placed above the crucible in order to remove it from danger of a break-out, instead of placing it on a level with the metal as in most previous designs. As the furnace necessarily operates on low frequency power, a motor generator set is needed to convert the available power to single phase current of low frequency. From the point of view of cost, of course, the expense of this motor generator set has to be compared with that of the transformers of an arc type furnace. A 2-ton unit has been built and is in regular operation for foundry work. In view of the difficulties which have been experienced in the past, especially the practical impossibility of building the lining of the crucible so that it would "stay put," the results of this new experiment will be watched with great interest.

During the year one of the largest producers of manganese steel castings in this country has turned to the use of the electric furnace for the manufacture of manganese steel. Although other makers of this alloy steel are already using the electric furnace, this is the first case, to the author's knowledge, where the electric furnace is contemplated for all or a very large part of the output of one of the leaders in the industry.

Improving Open-Hearth Ports

For a good many years efforts to increase the life of the ports of open-hearth furnaces have been directed chiefly toward the protection of the brick work by water cooling without radical change in the construction of the furnace. The problem has also been attacked in another way by providing spare ports already built up in a movable frame so that replacement could be made in the shortest possible time. Although these methods have, to some extent, expedited repairs and increased the life of ports, yet neither line of attack has been wholly satisfactory.

Recently several very radical changes in the design of open-hearth furnaces have been made with the object not only of increasing the life of the ports but of improving the efficiency of combustion of the fuel and hence the output of the furnace. In a general way the objects aimed at in these different designs are somewhat similar and are based on the idea of securing complete combustion of the fuel in the first few feet of the hearth, and of slowing down the outgoing gases in order to prevent them from coming in contact with the outgoing port at such high speed as to rapidly melt it away.

The Egler Furnace

In what is known as the Egler type a blow torch effect is given to the flame by mixing the air and gas in the port instead of in the hearth. In burning producer gas the object in view is attained by putting positive pressure on both air and gas and bringing the latter to the furnace by means of an up-take flue located in the position usually occupied by the air flue. This vertical up-take is connected with the hearth by a flue or port in the usual manner, but the air instead of being introduced through a separate opening above the gas is brought vertically into the bottom of the gas port through a suitable up-take.

At each end of the furnace are two auxiliary flues which can be closed by water-cooled mushroom valves. These flues are kept closed at the incoming end of the furnace, and those at the outgoing end are kept open.

The area of the passages carrying away the products of combustion is thus greatly increased so that the speed of the outgoing gases is considerably reduced. It has been found that the port temperature is not unduly high, that the roof can be kept cool by admitting a small surplus of air over that needed for combustion, and that a very high hearth temperature and very perfect transmission of the heat to the bath are secured. The time per heat has been greatly reduced and the output of the furnace correspondingly increased. For coke-oven gas and natural gas only one set of regenerators is used, and the gas is admitted to the air port by pipes located one on each side. For oil or tar the fuel is brought in by means of a burner in the end wall.

The McKune Furnace

The McKune design was first tried with by-product coke-oven gas. At each end of the furnace are three up-takes of which the central one is used as a port and the two outside ones at the incoming end are closed by dampers, while the corresponding ones at the outgoing end are open. The air is introduced under a fan pressure of about 6 oz., and the gas is introduced through pipes at each side of the central port. The fuel is burned very completely in the first 10 ft. of the hearth and the results secured in decreased time per heat and increased production have been very satisfactory.

What is called the Venturi line furnace works more or less on the McKune principle and was first developed for producer gas. In this type the port area is decreased by lowering the roof knuckles of the furnace, and moving in the wing walls in such a way as to form knuckles in the side walls, thus restricting the opening in two planes. In addition the mouth of the gas port proper is moved about 3 ft. back from the point of greatest restriction, thereby providing a channel where air and gas may mix before entering the hearth. No pressure is used on either air or gas but, as the furnace is fitted with waste heat boiler, induced fan draft is used.

McKune and Venturi Furnaces

A combination of the McKune and Venturi line type is also being worked out in which water-cooled dampers which are lowered one on either side of the gas port take the place of the knuckles in the side walls of the original Venturi design. These dampers, of course, are lowered at the incoming and raised at the outgoing end. In the first furnace of this type the neck opening is 13 sq. ft. at the incoming end and 31 sq. ft. at the outgoing end. The air is introduced under fan pressure and, as the furnace is provided with waste heat boilers, induced draft is used.

Coke-Oven Gas for the Open-Hearth

In the burning of by-product coke-oven gas trouble has always been encountered because of the tendency of the flame to rise from the bath and to burn without luminous effect. Tar has often been blown into the furnace over the gas in order to give a luminous flame. At one of the large plants it has been discovered that by admitting a small amount of air in the burner a luminous flame can be obtained, and that by varying the amount of this air the flame may be varied at will from non-luminous to very bright. In this plant short shut-downs of the furnaces have been necessary in the past in order to clean the underground flues which bring the producer gas to the furnaces. Arrangements have now been made to bring by-product coke-oven gas to each furnace and, while the producer gas flues are being cleaned, the furnaces are successfully operated on by-product coke-oven gas. Several long runs have been made with the latter fuel alone and one furnace made a run of 55 straight heats with by-product gas.

Benjamin Talbot has taken out patents covering the

design of tilting open-hearth furnaces of much larger capacity than any now built for use in his continuous process. In these furnaces a longitudinal wall divides the hearth of the furnace into two chambers and serves to support the very wide roof made necessary by the large size of the furnace. Passages are provided connecting the two baths and the furnace is arranged to tilt endwise instead of sidewise as in the old design.

Cupolas and Open-Hearths for Duplexing

During the year a very interesting description was published of a large scale experiment in the use of cupolas to provide hot metal for open-hearth furnaces. In the particular plant where this trial was made the four 60-ton basic open-hearth furnaces were fed with hot metal from a single blast furnace, but there was no mixer. During repairs to the blast furnace the furnaces were being run on cold charges of pig iron of which about 20,000 tons was on hand in one large heap, the silicon in the pig varying all the way from 0.50 to 6.00 per cent. Considerable trouble was encountered when a charge consisted largely of high silicon iron, as the bath of course then melted high in silicon with resulting delay in the operation.

Two large spiegel furnaces, each 6 ft. in diameter inside the lining, and 30 ft. high from the bottom to charging door, were used to melt the pig iron for the furnaces. It was found that by varying the amount of limestone charged in the cupola, the amount of silicon oxidized and slagged could be increased or decreased and in this way a good deal was done in reducing the silicon when it was found that a large proportion of the higher silicon iron was being charged. It was thought, when the experiment was started, that the cupolas would not be able to take care of the four open-hearth furnaces, but it was found that keeping them in blast only 18 hr. out of a possible 24 hr., they melted enough iron to furnish each of the open-hearth furnaces with 50 tons of hot metal at regular intervals. During the run about 13,000 tons of iron was melted, and the production of the open-hearth furnaces was increased very considerably over what was possible with cold charges. In fact, in one month the open-hearths produced more steel than they ever had when taking iron from the blast furnace, owing largely to the elimination of delays in waiting for blast furnace metal.

Although, of course, difficulties would necessarily be encountered in operating cupolas continuously and keeping them "in step" with the steel making equipment, yet the author of this article feels that in some instances at least cupola melting of the charges for the open-hearth furnace would be a paying proposition in plants having one or more open-hearth furnaces but no blast furnace to supply hot metal.

A German investigator published an article during the year on the influence of the time at which silicon is added to the ladle in the manufacture of basic open-hearth steel. He concludes that if the silicon is thrown in the bottom of the ladle before the heat is tapped, a greater loss of silicon and more blow holes in the ingots are encountered than is the case if the silicon is thrown in the ladle quite late in the tapping of the heat.

Oil as a Fuel for Cupolas

In Germany a trial was made of the use of oil to replace part of the coke in cupola melting. The oil flame was introduced through the tuyeres and blown against the incandescent bed of coke and the results are said to have been satisfactory and the saving in fuel considerable. From a published description of the experiment, the method appears to have been quite similar to that developed and patented in this country by Bradley Stoughton.

While nothing strikingly new has come up in the use of electric heating for heat-treatment furnaces, yet

continued progress has been made in the design of these furnaces and the number of installations is increasing quite rapidly. In most cases the cost of the electric heating is greater than that of mineral fuel, but this increased cost is offset to a considerable extent by the decrease in repair charges; the freedom from scaling due to the inert atmosphere of the furnace, coupled with the much better control of temperature, makes electric heating highly desirable for an increasing number of applications.

Better Malleable Castings

The Malleable Iron Association has published a report showing the progress made by its members in improving the quality of their product, especially during the last 3½ yr. In that period the average tensile strength of the test bars submitted by the members increased from a little under 49,000 lb. per sq. in. to over 53,000 lb., and the elongation from under 10 per cent in 2 in. to nearly 16 per cent. In June, 1921, the average extension was 15.77 per cent, or over twice that specified by the American Society for Testing Materials. In April, 1921, the average tensile strength of the test bars submitted by members was 53,530 lb., which is more than 8000 lb. over the minimum A. S. T. M. specification. The association feels that it has made great progress in the improvement of the average output of its members, and that the results shown in these test bars are a fair measure of the improved quality of their product.

Centrifugal Steel Castings

Results have been published showing the possibilities of castings both of carbon and of nickel steel made by the centrifugal process. The castings in question were cylinders with walls varying from 0.50 in. to 3.50 in. thick, and the only segregation found in the castings was in a radial direction. By heat treatment of the steel physical properties were secured which suggested the possibility of producing steel by this method with physical properties as good as those of forgings.

New Way to Make Welded Pipe

An interesting new development in the manufacture of welded pipe is a new plant designed to produce hammer welded steel pipe from 24 in. to 96 in. in diameter and with walls from ¼ in. to 1½ in. thick. Open-hearth steel plate is bent either hot or cold, depending on the thickness, by means of rolls such as are used in boiler shops. The lap is then heated with gas burners both inside and outside for a short distance and welded by means of a power hammer working against a suitable anvil within the pipe. Another section is then heated and welded, and so on until the weld is completed. This makes available larger sizes of welded pipe than have heretofore been on the market, which is of considerable advantage as compared to riveted pipes. On account of the friction in the latter a welded pipe of a given size will carry more water than the same size of riveted pipe, or to carry a given quantity of water a smaller-sized pipe may be used.

Stainless Iron

In the field of alloy steels progress has been made in the development of stainless iron, which is an alloy similar in composition to stainless steel, except that the carbon is below 0.10 per cent. This is an electric furnace product and has certain advantages over stainless steel in that it can be used for a wider range of forging, pressing and stamping operations. Already it has been developed on a commercial scale for the manufacture of automobile wheel disks, hoods, bodies, etc.; carbon-free ferrochrome is used in the manufacture of this metal.

Alloy-Iron Castings

Experiments have been made in Germany on the

addition of nickel and cobalt to cast iron. The latter was found to reduce the strength and to increase the hardness and hence to hold forth little promise of usefulness. The nickel in quantities up to 1 per cent raised the bending strength 30 per cent, the compressive strength 30 per cent, and the tensile strength 18 per cent. A large motor corporation in this country is reported to be using 1 to 1.50 per cent nickel in cupola castings and to find the iron harder and to possess better resistance to wear. Small amounts of nickel and chrome are also being tried as additions to car wheel mixtures.

One firm manufacturing electric resistance grids, which are castings of very small section and which must be of gray iron, are melting the metal for these castings in the electric furnace and using from 4 to 5 per cent nickel in the iron. In addition to its effect in increasing the electric resistance, the nickel is said to assist in the formation of graphite as the iron cools, and hence to make very light sections gray and soft.

Molybdenum Alloy Steels

* Further data have been published on the influence of molybdenum in small percentages (up to 1 per cent) in nickel, nickel-chrome, chrome and chrome-vanadium steel. The figures which have been published show an increase in strength due to the molybdenum with a simultaneous increase in ductility, especially in the reduction of area. In this same connection tests have been published on cast steel containing 0.27 per cent carbon, 1 per cent chrome, and 0.50 per cent molybdenum, heat-treated by quenching and drawing. The castings showed properties closely similar to those of forgings with a tensile strength of about 99,000 lb. per sq. in., an elastic limit between 65,000 and 66,000 lb. per sq. in., an extension of about 21 per cent, and a reduction in area of over 50 per cent.

Sulphur in Steel

The investigation into the influence of sulphur and phosphorus on steel which is being carried out by a representative committee from various scientific bodies under the chairmanship of the Bureau of Standards has made considerable progress during the year. The tests on the first class of steel selected for work are com-

pleted and the results will soon be published in the form of a Bureau of Standards bulletin. The manufacture of the next class of steel in order is under way.

In this connection it is interesting to note that the American Society for Testing Materials has voted to remove the temporary note allowing increases in phosphorus and sulphur on 14 of their standard specifications. The only exception to this action was to continue in force the increase of phosphorus and sulphur by 0.01 per cent in the case of steel castings and the increase of sulphur by the same amount in the specifications for structural steel for locomotives, cars and ships.

During the year a notable book on the heat treatment of medium carbon steel by a distinguished Italian metallurgist has been published in this country. The most noteworthy feature of this book from the practical man's point of view is the remarkably good results secured by careful heat treatment of nickel steel castings. Indeed, the author ventures the opinion that in some cases a casting may be superior to a forging because the casting is not subject to the transverse weakness often characteristic of a forged piece and most difficult to correct by heat treatment.

New Theory of Hardness

In the field of purely theoretical work the most striking contribution of the year is that of Zay Jeffries, who has put forward a new theory to account for the hardening of metals, known as the slip interference theory. In brief, Dr. Jeffries reasons that every known method of hardening metals can be referred to the principle of slip interference. Mechanical failure under stress is ordinarily premature because of the presence of crystallographic planes of weakness or potential slip planes, and any structural condition which interferes with slip on these planes of weakness increases the strength and hardness of the metal. Conditions which bring this about may be grain refinement, presence of amorphous metal, presence of a strong constituent at the grain boundary, or the presence of hard constituents within the grains themselves uniformly distributed in the form of very fine particles. This new theory has brought out a great deal of discussion.

Buying of Railroads at Low Ebb in 1921

Car Repair Orders Far Exceed Purchases of New Cars, the Latter Being the Smallest Since 1900— Rail Buying at Lowest Point in Years

IN a year of pronounced dullness in the iron and steel market, railroad purchases were conspicuous only because the individual tonnages placed were large in comparison with orders coming from other sources. In the aggregate, however, railroad buying was extraordinarily light and proved a disappointment to those who expected the accumulated deferred needs of several years to force large scale purchases. Just as their hopes were stimulated in March, 1920, when the railroads were released from Government operation and in August, 1920, when they were granted substantial rate increases, their expectations rose periodically during the course of the past year, as, for example, in February with the passage of the Winslow-Townsend bill authorizing the payment of \$350,000,000 due the railroads from the Government, and again on July 1, when railroad wages were reduced 12 per cent.

Optimism Not Justified

The failure of any of these flashes of optimism to find justification in subsequent events is now a matter of history. As early as January, railroads grew more conservative in their expenditures concurrently with a sharp decline in their freight loadings. This attitude was accentuated as their business continued to di-

minish and their costs mounted higher than their returns. By the end of the first quarter, the situation became so acute that the railroads had closed many of their shops and laid off thousands of men in an effort to reduce their costs. Repair work was postponed indefinitely, with the result that the number of bad order cars increased markedly. By the middle of May, buying had dropped to a low ebb, purchases being confined to small miscellaneous supplies for shop storekeepers' stocks. At that time, railroad stocks of all classes of material, steel included, were not more than one-half what they had been at the beginning of the year. Not only were the railroads unable to make new purchases, but they were also unwilling to receive shipments against previous orders. Releases against rail contracts dropped off sharply, with the consequence that rail mill operations were adversely affected. On May 19, it was recorded in our columns that five of the strongest Western lines had not laid a rail since the first of the year, despite the fact that some of their 1921 rails had been delivered. One of these roads, in fact, had received 60,000 tons which it had put in storage.

General Desire to Postpone

One reason for the inactivity of the railroads during

this period was a desire to postpone all work possible until railroad wages were reduced. And it is a fact that most of the railroad purchases of the year followed the wage cut of July 1. This buying, however, is probably attributable more largely to the fact that freight traffic revived in the last half of the year and net profits replaced the deficits suffered by the carriers in the early months of 1921. In the buying which did ensue, primary attention was given to car repairs. Of 41,040 cars let for repairs, as reported in our columns, contracts for all but 7000 were awarded in the last five months of the year. Besides the repairs let to private shops, there was some work done by the railroads' own forces, of which we have no record. In comparison with orders for repairs, purchases of new cars were insignificant. According to our records, orders for freight cars by domestic purchasers total 18,040 for the year, of which 12,440 were placed in the last quarter. It seems probable, therefore, that when complete figures are available for the entire year, the total for 1921 will be below that of 1919, 25,899 freight cars for domestic service which was the lowest since 1900. The full significance of the year's orders is grasped when it is realized that the total is hardly more than 10 per cent of the average annual purchases for the 13 years, 1901 to 1913 inclusive, which amounted to 180,000 cars. The 1921 total is also small compared with the average of annual orders during the period of light buying from 1914 to 1920 inclusive, which was 96,000 cars.

Passenger Equipment

Purchases of locomotive and passenger equipment were equally light. Orders for passenger cars in 1921, as recorded in our columns, totalled only 240, less than were ordered in any year since 1900, except in 1918 when 131 were bought. Orders for locomotives, as reported in our issues throughout the year, totalled only 255, the smallest number ordered in any year since 1900, and comparable with the small total of 1919, which was 272. The lack of buying during the past year is appreciated when one compares the number of locomotives bought with the average of purchases from 1901 to 1913 inclusive, which was 3800, and with the purchases during the period of curtailed buying from 1914 to 1920 inclusive, when the average was 1938.

The restricted buying during 1921 was accompanied by sharp declines not only in the prices of railroad rolling stock, but also of steel. During 1920, prices of cars and locomotives reached their peak. Mikado-type engines of 330,000 lb. weight brought as high as \$70,000 each, whereas 50-ton steel box cars cost as high as \$3,600. During the past year, prices of freight cars have been reduced 30 to 35 per cent and locomotives 25 to 50 per cent. On the other hand, the sharp reduction in steel is appreciated when it is recalled that the peak price for tank plates in 1920 was 3.75c., f.o.b. Pittsburgh, as against 1.50c. at the present time, a reduction of 60 per cent. Going back only so far as Jan. 1, 1921, when the market on tank plates was 2.65c., f.o.b. Pittsburgh, the reduction amounts to 43 per cent. The decline in steel becomes even more impressive in view of the fact that the Pittsburgh basing on tank plates as well as on structural shapes and bars, was openly abandoned in the Chicago market in August and from that time on car builders obtained prices f.o.b. Chicago, which were practically on a parity with prices quoted in the Pittsburgh district.

Rail Buying Very Light

Rail buying was extraordinarily light in 1921. Although complete statistics are not available, our records show orders for only 399,000 tons of which all but 51,400 tons are for 1922 delivery. At this time a year ago, most of the tonnage for 1921 rolling had already been placed, but this year the carriers are unusually tardy in making reservations for their requirements, the only orders of any size which have been placed, being those of the New York Central, Southern Pacific and Norfolk & Western for 125,000, 44,600, and 40,000 tons respectively. The tonnage thus far placed for the coming year is exceedingly small as compared with the annual consumption of rails in this country as disclosed by

statistics compiled by the American Iron and Steel Institute. During the 13 year period before the war, rail consumption ranged from a minimum of 1,726,224 tons in 1908 to a maximum of 3,654,794 tons in 1906, and during the years 1914 to 1920 inclusive, ranged from a minimum of 1,568,408 tons in 1919 to a maximum of 2,440,755 tons in 1917. Rail mill operations were exceedingly irregular during the course of the year. In the early months, heavy production was the rule. In March the Gary mill made a world's record of 92,600 tons rolled and shipped and in April nearly equalled that figure with 88,000 tons. In May, however, the railroads commenced to suspend shipments against their contracts and it was not until the latter part of the year, when rails were reduced to \$40 a ton, that the railroads again authorized deliveries in any quantity.

Track Supplies Dull

Orders for track supplies were light during the year and most of the business placed was concentrated in the last six months. Prices of these materials declined sharply during the 12 months: track bolts from 4.60c., Pittsburgh, to 3.20c.; standard railroad spikes from 3.65c., Pittsburgh, to 2.15c.; and tie plates from 3c., f.o.b. mill, to 1.90c.

Railroad bridge and building construction was of small proportions in 1921. Among the few projects which were undertaken was the mail terminal building and the Canal and Van Buren street viaducts of the Chicago Union Station, the steel for which amounting to 8160 tons was let the latter part of March. Another important job which went ahead was a large machine shop erected by the Atchison, Topeka & Santa Fe at Albuquerque, N. M.

Railroad buying of machine tools was on an unusually limited scale in 1921. The only order of any size placed during the first half of the year was that of the Santa Fe for \$125,000 worth of equipment for its Albuquerque, N. M., shop. In October the same road placed orders for one 250-ton, one 5-ton and six 15-ton cranes for the same shop. In June the Great Northern closed for \$25,000 worth of equipment. In July the Illinois Central bought \$150,000 worth of machine tools and this was the only purchase of importance until the last quarter when the Toledo & Ohio Central bought \$50,000 worth of tools, the Virginian \$20,000 worth, and the Missouri, Kansas & Texas closed for a list of 86 machines. Other lines which bought in a limited way during the last quarter were the Erie, the Cleveland, Cincinnati, Chicago & St. Louis (Big Four), the Boston & Albany, the Union Railroad and the Santa Fe.

Inquiries Pending

As the new year opens, several large inquiries for cars are pending and a number of extensive lists of machine tools are being figured on and others are being prepared. The year 1921 was exceedingly unsatisfactory from the standpoint of car and locomotive builders and machine tool manufacturers and all are glad that the year is now behind them. The same may be said of those makers of iron bars, bolts and nuts, springs and malleable castings whose chief business is with the railroads, as they too experienced a very discouraging year from the point of view of both orders and profits. In looking ahead into the coming year, better business is expected, although the railroads themselves are regarded as the chief remaining obstacle to a return to normal industrial activity. Substantial reductions in freight rates and if necessary to that end, further cuts in the wages of railroad employees are generally considered essential to complete the economic readjustment which has been going on during the past 12 months.

The Ohio Structural Steel Co. has established a plant at Newton Falls, Ohio, where it is equipped to handle structural and fabricated steel work of a not too complicated nature. M. H. Stauffer, formerly of the Niles Forge & Mfg. Co., Niles, Ohio, is president and general manager. J. S. Mitchell, formerly with the Kansas City Structural Steel Co., Kansas City, Mo., is the company's chief engineer.

The Status of the Electric Steel Industry

United States Still Leads with 388 Furnaces, A Net Gain of
About 9 Per Cent in 1921—Furnaces in the World's
Steel Industry Probably 1000

BY EDWIN F. CONE

DESPITE the acute depression prevailing in the steel industry last year, the expansion in the electric steel industry in 1921, as measured by the number of new installations of various types of furnaces, was practically equal to that in 1920. This is an unexpected development. No attempt has been made in this year's review to obtain data regarding other countries than the United States and Canada.

On Jan. 1, 1921, according to THE IRON AGE's annual review of the electric steel industry, published in the issue of Jan. 6, 1921, the United States was credited with 356 furnaces of all types, with 43 in Canada; on Jan. 1, 1922, these totals have been increased to 388 in this country and 50 in Canada. This compares with only 19 such furnaces in the United States and 3 in Canada on July 1, 1913, or nine and one-half years ago. The total in the world on Jan. 1, 1921, was estimated at 961. From facts known and deductions that are possible, the estimated number of all types in the world as of Jan. 1, 1922, is easily 1000 and probably more.

A review of this industry was inaugurated by THE IRON AGE when the first data were published in the issue of July 1, 1913. The German paper, *Stahl und Eisen*, made the first estimate of this nature, which THE IRON AGE amplified for its issue of April 14, 1910. That review showed 114 furnaces of all types in all countries; 29 of them were Heroult furnaces. In 21 years, therefore, the world's electric steel industry has expanded close to 10 fold.

The review which follows gives as complete data as was obtainable regarding every type of furnace. Concerning one prominent type no data were reported by the seller and, as indicated in the tables, one or two other selling companies could not see their way to supply information this year. In such cases, where reliable data could not be obtained from other sources, this information as of Jan. 1, 1921, was left standing. It is acknowledged that this results in incomplete data for the whole industry, but the general trend is indicated, despite the facts that some furnaces may be entirely out of commission.

Progress in the United States and Canada

THE net increase in the number of electric furnaces in the United States in 1921 has been 32 against 33 in 1920; 36 in 1919; 54 in 1918; 97 in 1917 and 63 in 1916. The total on Jan. 1, 1922, was 388 as compared

Table of Groves-Elch's Electric Steel Furnaces Installed or Contracted for in the United States on Jan. 1, 1922, as Sold by the Electric Furnace Construction Co., Philadelphia

Company and Location	Size, Tons	No of Furnaces	Product
U. S. Navy Yards at:			
Norfolk, Va.	6	1	Castings
Puget Sound, Wash.	6	1	Castings
Mare Island, Cal.	6	1	Castings
Charleston, S. C.	3	1	Castings
Philadelphia, Pa.	3	1	Castings
Total		5	Castings
American Radiator Co., Buffalo, N. Y.	6	2	Castings
American Radiator Co., Buffalo, N. Y.	1/2	1	Castings
Inland Steel Co., Syracuse, N. Y.	3	2	Tool steel
Ford Motor Co., Detroit, Mich.	1/2	1	Castings
Ford Motor Co., Detroit, Mich.	3	1	Castings
Ford Motor Co., Detroit, Mich.	10	2	Steel
Ford Motor Co., Detroit, Mich.	50	1	Steel
Davidson Tool Mfg. Co., New York City	1/2	1	High speed steel
Hoskins Mfg. Co., Detroit, Mich.	1/2	1	Nichrome
Sullivan Machinery Co., Claremont, N. H.	1	1	Castings
Dodge Steel Castings Co., Philadelphia	3	1	Castings
Hammond Steel Co., Syracuse, N. Y.	3	1	Castings
Bird-Archer Co., New York		1	High speed steel
Brennan Steel Castings Co., Cleveland, O.	1/2	1	Castings
Electric Steel Products Co., Turners Falls, Mass.	1	1	Castings
C. H. Wills & Co., Port Huron, Mich.	1	1	Refining iron
Wayne Steel & Iron Co., Pittsburgh	1	1	Castings
Wayne Steel & Iron Co., Pittsburgh	900 kva	1	Special
Vancouver Engineering Works, Vancouver, B. C.	1	1	Castings
Joliet Castings & Forgings, Ltd., Joliet, Que.	1	1	Castings
Total in the United States, 26; Canada, 2.			

There have also been sold a 1/2-ton furnace to the Imperial Japanese Mint, Osaka, Japan; a 1-ton furnace to Brazilian Military Commission, and a furnace to the Sociedad Espanola de Construcion Naval, Madrid, Spain, for making ferroalloy.

The Ford Motor Co., Highland Park, Mich., recently purchased 4 electric brass-melting furnaces from the Electric Furnace Construction Co.

with 356 on Jan. 1, 1921; with 323 on Jan. 1, 1920; with 287 on Jan. 1, 1919; with 233 on Jan. 1, 1918, and 136 on Jan. 1, 1917. The apparent net increase of 32 furnaces in 1921 is less than the actual, due

either to the passing out of commission of some installations or to cancellations of contracts, some of which were not reported.

The expansion of the American electric furnace industry may be appreciated when it is recalled that on July 1, 1913, there were only 19 furnaces using electricity. The expansion is therefore over 20 times.

Table of Volta Electric Steel Furnaces Installed or Contracted for in the United States and Canada, Jan. 1, 1922, as Sold by the Volta Mfg. Co., Ltd., Welland, Ont., Canada

Company and Location	Size, Tons	No of Furnaces	Product
United States:			
Union Electric Steel Co., Carnegie, Pa.	6	2	Steel
Canada:			
Hydro-Electric Commission, Chatham, Ont.	1/2	1	Steel or Gray Iron
Hiram Walker & Sons Metal Product Co., Walkerville, Ont.	1	1	Steel
Canadian Steel Foundries, Ltd., Montreal, Ont.	3	1	Steel
Dominion Foundries & Steel, Ltd., Hamilton, Que.	6	2	Steel
Electric Iron, Ltd., Lakefield, Ont.	6	1	Steel
Electric Foundries, Ltd., Orillia, Ont.	6	1	Pig Iron
Shawinigan Foundries, Ltd., Shawinigan Falls, Que.	5	1	Steel or Gray Iron
Turnbull Electro Metals, Ltd., St. Catharines, Ont.	6	1	Pig Iron
Port Moody Steel Works, Ltd., Port Moody, B. C.	6	1	Pig Iron
Lowry Steel Co., Ltd., Vancouver, B. C.	6	1	Pig Iron
Total in Canada, 11; in United States, 2.			

The FitzGerald Laboratories, Inc., Niagara Falls, N. Y., has a 1-ton Volta furnace for making brass.

The T. Waddell & Sons Co., Ltd., Christchurch, New Zealand, has a 6-ton Volta furnace, Heroult type, for making steel.

Two Volta furnaces are making ferrosilicon and ferrochromium for two Canadian companies.

In Canada the industry shows a net gain of 7 furnaces in 1921. The actual gain is larger, but the total increase is explained in part by the fact that a more complete report of the Volta and other installations was possible the past year than the previous one. Our record shows 50 furnaces in Canada on Jan. 1, 1922, as against 43 on Jan. 1, 1921; 19 on Jan. 1, 1917 and only 3 on July 1, 1913.

The net increase in the two countries has been 39

Table of Heroult Electric Furnaces made by American Bridge Co., New York, and sold to the following, up in Jan. 1, 1922.

Company and Location	No. of Furnaces	Size, Tons	Product	Company and Location	No. of Furnaces	Size, Tons	Product
Alaska-Treadwell Gold Mining Co., Treadwell, Alaska	1	2	Castings	Lemoyne Steel Co., Monongahela, Pa.	1	2	Ingots
American Manganese Steel Co., Oakland, Cal.	1	3	Castings	Llewellyn Iron Wks., Los Angeles, Cal.	1	3	Castings
American Manganese Steel Co., Chicago Heights, Ill.	2	3	Castings	Lorain Steel Co., Johnstown, Pa.	1	3	Castings
American Manganese Steel Co., Chicago Heights, Ill.	1	6	Castings	Luckenheimer Co., Cincinnati	1	1	Castings
American Steel Foundries, Indiana Harbor, Ind.	1	6	Castings	Michigan Steel Casting Co., Detroit, Mich.	1	6	Castings
Annisston Steel Co., Anniston, Ala.	5	6	Castings and pig iron	Michigan Steel Casting Co., Detroit, Mich.	2	3	Castings
Armstrong, Whitworth of Canada, Ltd., Longueuil, Que.	1	3	Ingots	Millbury Steel & Ordnance Co., Newtown, Phila.	1	6	Ingots
Armstrong, Whitworth of Canada, Ltd., Longueuil, Que.	3	6	Ingots	Millbury Steel Foundry Co., Millbury, Mass.	1	2	Castings
Atlantic Gulf & Pacific Co., Manila, Philippine Islands	1	1	Castings	Milton Mfg. Co., Milton, Pa.	1	3	Castings
Atlas Crucible Steel Co., Dunkirk, N. Y.	1	3	Ingots	Milton Mfg. Co., Milton, Pa.	1	6	Castings
Atlas Crucible Steel Co., Dunkirk, N. Y.	2	6	Ingots	Milwaukee Steel Foundry Co., Milwaukee, Wis.	1	3	Castings
Baldwins Canadian Steel Corp., Ltd., Toronto, Can.	7	6	Ingots	Monarch Foundry Co., Stockton, Cal.	1	1	Castings
Best Steel Castings Co., Oakland, Cal.	1	6	Castings	National Malleable Casting Co., Sharon, Pa.	2	6	Castings
Bethlehem Steel Co., Bethlehem, Pa.	1	3	Castings	National Malleable Casting Co., Grant Wks., Chicago	3	6	Castings
Bethlehem Steel Co., Bethlehem, Pa.	1	6	Ingots	National Malleable Casting Co., Cleveland	2	15	Castings
Braceburn Steel Co., Braceburn, Pa.	2	6	Ingots	Newport News Shipbuilding & Dry Dock Co., Newport News, Va.	1	6	Castings
Buckeye Steel Casting Co., Columbus, Ohio	2	6	Castings	Ontario Electric Steel Co., Fulton, N. Y.	1	1	Ingots
Carbon Steel Co., Pittsburgh, Pa.	1	6	Ingots	Ontario Electric Steel Co., Fulton, N. Y.	1	6	Ingots
Carnegie Steel Co., Duquesne, Pa.	1	25	Ingots	Pennsylvania Engineering Wks., Newcastle, Pa.	1	6	Castings
Carpenter Steel Co., Reading, Pa.	4	6	Ingots	Pittsboro-Muliken Co., Chicago	1	2	Castings
Clark Equipment Co., Buchanan, Mich.	1	2	Castings	Racine Steel Casting Co., Racine, Wis.	1	3	Castings
Clark Equipment Co., Buchanan, Mich.	1	3	Castings	Railway Steel Spring Co., Latrobe, Pa.	1	3	Ingots
Connecticut Electric Steel Co., Inc., Hartford, Conn.	2	2	Castings	Simonds Mfg. Co., Lockport, N. Y.	2	6	Ingots
Crane Co., Chicago, Ill.	1	6	Castings	Sizer Forge Co., Buffalo, N. Y.	2	10	Ingots
Crucible Steel Casting Co., Cleveland	1	1	Castings	Southern California Iron & Steel Co., Los Angeles, Cal.	1	6	Ingots
Crucible Steel Casting Co., Lansdowne, Pa.	1	2	Castings	Southern Pacific Co., Sacramento, Cal.	1	6	Ingots and Castings
Crucible Steel Co. of America, Atha Wks., Harrison, N. J.	1	3	Ingots	Spencer Heater Co., Scranton, Pa.	1	3	Castings
Crucible Steel Co. of America, Atha Wks., Harrison, N. J.	3	6	Ingots	Standard Seamless Tube Co., Economy, Pa.	1	15	Ingots
Crucible Steel Co. of America, Park Wks., Pittsburgh	2	6	Ingots	Standard Stoker Co., Erie, Pa.	1	2	Castings
Crucible Steel Co. of America, Sanderson Wks., Syracuse, N. Y.	2	3	Ingots	Taylor, W. P. Co., Buffalo, N. Y.	1	2	Castings
Damascus Crucible Steel Casting Co., New Brighton, Pa.	1	2	Castings	Taylor-Wharton Iron & Steel Co., Highland, N. J.	1	3	Castings
Disston, Henry & Sons, Inc., Philadelphia	1	3	Ingots	Taylor-Wharton Iron & Steel Co., Easton, Pa.	1	6	Castings
Disston, Henry & Sons, Inc., Philadelphia	1	6	Ingots	Tennessee Coal, Iron & Railroad Co., Ensley, Ala.	1	6	Molten Ferro- Manganese
Domination Foundries & Steel, Ltd., Hamilton, Can.	2	6	Castings	Timken-Detroit Axle Co., Canton, Ohio	1	2	Castings
Driver-Harris Co., Harrison, N. J.	1	1	Castings	Timken Roller Bearing Co., Canton, Ohio	4	6	Ingots
Electric Alloy Steel Co., Chardford, Pa.	2	6	Ingots	Treadwell Engineering Co., Easton, Pa.	1	2	Castings
Electric Engineering & Foundry Co., Tacony, Pa.	1	1	Castings	Trojan Electric Steel Co., Chicago	1	1	Ingots
Electric Steel & Forge Co., Cleveland	1	6	Ingots	Tungsten Steel Co., Toledo, Ohio	1	3 1/2	Cast Tool
Electric Steel Co. of Indiana, Indianapolis, Ind.	1	3	Castings	Twin City Forge & Foundry Co., Stillwater, Minn.	1	3	Castings
Electric Steel & Metals Co., Ltd., Welland, Can.	2	6	Ingots	Union Electric Steel Co., Carnegie, Pa.	3	6	Ingots
Erith-Sterling Steel Co., McKeesport, Pa.	2	3	Ingots	Union Spring & Mfg. Co., New Kensington, Pa.	1	6	Castings
Fort Pitt Steel Casting Co., McKeesport, Pa.	1	3	Castings	United Alloy Steel Corp., Canton, Ohio	1	6	Ingots
General Electric Co., Schenectady, N. Y.	1	5	Castings	United Alloy Steel Corp., Canton, Ohio	2	15	Ingots
General Electric Co., Schenectady, N. Y.	2	2	Castings	U. S. Government, Watertown Arsenal, Watertown, Mass.	1	2	Castings
General Electric Co., Schenectady, N. Y.	1	1	Ingots	U. S. Government, Watertown Arsenal, Watertown, Mass.	2	6	Ingots
General Electric Co., West Lynn, Mass.	1	6	Castings	U. S. Government, Naval Gun Factory, Washington, D. C.	1	6	Castings
General Electric Co., Erie, Pa.	1	6	Castings	U. S. Government, Charleston, W. Va.	3	6	Ingots
General Electric Co., Pittsfield, Mass.	1	1	Experimental products	U. S. Government, Charleston, W. Va.	2	40	Ingots
Halcomb Steel Co., Syracuse, N. Y.	1	4	Ingots	U. S. Government, Charleston, W. Va.	1	1	Ingots and Experimental Products
Halcomb Steel Co., Syracuse, N. Y.	3	6	Ingots	Universal Steel Co., Bridgeville, Pa.	2	6	Ingots
Harrow Spring Co., Kalamazoo, Mich.	1	6	Ingots	Vanadium Alloys Steel Co., Latrobe, Pa.	2	3	Ingots
Heppenstall Forge & Knife Co., Pittsburgh	1	6	Ingots	Vulcan Crucible Steel Co., Allquippa, Pa.	2	3	Ingots
Hess Steel Corp., Baltimore, Md.	6	6	Ingots	Warman Steel Casting Co., Los Angeles, Cal.	2	3	Castings
Hub Electric Steel Casting Co., Boston	1	2	Castings	Warren Steel Casting Co., St. Louis, Mo.	1	2	Castings
Illinois Steel Co., South Chicago	2	15	Ingots	Warren Steel Casting Co., St. Louis, Mo.	1	3	Castings
Illinois Steel Co., South Chicago	3	25	Ingots				
Illinois Steel Co., Joliet, Ill.	1	4	Molten Ferro- Manganese				
Latrobe Electric Steel Co., Latrobe, Pa.	1	3	Ingots				
Latrobe Electric Steel Co., Latrobe, Pa.	2	6	Ingots				
Lebanon Steel Foundry, Lebanon, Pa.	2	2	Castings				

The International Nickel Co., Huntington, W. Va., has purchased one 7-ton furnace for production of Monel metal.

furnaces in 1921 or close to 10 per cent. This contrasts with 36 in 1920; with 33 in 1919; with 31 in 1918 and with 114 in 1917.

The table of Heroult furnaces this year has been secured to date and contains all of that type now in existence or contracted for as of Jan. 1, 1922. The total of this type on Jan. 1, this year, was 164 in the United States and 15 in Canada, a net gain of 5 in the United States and a net loss of 3 in Canada, accounted for by the changes at the plant of the Baldwin

Canadian Steel Corporation, Ltd., Toronto. The net gain for the total of the two countries is therefore only 2 furnaces in 1921.

Among the new Heroult installations in the United States in 1921 were the following: One 6-ton furnace

Table of Rennerfelt Electric Steel Furnaces Installed or Contracted for in the United States, Jan. 1, 1922, as Sold by Hamilton & Hansell, Inc., New York

Company and Location	Capacity, Lb.	Product
American Foundry & Machine Co., Salt Lake City, Utah	6600	Castings
Best Steel Castings Co., Oakland, Cal.	2200	Castings
The Parsons Co., Newton, Iowa	2200	Castings
Pacific Foundry Co., San Francisco, Cal.	750	Pig iron
Chile Exploration Co., New York City	1000	Testing
Hamilton & Hansell, New York City	500	Special testing
Oklahoma Iron Works, Tulsa, Okla.	2200	Castings
Philadelphia Electric Steel Co., Conshohocken, Pa.	2200	Castings
Simonds Steel Co., Lockport, N. Y.	500	Testing
Liberty Steel Co., Morristown, N. J.	1000	Alloy steel
A. M. Byers Co., Pittsburgh	1000	Alloy steel
United States High Speed Steel & Tool Corporation	1000	Alloy steel
United States High Speed Steel & Tool Corporation	1000	Alloy steel
United States High Speed Steel & Tool Corporation	500	Alloy steel
Haynes Stellite Co., Kokomo, Ind.	200	Nichrome
Driver-Harris Co., Harrison, N. J.	300	Nichrome
Hardite Metals Co., Long Island City, N. Y.	1000	Nichrome
Vaughan Motor Works, Portland, Ore.	500	Steel castings
Total in the United States, 18.		

for ingots at Milton Mfg. Co., Milton, Pa.; one 1-ton for castings at Electric Engineering & Foundry Co., Tacony, Pa.; one 3-ton for castings at Lorain Steel Co., Johnstown, Pa., and one 6-ton for ingots at Henry Disston & Sons, Philadelphia.

The American Bridge Co., New York, which sells the Heroult furnace, has brought out a modified design for a 7-ton furnace, the latest type. A detailed descrip-

Table of Greene Electric Steel Furnaces Installed or Contracted for in the United States and Canada, Jan. 1, 1922, as Sold by the Greene Electric Furnace Co., Seattle, Wash

Company and Location	Size Tons	No. of Furnaces	Product
Dayton Malleable Iron Co., Dayton, Ohio	2 1/2	1	Iron and steel
Tannent Steel & Iron Co., Tacoma, Wash.	3 1/2	2	Steel
Pacific Car & Foundry Co., Renton, Wash.	1 1/2	1	Steel
Lamb Machine Co., Bonanza, Wash.	1 1/2	1	Iron and steel
Aurora Foundry Co., Seattle, Wash.	2	1	Iron and steel
Everett Steel Co., Everett, Wash.	3 1/2	1	Steel
Olympic Steel Works, Seattle, Wash.	1	1	Steel
Olympic Steel Works, Seattle, Wash.	2 1/2	1	Steel
Vulcan Mfg. Co., Seattle, Wash.	1 1/2	1	Iron and steel
Capitol City Iron Works, Olympia, Wash.	1 1/2	1	Steel
Canadian Klondike Mining Co., Dawson, Y. T.	3	1	Steel
Joplin Steel & Malleable Co., Joplin, Mo.	3	1	Iron and steel
Standard Brake Shoe & Foundry Co., Pine Bluff, Ark.	2	1	Steel
Skagit Steel & Iron Works, Sedro-Wailley, Wash.	1 1/2	2	Iron and steel
Hanford Iron Works, San Bernardino, Cal.	2	1	Steel
Los Angeles Foundry Co., Los Angeles, Cal.	1 1/2	1	Hard iron
Greene-Shaw Co., Berkeley, Cal.	3 1/2	1	Iron and steel
Columbia Steel Co., Portland, Ore.	1 1/2	1	Steel
Raele Brass Co., Seattle, Wash.	250 lb.	2	Monel, iron, etc.
Special induction furnaces*		2	
Total in the United States, including Alaska, 23.			

*These are two furnaces concerning which further information is not yet available.

Table of Snyder Multi-Phase and Single-Phase and of Von Schlegell Repelling Arc Type Electric Steel Furnaces Installed or Contracted for in the United States and Canada, Jan. 1, 1922

Company and Location	Size, Tons	No. of Furnaces	Product
Snyder Multi-Phase:			
Dayton Steel Foundry Co., Dayton, Ohio	5	1	Steel
West Steel Casting Co., Cleveland	5	1	Steel
Joyce-Cridland, Dayton, Ohio	3	1	Steel
Zimmerman Steel Co., Bettendorf, Iowa	5	1	Steel
Atlantic Foundry Co., Akron, Ohio	3	1	Steel
Standard Steel Castings Co., Clearing, Ill.	5	2	Steel
Buckeye Traction Ditcher Co., Findlay, Ohio	1	1	Iron and steel
Hubbard Steel Foundry Co., East Chicago, Ind.	5	1	Steel
Niagara Elec. Steel Corporation, No. Tonawanda, N. Y.	1	1	Steel
Western Crucible Steel Cast. Co., Minneapolis, Minn.	3	1	Steel
The Denver Rock Drill Mfg. Co., Denver, Col.	3/4	1	Steel
Industrial Steel Casting Co., Toledo, Ohio	2	1	Steel
Standard Steel Casting Co., Cleveland, Ohio	3	1	Steel
Chicago Steel Foundry Co., Chicago	3	1	Steel
W. K. Henderson Iron Works & Supply Co., Shreveport, La.	1 1/2	1	Steel
Von Schlegell Repelling Arc Type:			
H. D. Stroud, Detroit, Mich.		1	Alloy Steel
Snyder Single-Phase:			
Crucible Steel Casting Co., Milwaukee, Wis.	1	1	Steel
Dayton Steel Foundry Co., Dayton, Ohio	1	1	Steel
B. Fair & Son, Saginaw, Mich.	1	1	Steel
Western Crucible Steel Casting Co., Minneapolis, Minn.	1	1	Steel
Monroe Steel Casting Co., Monroe, Mich.	1	1	Steel
Sivyer Steel Casting Co., Milwaukee, Wis.	1	1	Steel
Olis Elevator Co., Buffalo, N. Y.	5	1	Steel
Minneapolis Elec. Steel Cast. Co., Minneapolis, Minn.	3/4	1	Steel
Gerlinger Steel Casting Co., Milwaukee, Wis.	3/4	1	Steel
Amer. Well & Prospecting Co., Corsicana, Texas	3/4	1	Steel
Olis Elevator Co., Buffalo, N. Y.	5	1	Steel
Haynes Stellite Co., Kokomo, Ind.	3/4	3	Stellite
Niagara Elec. Steel Corp., No. Tonawanda, N. Y.	3/4	1	Steel
Chile Exploration Co., New York, N. Y.	3 & 1	2	Steel
Davidson Mfg. Co., Montreal, Canada	1	1	Steel
Electric Steel Co., Chicago, Ill.	1	1	Steel
Gerlinger Steel Casting Co., Milwaukee, Wis.	1	1	Steel
Manitoba Steel Foundry, Selkirk, Manitoba, Can.	1	2	Steel
Pelton Steel Co., Milwaukee, Wis.	3	1	Steel
New London Ship & Engine Co., Groton, Conn.	1	1	Steel
Stearnes Rogers Mfg. Co., Pueblo, Col.	3/4	1	Steel
Electric Steel Co., Chicago, Ill.	3	1	Steel
Fairbanks Steam Shovel Co., Marion, Ohio	1	1	Steel
Beaumont Iron Works, Beaumont, Texas	1	1	Iron and Steel
W. K. Henderson Iron Wks. & Supply Co., Shreveport, La.	3/4	1	Steel
United Alloy Steel Corp., Canton, Ohio	1	2	Alloy Steel
Western Steel Car & Foundry Co., Hegewisch, Ill.	1	2	Steel
Oil Well Supply Co., Oil City, Pa.	3/4	1	Steel
Fluid Compressed Steel Co., Keokuk, Iowa	1	1	Steel
Industrial Steel Castings Co., Toledo, Ohio	2	1	Steel
H. Lifchitz Brass Foundry & Machine Shop, Indianapolis, Ind.		3/4	Steel
Total in the United States, 52; Canada, 2.			

tion of this will be published in a later issue of THE IRON AGE.

Conspicuous among sales of new furnaces in 1921 is the Greene with the reported sales of 5 furnaces as follows: Los Angeles Foundry Co., Los Angeles, Cal., one 1 1/2-ton furnace for hard iron; Greene-Shaw Co.,

these are significant as marking a contract for the largest electric furnace ever built and also as revealing plans for the largest electric steel plant in the country though definite announcement of this has not been made. The three new contracts referred to are two 10 to 15-ton furnaces and one 50 to 60-ton furnace for the Ford Motor Co. These supplement a 3-ton and a 1/2-ton of the same type in use for some time.

For the first time it is possible to publish a table of the installations of Volta furnaces. Previous to this only estimates have been available. Of these there are 2 in the United States and 11 in Canada, the furnace being distinctly a Canadian development.

The table of general furnaces includes some that were not published a year ago, mostly Canadian instal-

Table of Electric Steel Furnaces Installed or Contracted for in the United States and Canada, Jan. 1, 1922, other than the Heroult, Snyder, Rennerfelt, Gronwall-Dixon, Greaves-Etchells, Greene and Booth Types

Company and Location	Size, Tons	No. of Furnaces	Type
Bethlehem Steel Co., South Bethlehem, Pa.	10	1	Girod
Washington Iron Works, Seattle, Wash.	3 & 1	2	Girod
Electric Steel Foundry, Portland, Ore.	1	2	Girod
Washington Steel & Ordnance Co., Washington, D. C.	1	1	Stassano
American Iron & Steel Mfg. Co., Lebanon, Pa.	20	2	Induction
General Electric Co., Pittsfield, Mass.	2	1	Induction
Ludlum Steel Co., Watervliet, N. Y.	10	3	Ludlum*
Metal Alloys, Inc.	5	3	Ludlum
Hammond Steel Co., Syracuse, N. Y.	10	1	Ludlum
McCord Mfg. Co., Chicago	6	2	Ludlum
American Cast Iron Pipe Co., Birmingham, Ala.	6	1	Ludlum
Omaha Structural Steel Works, Omaha, Neb.	2	1	Ludlum
Westinghouse Electric & Mfg. Co., Trafford, Pa.	6	1	Ludlum
Bonney-Floyd Co., Columbus, Ohio	3	1	Ludlum
Old Dominion Iron & Steel Corporation, Richmond, Va.	3	2	Webb
Hercules Steel Casting Co., Milwaukee, Wis.	6	1	Vom Bauer†
Moreland Motor Truck Co., Los Angeles, Cal.	3	1	Vom Bauer
Moreland Motor Truck Co., Los Angeles, Cal.	3 1/2	1	Vom Bauer
A Steel Casting Company, New York City	3 1/2	1	Vom Bauer
Rhode Island Crucible Steel Co., Providence, R. I.	1 1/2	1	Vom Bauer
Nitrogen Corporation, Providence, R. I.	1 1/2	1	Vom Bauer
Michigan Steel Castings Co., Detroit, Mich.	1	1	Detroit
Homestead Valve Mfg. Co., Homestead, Pa.	1	1	Detroit
Russell Wheel & Foundry Co., Detroit, Mich.	1	1	Detroit
Chenadaga Steel Co., Syracuse, N. Y.	1	1	Special
Chrome Steel Works, Chrome, N. J.	1	1	Special
Truani Electric Steel Co., Belleville, Ont.	3	1	Special
Hesse-Martin Iron Works, Portland, Ore.	1	1	Special
Thos. Davidson Mfg. Co., Montreal, Que.	8	4	Special
Thos. Davidson Mfg. Co., Montreal, Que.	1 1/2	1	Special
Canadian Electric Steel, Ltd., Montreal, Que.	7	3	Heroult modified
Canadian Brake Shoe Co., Sherbrooke	1	1	Special
Canadian Brake Shoe Co., Sherbrooke	2	3	Special
Hull Iron & Steel Foundries, Ltd., Hull	5	1	Heroult modified
Baldwin Canadian Steel Corporation, Collingwood	3	1	Heroult modified
Canada Electric Castings Co., Ltd., Orillia	1 1/2	1	Special
Manitoba Steel Foundries, Ltd., Winnipeg	2	2	Special
Opel Steel Co., Vancouver, B. C.	2 1/2	1	Special
Shipton Electric Pig Iron & Steel Co., Ltd., Vancouver, B. C.	1	1	Special
Other special furnaces, estimated			
Total in United States and Canada: Girod, 5; Stassano, 1; Induction, 3; Ludlum, 13; Webb, 2; Vom Bauer, 6; Detroit, 3; Special and Heroult modified, 28. Total, 66.			

*A Ludlum 3-ton furnace has been sold to the Consolidated Rolling Mills & Foundry Co., Inc., New York, for installation in Chile. There are also 9 Ludlum furnaces of special type making various ferroalloys for the Metal Alloys, Inc., Watervliet, N. Y. The Ames Electric Corporation, Conny Island, N. Y., also is using a special 3-phase Ludlum furnace for smelting tin ore.

†Four Vom Bauer furnaces have been sold for installation in Japan, one 6-ton furnace to Le Flavia et Cie., St. Etienne, France, and one 3-5 ton furnace to Consolidated Rolling Mills & Foundries Co., Mexico City, Mexico, for castings.

Table of the Number of Electric Steel Furnaces in the United States and Canada

Type	U. S. 1922	Canada 1922	U. S. & Canada 1922	U. S. 1921	Canada 1921	U. S. & Canada 1921	U. S. 1920	Canada 1920	U. S. & Canada 1920	U. S. 1919	Canada 1919	U. S. & Canada 1919	U. S. 1917
Heroult	164	15	179	177	170	163	146	84					
Snyder and Von Schlegell†	52		51	54	40	48							
Rennerfelt	18		18	17	18	13	13	13					
Greaves-Etchells	20		28	25	18	11	12	9					
Gronwall-Dixon	11	1	12	12	13	12	12	0					
Ludlum	13	0	13	13	12	11	6	5					
Girod	5	0	5	5	5	5	5	4					
Booth†	14	0	14	14	12	11	4	0					
Moore*	36	0	36	24	20	12	4	0					
Induction	3	0	3	3	3	3	3	3					
Webb		0	2	2	2	2	2	0					
Stassano	1	0	1	1	1	1	1	1					
Greene	23	0	23	18	11	8	1	1					
Vom Bauer	6	0	6	5	4	2	0	0					
Wile	0	0	0	0	0	0	1	1					
Detroit		0	3	1	1	0	0	0					
Volta		11	13	8									
Special, etc.*		19	28	20	24								
Total	388	50	438	399	363	330	269	185					

*Estimated.
†No report; data left same as year ago.

Berkeley, Cal., one 1/4-ton for iron and steel; Eagle Brass Co., Seattle, Wash., two 250-lb. furnaces for monel metal, iron, etc., and the Columbia Steel Co., Portland, Ore., one 1 1/2-ton for steel.

The Greaves-Etchells furnace is credited with three new installations in 1921. Though not large in number

lations. These are based on Canadian Government records and account in part for the net increase in furnaces in Canada for 1921.

Data regarding the Moore and Pittsburgh furnaces were unobtainable from the sellers as in previous attempts to compile this review, but from data obtained from several sources it is possible to publish this year our estimate which is probably nearer the total than in past years. This estimate credits this type of furnace with 36 furnaces as contrasted with 24 a year ago.

An interesting fact is the sale of two Detroit rock-ing furnaces in 1921 for use in the iron industry. This is primarily a non-ferrous electric melting furnace. The new installations include one 1-ton furnace, 300 k. v. a., at the Homestead Valve Mfg. Co., Homestead, Pa., for making gray iron and semi-steel valve bodies and one 1-ton furnace, 300 k. v. a. for producing gray iron and semi-steel castings.

One new installation of a Rennerfelt furnace is reported for 1921 at the plant of the Vaughan Motor

Works, Portland, Ore. It is a $\frac{1}{4}$ -ton furnace for steel castings.

No data were available from the sellers of the Von Schlegell or Booth furnaces. Statements were received that there had been no change in the Ludlum, Snyder

or Grönwall-Dixon lists as published a year ago.

One of the tables shows the number of furnaces by types in the United States and Canada as of Jan. 1, 1922, as well as the total of the two countries, compared with recent years.

Developments in the World

NO attempt has been made this year to obtain data regarding the progress of the electric steel industry in other countries than the United States and Canada. It is probable that this will be possible later. In this review published Jan. 6, 1921, covering the year 1920, data regarding the various types of furnaces in these countries were published including a table which gave known and estimated figures for all countries and all types. According to this there were 562 electric furnaces of all types outside the United States and Canada. Of these 131 were Heroult, 85 were Rennerfelt, 65 were Greaves-Etchells, 7 were Snyder and 6 were Vom Baur, with other types estimated at 268. England led with 150, Germany following with 100 and France with 69 furnaces. Italy and Sweden were credited with 50 each, Norway and Austria (with Hun-

gary) with 20 each, Japan with 11 and Spain and Luxembourg with 10 each.

It is known that these totals have been increased recently so that it is safe to say that, allowing for additions and discontinuances and adding the present total of 438 in the United States and Canada, the world's total is easily 1000.

Of the total installations the United States is credited with 388 or practically 39 per cent. In the production of steel and iron in electric furnaces, this country easily leads all the rest with a capacity probably equal to the total of the other countries combined.

Outstanding in the progress of 1921 is the introduction of the electric furnace into the manganese, steel and the gray iron foundry industry—a movement sure to expand.

Hope for Improvement in Export Business

No Decided Change Is, However, Expected This Year
Owing to Disturbed Conditions in Europe—
Japan a Good Customer

FOR American exporters, 1921 was largely a year of liquidation and retrenchment. A number of prominent exporting companies liquidated, many smaller exporters reduced their personnel to a minimum and several American branches of foreign export houses were closed because of the depressed condition of business. Although the majority of exporters look forward to the coming year as a period of improvement, but slight approach to normal business is expected in view of the unsettled condition of almost all foreign market.

Throughout the past year, Japan has been practically the only active market and this situation is expected to continue for the greater part of next year. In the first quarter, Japanese buying assumed fairly large proportions, continuing until about June when the effect of German competition began to be felt by traders with the Far East. At this time it was variously estimated by Japanese exporters that from 70 to 80 per cent of Japanese buying was being done in the United Kingdom and Continental markets, the remainder coming to the United States. This competition was confined to a great extent to light rails, bars, wire and wire products. The report of a Japanese warehouse company on warehouse stocks for the first ten months of this year shows a decrease in the value of iron and steel on hand. Compared with this company's figures for November, 1920, when warehouse stocks were estimated at about 57,000,000 yen (\$27,360,000), November, 1921, showed stocks in warehouses of the principal ports and cities, valued at about 19,000,000 yen (\$9,120,000).

Japan Purchases Sheets

Japan purchased about 54 per cent of the sheet exports of this country during the first 10 months of the year. The majority of these orders were for Nos. 31 and 31½ gage black sheets, much of the business in heavier gages going to British mills. A large part of these sheets was galvanized in the Japanese galvanizing plants. To protect this infant industry, a duty of about 30 yen (\$14.40) per ton is imposed upon imports of galvanized sheets, compared with about 5.50 yen (\$2.64) per ton on plain black.

Imperial Government purchases have been largely

confined to rails and locomotives. The year's purchases for the Imperial Government Railways alone are estimated to total about 50,000 to 60,000 tons of 60-lb., 75-lb. and heavier rails and light rail purchases were swelled by both Government and private buying. Although buying of copper was fairly active during the year, the total shipments during the first ten months placed Japan in fourth place among foreign buyers of American copper. For a short time, activity was noted in structural material for bridges, which were being erected to replace old bridges in the vicinity of Tokio. More than a dozen bridges were purchased in the United States, which represents only a small percentage of the total of more than a thousand, which will eventually be bought for erection in and near Tokio. Construction of new buildings in Tokio, Osaka and other large cities resulted in a few tonnages of structural steel and as the trend toward modern fire-proof office buildings in Japan is evidently continuing, the ensuing year may see further purchases for this purpose.

Large Electrical Equipment Contract

One of the largest contracts placed in the United States during the year was for about \$2,000,000 worth of electrical equipment, awarded by the Tokio Electric Light Co., to the Westinghouse International Co. Another smaller order called for about \$600,000 worth of equipment for the Daido Electric Power Co. Electrification of the Government railroads is in progress, opening prospects for future purchases, many of which may be made in the United States. In addition to previous rail purchases made by the Imperial Government Railways, about 13,000 tons of 60-lb. and 75-lb. rails was awarded during the last week of December by the Government and decision was also made on the purchase of 5500 tons of 100-lb. rails for the Hanshin Electric Railway.

The South Manchuria Railway Co., Japanese owned, placed a number of orders in the United States during the year. The purchasing of this railroad, which is fairly regular, averages between 350,000 yen (\$168,000) and 400,000 yen (\$192,000) per month. In 1919 purchases totaled about 10,600,000 yen (\$5,088,000) and in 1920 about 6,146,186 yen (\$2,950,169).

These purchases did not include buying done in the United Kingdom, Germany and elsewhere. In prospect for 1922 is the material for hydro-electric projects, particularly a large one on the island of Formosa, material for the electrification of railroads in Japan, structural steel for bridges, new office buildings and other buildings in the cities, the usual rail requirements of the Government railroads, municipal street car lines and private mining, lumbering and other enterprises and the usual consumption of black sheets. A number of sheet orders have been booked by Japanese export houses and placed with American mills for January-February delivery, as well as orders for wire and wire nails.

South American Conditions

Early in 1921, South American markets were in a chaotic condition, practically all the principal ports of South American countries being congested with canceled material. The greatest supplies were at Buenos Aires, where the two leading interests and numerous small exporters were holding stocks of canceled material. While a large part of this material was rendered practically useless by exposure to the weather, some was sold at heavy losses and a not inconsiderable part is reported to have been re-exported to other markets. Gradually the situation was cleared and although South American markets will probably not enter into American exports as a factor in 1922, there will undoubtedly be some purchasing on a scale slightly greater than in 1921.

Construction contracts have been let to American builders in Chile, Brazil, Bolivia, and Argentina and other countries and the development of oil fields in Chile, Argentina, Bolivia and Venezuela will doubtless result in the exportation of oil well equipment, tanks, pipe and pumping machinery. The Westinghouse International Co. received part of a railroad electrification contract for Chile, the locomotives being awarded to the American Locomotive Co. The Chilean State Railways closed on about 20,000 tons of heavy rails and about 400 cars in November, placing the rails in Germany, for the first time in about 20 years, and the cars with two American builders. A project is reported from Colombia for railroad construction, which, if carried through, would eventually involve the purchase of a large tonnage of heavy rails as well as locomotives and cars. This project is in line with the Colombian Government's intention of spending the \$25,000,000 indemnity for Panama, when it is received from the United States Government. The railroad contract for 128 miles of standard gage track, on which the Ulen Contracting Co., New York, is working in Bolivia, will result in inquiries, according to the contractor, in February or March, when the engineering is completed and construction begins. A number of steel bridges and a tonnage of 60-lb. rails will be included.

Locomotives for Mexico

The National Railways of Mexico have purchased a total of 216 locomotives, heavy and light, of which slightly less than half were second-hand. Rail requirements have been handled satisfactorily by the Monterey Iron & Steel Co., which is at present engaged in executing an order for about 25,000 tons of rails for the Mexican railroads. The Mexican railroads are in need of adequately equipped repair shops. Although there is an ample supply of standard gage freight cars for present conditions, standard gage passenger coaches and narrow gage passenger coaches and freight cars are needed. Purchases, however, can only be made when generous credit terms are extended.

Early in the year Germany was not yet a large factor in international markets, but by June, competition of German products was being rather severely felt by American exporters. A number of fairly large rail and structural steel orders were booked and the Japanese, who had been notably active in purchases of wire and wire products in the United States, began buying in Germany and England, because of lower prices. The low quotations made by German wire mills stimulated

an interest among American consumers and negotiations were instituted on several large wire nail orders.

Policy of German Companies

Although numerous representatives of German mills and export houses have established themselves in New York this year, the depressed condition of the American market has precluded any large transactions, but there has been some activity on the part of American exporters, who have purchased German material for shipment to foreign markets. The large German interests, such as those of Stinnes and Thyssen, do not look with favor upon any attempt to export iron and steel to the United States on a large scale, believing that such business would not be sufficiently remunerative or last sufficiently long to offset the antagonism that would be aroused.

Following the short period when German mills were booking orders from all markets, the decline of the mark stimulated not only foreign but domestic German purchasing. Exporters and dealers in Hamburg, Rotterdam and other ports filled available warehouses with material to replace their paper marks, which were daily declining in value. This unusual buying activity served to stimulate German prices and as the American iron and steel market declined, the German market rose. To-day, from a price standpoint, Germany is competing with American products in foreign markets on a very much reduced price margin. German interests during the year accepted a number of orders, chiefly for railroad material and equipment and agricultural machinery, from the Russian Soviet Government, extending long terms of credit.

Railroad Material for China

China became active for a short period during the year, purchasing rather heavily of railroad material and equipment. Heavy rails and a large number of locomotives and cars were placed in the United States, but on some of this material, difficulty has been encountered by the sellers in finding financing. China was also active for a short time in purchasing copper for minting, but the unstable political situation curtailed this considerably. Several large tonnages of second-hand plates and shapes, used extensively by Chinese blacksmiths, were shipped by American exporters and Chinese buyers inquired in most cases unsuccessfully for wire shorts. There was some activity in electric units and machinery and machine tools.

Some sales of imported semi-finished material have been made in the American market during the year and a considerable tonnage of pig iron has been sold on the Pacific Coast, where high railroad freights eliminated Eastern iron. According to Paul G. Leoni of the Iron & Ore Corporation of America, 11 Broadway, New York, an active importer of foreign pig iron and some semi-finished material during the past year, there have been imports from Belgium, Luxemburg and Germany but most of these sales were made in September and October, when American pig iron was higher and European iron cheaper. Pig iron sales were then made at \$18 to \$19 per ton, c.i.f. Atlantic ports and \$26 to \$30 per ton, c.i.f. Pacific ports. Since then the situation has changed. American prices have declined and European prices increased and since November none of the negotiations for foreign pig iron, which were pending, has led to any results, notwithstanding reports to the contrary.

Outlook for This Year

At present, European prices are about \$17 to \$18 per ton, f.o.b. European ports, and as the freight rate to Atlantic ports is about \$4, the delivered prices cannot compete with the American quotations, except, perhaps, in special cases where the consumer is located close to a port. On the Pacific Coast there is still an advantage in importing European pig iron and several sales were made during December at prices between \$24 and \$26 per ton, c.i.f. port. The outlook for 1922 depends on the developments in both the European and American markets. It is, however, likely that there will be a close race between foreign and domestic pig iron and there may be times when importation will be possible.

However, if the new tariff goes through, providing a duty on pig iron of \$1.25 per ton, the chances for importing foreign pig iron in the East will not be great.

Movement of Foreign Ores

Imports of iron ore are also dependent upon freight rates. European iron ore, suitable for making foundry iron can be imported at from 8c. to 9c. per unit, c.i.f.

Atlantic ports and in view of the special freight rates on imported ores, which have been established lately for Virginia and Pennsylvania points, some business in foreign ore may be expected when demand increases.

Low phosphorus iron ore is quoted at present between 10c. and 25c. per unit, according to quality, but no sales of any importance have been effected, because of the lack of demand for low phosphorus pig iron.

British Iron and Steel in 1921

The Slump in Output and Prices—Continental Competition— Conditions Nearing Normal as Year Ends

LONDON, ENGLAND, Dec. 15.—Since the slump of 1879 which still lives in the memory of British ironmasters as the most disastrous period in the history of the trade, no more difficult times have ever been experienced than those through which the iron trade has passed during the last 12 months. The transition from prosperity to acute depression came with almost the rapidity of a thunderbolt. Production has fallen to the lowest level recorded for several decades, and the collapse in prices has been wholly unprecedented since the iron industry was established.

The Slump in the Industry

It was of course the inflation of values which in the first instance was responsible for the slump. Prices had reached an impossible level. Foreign consumers with depreciated exchanges were simply unable to pay the price for British iron and, in consequence, we have witnessed an almost complete surrender of our overseas trade.

But that does not mark the full extent of the blow. Cleveland, our leading producing area, has not only lost its overseas markets, which in pre-war days represented a trade of about 750,000 tons per annum, but in addition the home markets have been invaded and for months past our ironmasters have had the mortification of witnessing a constant influx of pig iron pouring into the Tees from continental ports, while their own blast furnaces were standing idle. For months past also Cleveland has been shut out of the Scottish market which has always been the mainstay of the local pig iron trade.

This diversion of the normal flow of trade has been entirely attributable to the fact that France, Belgium and Germany, aided by the vagaries of falling currencies, have been able to undersell us both at home and abroad, and the effect of this is seen in the fact that whereas the exports of pig iron from the Tees during the 12 months ended Oct. 31, 1920, were 470,794 tons, they fell in the ensuing 12 months to 125,730 tons, while the imports from abroad, which in the 12 months ending Oct. 31, 1920, amounted to the negligible quantity of 4,668 tons, reached in the ensuing 12 months 78,293 tons. Indeed, in the latter months of the year the imports far exceeded the shipments both to foreign and home ports.

High prices in the first instance precipitated the slump and it is true that, even before the coal strike, many furnaces had been put out of blast, the position being that on the day before the miners ceased work only 41 furnaces were operating on the Northeast Coast, against a normal average of 72. But the plunge to disaster was rendered deeper and more rapid by the ill-advised action of the coal miners in their declaration of industrial war.

The Pig Iron Output

The miners themselves suffered severely but their own sufferings were as nothing to those inflicted upon

the iron and steel trade and upon those who depended upon it for a livelihood. For three months the industry was entirely at a standstill and, even after the miners got back to work and fuel was again available, very little pig iron was produced on the Northeast Coast and in October, which is the last month for which the figures of production are available, the total output of pig iron was less than half the quantity produced in March, the month preceding the coal strike.

The Cleveland pig iron output for the year is likely to be no more than 40 per cent of the production in 1920. The furnaces now in blast number 24, whereas at the end of 1920 there were 72 in operation and the chief problem engrossing the minds of ironmasters at the present moment is how to get these idle furnaces back to work again. It is simply a question of prices. There is no sentiment in business and if the British or foreign consumer finds that he can buy continental iron cheaper than Cleveland iron, nobody expects him to be patriotic at the expense of his pocket. Indeed, the local steel makers themselves, though in most cases owning their own blast furnaces, have preferred to keep their blast furnaces idle, and to use foreign pig iron and scrap, rather than face the high costs of production involved in smelting their own pig iron.

Extent of the Price Decline

The great problem therefore has been to reduce prices, and in this direction remarkable results have already been achieved. At the beginning of the year No. 3 Cleveland G. M. B. pig iron was quoted at 225s per ton; today it is offered at 100s and even yet the trade is convinced that the end of the downward movement is not reached. This rapid descent to the lower level of values has only been rendered possible by the sacrifices of employers and employed.

The ironmasters have not only abandoned all profits but are actually now producing at a loss, while the wages of the blast furnacemen have fallen from 170¼ per cent above the standard to 77¼ per cent above it. Equally drastic have been the sacrifices made by the Cleveland ironstone miners. Their wages have fallen about 9s per day and they have further voluntarily agreed to sacrifice a guaranteed minimum of 8s per day, consenting to the regulation of earnings entirely by output as a further means of assisting the revival of industry. Even yet prices have not fallen to such a level as to shut out foreign pig iron, except perhaps in the Tees ports.

In other areas the high cost of transport added to the price of Cleveland pig iron brings up the figure to such a level that the foreigner can still compete successfully. The costs of production are steadily falling and it is hoped that the railroad companies will promptly make substantial reductions in rates. Moreover, fuel costs are dropping and the day seems now not far distant when British furnaces will be able to cope successfully with foreign material.

At the beginning of the year there was an export premium of 22s 6d per ton on Cleveland pig iron; that is to say, the Cleveland makers demanded 22s 6d per ton more from the foreigner than from the home consumer. On Jan. 7 the export premium fell to 20s per ton, and on Jan. 25 it fell to 5s per ton. Since then there have been occasional periods when iron was offered at home and abroad at the same figure but for the most part the export premium was maintained at 5s per ton. The following table shows the price changes in shillings during the year so far as they relate to No. 3 Cleveland G.M.B. which is the standard quality upon which all wage ascertainties are based:

1921	Home	Export
Jan. 1	225	247 1/2
Jan. 7	215	235
Jan. 25	215	220
Feb. 1	195	200
March 1	150	155
April 5	120	125
Nov. 1	110	115
Nov. 28	100	105

It should be added, in explanation of the above figures, that they are the official minimum prices agreed upon by the Cleveland ironmasters committee and, during the scarcity occasioned by the coal strike, the price of No. 3 actually ran to 140s but speedily relapsed when production was resumed.

The following summary compares the average officially ascertained price of No. 3 Cleveland G.M.B. in the past two years:

	1920		1921	
	s.	d.	s.	d.
First quarter	178	3 18	198	1 31
Second quarter	203	8 06	126	11 56
Third quarter	217	6 31	131	6 13
Fourth quarter	224	5 37		
Year's average	205	11 95		

The Steel Situation

As regards the steel industry, the beginning of the year found makers with clean order books and prices somewhat removed from the highest levels reached in 1920, but still exorbitant. The boom of the previous year had enabled makers to become independent and to put up prices heedless of what the future would bring. Costs were undoubtedly high, but there was little justification for maintaining selling values at such levels. Taking into consideration the fact that continental works were beginning to get into swing again, one would have thought that the steel makers would have made some attempt at any rate, to avoid what was the natural course of events, namely, acute continental competition, by making drastic reductions, but this was not the case and throughout the year steel prices in this country have simply been cut by dribblets, except toward the close, when a bold bid was made. Continental competition began to make itself felt in January, taking the form of undercutting in the sheet trade, and our old overseas markets were temporarily lost to us, heavy tonnages finding their way to foreign destinations, chiefly South America and the Far East. Subsequently good railroad material orders were booked by the continent and plants here began to shut down for want of orders.

The Coal Strike

With the government control of the coal industry coming to an end on March 31, the coal miners declared war on the nation and thereby struck the greatest blow to the steel trades. Most works had to shut down entirely and production in consequence fell to practically nothing. When the strike was settled three months later, steel makers found themselves with empty order books and thoughts concentrated upon where business was to come from and how they were to get their prices down. During the period of complete stagnation, continental works saw their opportunity and with the rate of exchange favorable to them, very large quantities found their way to other

foreign markets while such home consumers as were enabled to carry on were forced to import their supplies from abroad. These latter sales consisted in large part of semi-finished steel. Subsequently, Belgium began to have industrial troubles and other continental countries, from one cause or another, got very much behind hand with deliveries of finished material and, as in most cases the steel was required urgently, a number of orders were cancelled and were booked with works here though at slightly higher figures.

In semi-finished steel, however, British prices fell to competitive levels with the result that continental sales in this direction diminished and gradually ceased. In November British steel makers of shapes, etc., finding that there were orders to be had, abandoned ideas of profits and made cuts which, though insufficient to oust continental competition, nevertheless gave certain buyers a little more confidence and orders began to dribble in again, though only sufficient to keep plants partly employed.

In Scotland where the depression had been at its worst, the placing of the Admiralty contracts for three new capital ships, had caused a certain amount of encouragement and employers and employees alike were looking to activity for some time. The suspension of these orders, however, as a result of the naval holiday proposed by the Washington Conference brought disappointment. This feeling, however, was soon overcome, it being realized after all that the limitation of armaments would in the end prove not only a benefit to the nations but to the steel industry as well.

Throughout the whole year shipbuilding, generally speaking, has been stagnant so far as new orders are concerned and ship repairs were sent freely to the continent, where they could be effected at probably half the home cost.

Activity in Tin Plate

An exception to these remarks must, however, be taken with regard to the tinplate industry. Upon the cessation of the boom in 1920, prices began to fall and whereas 77s a basis box was the highest price paid by December of that year, values had fallen to 33s basis. This year, except for minor fluctuations, quotations have dropped and a basis box is now worth about 21s. The trade of course suffered severely during the coal strike, but recovered comparatively rapidly, there being no competition to meet except from America. True, Germany was a seller at one time at competitive prices, but heavy tonnages changed hands, and to-day Wales stands as the cheapest seller. Export business has been moving better, but has naturally been limited in the case of those markets where the exchange rates are adverse. The Far East has been quite a fair buyer, but latterly the demand from that quarter has subsided. Much encouragement given to Wales was the securing of 150,000 boxes for British Columbian packers in face of keen competition from United States manufacturers.

Comparative Prices

The following are comparisons of prices per ton of leading iron and steel products:

	December, 1920		December, 1921	
	£	s.	£	s.
Steel ship plates	25	0	10	10
Steel joists	24	0	10	0
Steel rails (heavy)	25	0	10	0
Steel billets	15	10	7	10
Marked bars (Staffs)	33	10	16	10
Tinplates, 20 x 14, basis f.o.b. (per box)	1	13	1	1

In connection with the study of corrosion of metals in mine water, 44 specimens of material received from 25 manufacturing companies co-operating in the mine-water tests have been weighed, checked, numbered and polished at the Pittsburgh experiment station of the Bureau of Mines, and placed in certain mines where they will remain possibly six months.

German Industry Had Prosperous Year

Booked into 1922 but Speculative Character of Business

May Result in Some Cancellations—

Details of German Exports

(Special Correspondence)

BERLIN, GERMANY, Dec. 9, 1921.—When the history of the German iron and steel industry comes to be written, 1921 will figure as one of the most remarkable years on record. On casting a retrospective glance on the trend of developments during this year, two distinct periods—linked by a short transitional period—may be observed. If developments were to be depicted in a curve, the graph to be plotted would somewhat resemble a parabola with the origin representing the turn of the tide toward the end of May.

The opening of the year found the industry in a fairly satisfactory position, as mills were on the whole still well employed on old contracts. Warehouses and producers' yards were amply stocked, prompt and quick delivery could be effected and supplies of raw material—with the possible exception of coke—were plentiful.

Official Maximum Prices Became a Farce

New business, however, left much to be desired, since consumers, in anticipation of a reduction of official prices by March, adopted a rather conservative attitude. Contrary to general assumption, the foreshadowed cut in prices in March was deferred for an indefinite period. If free market prices had fairly stabilized on the level of official maximum prices at the beginning of the year, the approaching London conference and the growing political and economic uncertainty were introducing an element of insecurity into the market. This situation became even more pronounced when the failure of the conference was realized and the sanctions of the Allies came into force. The pick-up character of business assumed decidedly grave aspects and prices began to give way. Supply and demand were once again ruling the situation and the operation of official maximum prices became a consummate farce.

The bottom point of the downward curve was reached toward the middle of May. The trend of prices in some of the principal departments is shown in the appended table, in marks per metric ton.

	Jan	-Beginning of -			Last Offi- Maximum	
	Feb	March	April	May	June	Price
Ingot	1,850	1,800	1,750	1,700	1,600	1,370
Billet		1,950	1,950	1,900	1,800	1,995
Bar iron	2,515	2,350	2,350	2,300	1,800	2,440
Sheets	3,125	3,000	2,700	2,500	2,100	3,090
Sheet		3,350	3,250	2,800	2,300	3,360
Plates light	3,560	3,500	3,000	2,850	2,350	3,500
Wire rods		2,800	2,500	2,300	1,700	2,720

Revival of Activity Late in May

Though prices for some commodities receded still further during the latter half of May and even during June, a slight but none the less noticeable reaction set in toward the end of May—less reflected in a hardening of quotations than by a more active demand, especially on the part of merchants who were replenishing stocks. Furthermore, the effects of freedom from control made themselves felt at last and in conjunction with the miners' dispute in the United Kingdom and the acceptance of the ultimatum resulted in a certain consolidation of the market.

It is true that the political riots and disturbances in Upper Silesia affected the output capacity of the Silesian industry to a notable extent; so far as operations could be maintained, stocks had to be piled up at the yards because of the interrupted and disorganized transportation service. It should be borne in mind, however, that after all it is the Rhenish-Westphalian district where the center of gravity of the German iron industry rests and it is only natural that the latter profited by the elimination of the Upper Silesian factor during that period.

The upward tendency of prices received a strong impetus through the rapid deterioration of the German exchange toward the end of August and the further depreciation of the mark during the following weeks proved the general signal for an extraordinary rush for material. Available stocks were snatched up in no time, prices advanced by leaps and bounds and within a short time mills found themselves sold out for the rest of the year. Interested circles were at first inclined to predict a short life for the ensuing boom but developments up to date have proved the contrary so far. At present, mills are sold out for the first quarter and flooded with inquiries and orders for the second quarter of 1922 but are, on the whole, reluctant to enter long-term engagements on account of the uncertain raw material and exchange situation.

Business in Hands of Middlemen

The tremendous pressure of demand naturally brought about most abnormal conditions. Spot stocks have latterly been non-available and fancy prices were paid for prompt and quick delivery. As mills closed their books as far back as October and November, present business is almost exclusively handled by the second and third hand. The unparalleled soaring of prices is being viewed with much apprehension in responsible quarters, but no serious effort has so far been made to stem the upward trend.

Labor in insisting upon the reintroduction of official maximum prices takes a rather isolated stand, and when met with a counter proposal by producers and the trade suggesting the drafting of a guiding price schedule, declined to be party to any such scheme. The guiding prices fixed by the steel federation in October and subsequently readjusted in November merely represent a voluntary agreement between producers and consumers and as such do not possess legal character.

The subjoined table shows the trend of prices, in marks per metric ton, during the second period. The figures for the last two months must be considered largely nominal, as they almost exclusively represent jobbers' quotations.

Prices of Steel in Marks per Metric Ton

	-Beginning of -						
	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Billets	1,420	1,300	1,600	1,900	2,350	3,600	4,800
Bar iron	1,800	1,800	2,650	2,700	3,250	4,200	6,600
Sheets, heavy	1,850	1,750	1,900	2,200	2,700	4,100	6,200
Sheets, medium	1,900	1,800	1,950	2,500	3,100	4,600	7,400
Plates, light	2,000	1,850	2,300	3,100	3,900	5,300	14,000
Wire rods	1,700	2,000	2,050	2,700	3,000	4,650	7,300

Compared with the impetuous upward trend in the finished iron and steel market, pig iron increases were lagging behind all the time except in the last two months. Following upon the recent increase, prices have just again been raised by an average of 1000 marks per ton, the new prices being shown in the table below:

Prices of Pig Iron in Marks per Metric Ton

	Pre-war	Jan., 1919	Jan., 1920	May, 1921	July, 1921	Nov., 1921	Dec., 1921
Hematite	79.50	314.50	1,718.50	1,816	1,816	2,700	3,891
Foundry, No.	75.50	250.00	1,354.50	1,560	1,560	2,200	3,326
Foundry, No.	70.50	248.00	1,323.50	1,484	1,484	2,134	3,250
Steel-making	79.00	240.00	977.00	1,535	1,485	1,930	....
Spiegelisen	75.00	240.00	1,017.00	1,708	1,733	2,021	....

Prices for the last two grades have not been announced pending the readjustment of Siegerland ironstone prices.

After a period of suspension covering several years, German import and export statistics have made their reappearance while production statistics for 1920 and 1921 have not been published as yet. Unfortunately, the appended statistics in metric tons are not complete as the Bureau of Statistics has deferred the publishing

of the returns of the first four months in order to accelerate the issuance of the returns of the later months. For the sake of comparison, the returns for the entire year 1920 are given.

Where German Exports Went

As in 1920, Holland will probably figure as the principal export market during 1921 with 190,431 tons out of a total of 935,319 tons exported iron and steel commodities, equal to about 20 per cent. These figures refer, of course, to the period of May-September, 1921, only. The final result will probably show a noteworthy increase of tonnage shipped to the Far East but it seems rather doubtful whether any country will wrest the first place from Holland. Striking features of the returns are the heavy export of pig iron to the United Kingdom and rails and track supplies to Northern Russia during the July-September period. Broadly speaking, the largest shipments in all departments were made during August while the September figures show a slight falling off.

A detailed study of the returns shows the Saar district as the largest importer of pig iron with 21,578 tons, equal to 27 per cent of the total. The United Kingdom imported 3640 tons in August and 8360 tons in September, being the best customer in the last month. These figures are the more surprising in that shipments during former months were nil or at least insignificant.

Regarding bar iron, beams, girders, etc., Holland heads the list with 50,834 tons, or 26 per cent of the total, followed by Austria with 21,124 tons. The principal buyer of rails and track supplies was northern Russia which imported 52,354 tons (36 per cent of the total) during the July-September period, shipments in former months again being nil or insignificant. Other

ample confirmation in the company reports published in the course of the last year. Though 1920-1921 was a less satisfactory year in regard to employment and sales, yet it is astounding to note that profits have rather increased than diminished. Profits and dividends of some of the principal works were as follows, figures in brackets denoting last year's returns: Phoenix 108,285,000 marks (47,687,500) and 25 (20) per cent. Gelsenkirchner Gusstahl, 12,297,000 m. (4,950,600) and 16 (10) per cent. Mannesmann Tube Co., 77,354,500 m. (46,616,600) and 30 (20) per cent. Gutchoffnungshütte, 60,106,000 (40,550,000) m. and 24 (16) per cent. Rheinische Stahlwerke, 19,786,600 m. (14,087,200) and 20 (20) per cent. A. E. G., 81,581,000 m. (44,675,000) and 16 (14) per cent.

Stress must be laid upon the fact, however, that mere dividend figures have ceased to be a criterion as the bulk of the profits are concealed in special reserve and sinking funds ultimately to be invested in real values, thereby evading the heavy taxation. "No piling up of paper marks"—this was the slogan of the industry throughout the year, and the reconstruction work, erection of new mills and factories, replacement of obsolete and wornout machinery by new equipment, etc., noticeable everywhere, bear testimony to its practical application. There can be little doubt that the relatively favorable financial returns of the past business year may primarily be attributed to the steadily proceeding integration and consolidation of the industry which made for the elimination of waste in every form and shape, coupled with an intensified scientific research and strenuous efforts at lowering of production costs.

Outlook Seldom So Uncertain as Now

Never has the outlook for the industry been so uncertain as at present. This may sound paradoxical in

Five Months' German Exports and Imports

	Imports		Exports	
	1920	May to September, 1921	1920	May to September, 1921
Pig iron, including scrap, old material, ferroaluminum, chrome, nickel, manganese, silicon and other non-malleable iron alloys.....	206,064	75,151	152,922	77,792
Piping and pipe shapes, made of non-malleable iron, rough and machined..	11,929	5,937	22,830	14,261
Rolls, made of non-malleable iron.....	293	51	9,154	6,552
Machine parts, rough and machined, made of non-malleable iron.....	2,372	414	7,120	3,779
Other iron ware, rough and machined, made of non-malleable iron.....	3,793	1,552	67,500	24,174
Ingot, blooms slabs billets, sheet bars, rough rails, crucible steel in blooms	31,093	41,941	20,186	17,529
Bar iron, beams, girders, joists, hoop iron, structural shapes.....	78,460	107,093	460,278	192,267
Sheets and plates, rough, pickled, straightened, dressed, varnished.....	16,537	11,156	232,111	82,292
Sheets and plates, lacquered, polished, etc., tin plate; galvanized sheets; corrugated sheets; checkered plates, etc.....	3,627	4,138	15,770	12,556
Wire, rolled and drawn.....	14,014	12,131	83,908	73,313
Tubing and tube shapes, rolled and drawn; coiled tubes.....	2,221	1,547	84,021	43,299
Rails, ties, fishplates, washers.....	16,128	24,898	152,016	144,017
Wrought iron ware, rough and machined, including machine parts, drop forgings, buckets, lamps, containers, etc.....	5,470	1,946	127,867	43,565
Total of iron and steel products.....	419,406	322,524	1,750,601	935,319
Value in 1,000 marks.....		654,053	13,471,208	5,416,633

notable customers were Holland with 21,755 tons, Sweden with 17,719 tons, and southeastern Asia (British-India, Malacca, Ceylon, and the French, Dutch and Portuguese Indies, and the Philippines and Siam) with 16,050 tons.

Holland also lead in the sheet and plate market, her imports amounting to 25 per cent of the total German shipments; namely, 24,274 tons. Austria is second with 9347 tons. Other principal buyers, especially during the latter months, were the United Kingdom and southeastern Asia with 7837 tons and 5734 tons, respectively.

In the wire export market, the Far East and South America took a prominent place, while other noteworthy customers were the United Kingdom and Belgium. Eastern Asia (China, Japan, Hongkong, Korea) ranks foremost with 15,663 tons equal to about 20 per cent of the total, followed by Belgium with 11,707 tons, United Kingdom with 7863 tons, and South America with 7312 tons. The chief buyers of wire nails were eastern Asia and southeastern Asia with 8313 tons and 5090 tons, respectively, out of a total of 28,000 tons exported.

Financial Successes for Steel Makers

That the 1919-1920 year was a brilliant one in every respect was but feebly denied by the industry and found

face of the period of prosperity the industry is just experiencing but is nevertheless true. The present boom is largely built up on the enormously depreciated mark and voices are already heard according to which the peak of the upward curve has now been reached. The notable appreciation of the mark during the past weeks has already had a sobering effect upon the tone of the market and the fact that recent developments at the Washington conference have caused a cancelling of steel orders placed by Japanese customers with the German industry is much commented upon.

Speculative Motives Dictate Glut of Orders

The glut of orders which has lately broken in upon the industry is largely dictated by speculative motives and the experience of 1920 when buyers cancelled orders left and right owing to the appreciation of the German currency, is still fresh in the memories of producers. History may repeat itself and there is no reason to assume that customers will be any more scrupulous than in the spring of 1920. Moreover, the separation of Upper Silesia constitutes a problem the importance of which should not be underrated. About 70 per cent of the steel and 67 per cent of the pig iron production in that province will go to Poland—not to mention the losses in coal and zinc.

Quiet Year in Ferroalloys and Their Ores

A Review of Technical Developments and of Market Conditions—Increase in Number and Uses of Alloys with Steel

BY ROBERT J. ANDERSON

NINETEEN twenty-one was a year of great dullness in the metallurgical ferroalloy and ore industries and, as is usually the case during inactive times, prices showed much irregularity and a marked downward tendency. With steel ingot output at much less than one-half of actual capacity during the past year—and at times as low as 20 per cent—and with the widespread depression in the metal industries as a whole, it is not surprising to find the utmost stagnation in metallurgical ores and steel making alloys. While the power capacity of the electric ferroalloy plants in the United States has increased from 20,000 to 200,000 kva. in the past ten years, probably only about 20 per cent of the plants were operating in 1921.

The automotive consumption of steel has been stressed too strongly in the past. Roughly this is only about 3.5 per cent of the steel ingot production and 6.8 per cent of the alloy steel output. Of course, there is a large quantity of high speed steel normally used in machining operations, and any slump in the automotive industry is felt adversely in the ferroalloy trade. The general condition of the automotive industry is bad and the outlook is poor, and a revival is not likely for some time.

During the late war, in many countries new sources of metallurgical ores were developed, and new electric furnace alloy makers entered the field. Both these influences are likely to prove largely permanent, but it will be a long time before another boom in so-called war minerals is seen. The proposed scrapping of battleships and the ten-year naval holiday may be a bullish argument for general business but these proposals, if effected, will be adverse factors to the ferroalloy and special steel trades.

Metallurgical Progress

Technical developments are normally expected in dull business times, and while no startling changes occurred in practice last year, still alloy makers were engaged in the usual routine development work, and mine operators put their properties and mills in condition for better days expected to come. As is known, the character of the steel casting output of the country is changing; more alloy-steel castings are being made yearly, and the electric alloy-steel output is growing. These changes portend greater consumption of ferroalloys and special steel making metals in future years. Recent developments indicate the growing importance of alloy cast iron for industrial use, and alloy cast iron received considerable attention in the past year, i. e., the manufacture of direct alloy pig iron and also the use of alloy cast iron in foundry practice. Further work has been done on the investigation of substitute deoxidizers by Cain; this was started during the war under the auspices of the National Research Council.

More attention has been paid to the preparation of low carbon ferroalloys by the refining of high carbon ones, and a number of interesting patents purporting to be suitable for this have been taken out in the past year. A new development in this direction is the production of various grades of low carbon ferromanganese by refining the high carbon alloy in the electric furnace. This is being done commercially in France and the alloys are now available in the American markets. Sili-

conthermy was the subject of increased interest and experiment in 1921, and evidently the silicon reduction of ores will be more fully investigated and applied commercially. Much attention was given also to high chromium alloys of iron for oxidation and heat resisting uses. The use of alloy steel for bridges has received further attention in Germany, and it is not improbable that alloy steel bridges will be important in the future.

Ferromanganese and Related Alloys

Manganese mining was naturally at a low ebb in the United States in 1921 and the output was at pre-war levels. Imports of manganese ore in 1921 (principally from Brazil and British India) were about 400,000 gross tons* as against 601,437 tons in 1920, and 333,344 tons in 1919. Southern manganese operators were active in regard to consolidation of properties and planning for more efficient operation of the mines, but little ore was produced. Manganese mining in the Batesville district (Arkansas) has been practically suspended, as was the case in Montana. An outstanding occurrence was the purchase of the Morro da Mina manganese property in the State of Minas Geraes, Brazil, by the United States Steel Corporation. This move makes the corporation independent in respect to manganese ore.

The monopoly of exporting manganese ores from the Republic of Georgia (Caucasus) has been given to the Société d'Exportation de Manganèse de Tchiatouri. Report has been made on the deposits of Horseshoe Range, Peak Hill Goldfield, Western Australia. These deposits have not been worked so far, but it is estimated that 1,250,000 tons of ore of marketable grade could be secured from the top crust. Foreign ore opened the year at 40 to 45 per unit, c.i.f. Atlantic ports, went as low as 20c, and closed at 22c to 23c. There was a sagging tendencing all year, and prices were less than half those in 1920.

OUTPUT AND MARKET

The domestic output of ferromanganese in 1921 may be taken as about 93,000 gross tons, as against 282,681 tons in 1920 and 179,029 tons in 1919. The spiegeleisen production in 1921 was about 67,000 tons as against 103,448 tons in 1920 and 65,391 tons in 1919. The imports of ferromanganese in 1921 were about 9000 tons, as against 59,254 tons in 1920, and 33,022 tons in 1919. Exports were about 800 tons in 1921, as compared with 3454 tons in 1920, and 2999 tons in 1919. The production and movement of both ferromanganese and spiegeleisen have been the lowest in history. No spiegeleisen has been made since last July.

Prices for ferromanganese were exceedingly low in 1921 as compared with 1920, and much foreign and resale alloy was available. With open-hearth steel operations, particularly among the independent steel companies, at the lowest point in years, consumption was much restricted and most melters had ample supplies. Domestic 70 to 80 per cent ferromanganese was quoted at \$120 to \$125 per ton in January, and declined gradually to \$60 to \$63 at the close. English alloy correspondingly sold at \$130 to \$135 down to \$60 to \$63, c.i.f. At-

*Figures for production, imports and exports of ores and alloys in 1921 are estimates in all cases, since they are based on figures reported for only part of the year.

lantic seaboard. Spiegeleisen opened at \$60 to \$65 per ton for 18 to 22 per cent alloy and showed a downward tendency all year, dropping to \$25 to \$27, but strengthening at the close to \$30 to \$32.

NEW LOW CARBON ALLOYS

In connection with the development of low carbon alloys, it is of interest to direct attention to some new grades of manganese and ferromanganese produced by French makers. One contains 75 to 80 per cent Mn, 0.10 per cent maximum C, 1.5 per cent maximum Si, and 25 to 20 per cent Fe. Another contains 95 to 97 per cent Mn, 0.10 per cent maximum C, 2 per cent maximum Si, and 1.5 per cent maximum Fe.

The Kyva Ferromanganese Corporation resumed making ferromanganese and spiegeleisen in the 10-ton electric furnace at Cleveland, Tenn.

METALLURGICAL PROGRESS

In the metallurgy of ferromanganese, the greatest single advance as regards electric furnace practice has been in the use of the Söderberg continuous electrode, introduced in the United States two years ago by the late J. W. Richards. In smelting oxide ore in the electric furnace it has been found that better recoveries are obtained when any necessary iron is added in the form of manganiferous iron ore rather than as steel turnings. It is likely that with the same grade of ore the electric furnace would show at least 5 per cent greater recovery than the blast furnace, and considerable reduction of cost is possible by the use of the Söderberg electrode.

A method for preparing low-carbon ferromanganese is described in a recent patent (Canadian patent 209,740, March 22, 1921). Thaler has discussed the production of pig iron containing manganese from manganiferous blast furnace slags and other residues in the electric furnace, while Stöckmann has described the production of silicospiegel in the blast furnace. The equilibrium diagram of the carbon-manganese alloys has received further attention at the hands of Kido.

Electric and Bessemer Ferrosilicon.

Developments in ferrosilicon in 1921 were unfavorable, and several makers of 50 per cent alloy went out of business in the first few months of the year. With steel production low, and manufacturers of automobile castings out of the market, there was little demand for Bessemer grades and silvery iron. Imports of all grades of ferrosilicon were about 6300 gross tons in 1921 as compared with 13,609 tons in 1920 and 10,445 tons in 1919. Exports were about 380 tons as against 632 tons in 1920. Prices for all grades were lower than in 1920, and some extremely low prices were named by makers of electric ferrosilicon of the lower grades—the differential between these and the blast furnace product being about \$14 at one time. Bessemer ferrosilicons—9, 10, 11, and 12 per cent, grades—sold at \$61, \$64.50, \$67.80 and \$71.10, respectively, until the latter part of March, then dropped substantially, and had a downward tendency most of the year. At the close, the 10, 11, 12, 13 and 14 per cent grades were quoted at \$38.50, \$41.80, \$45.10, \$49.10 and \$54.10, respectively, Jackson and New Straitsville, Ohio. Domestic 12 to 15 per cent electric furnace alloy sold at \$55 to \$60 at the opening and closed at \$38 to \$40 per gross ton, f.o.b. works. The 50 per cent grade opened at \$75 to \$80 and declined to \$57 to \$60, furnace, freight allowed, while the 75 per cent alloy opened at \$150 and declined to \$120 to \$125. Foreign and resale alloys were plentiful.

METALLURGICAL DEVELOPMENTS

Siliconthermy received more attention than in some years. Terrisse and Levy (British patent 151,974, Aug. 3, 1920) have patented the addition of tungsten and vanadium to acid-proof iron-silicon alloys for the purpose of improving the mechanical properties. Becket (United States patent 1,386,227) has a process for re-

fining crude electric furnace silicon, based on the selective action of hydrofluoric acid on the iron contained as an impurity. Piowarsky has examined exhaustively the effect of the time of adding silicon on the physical properties and gas content of open-hearth steel and recommends adding ferrosilicon as late as possible. Lowzon has examined the constitution of the iron-silicon system and published a complete diagram. In passing, it may be pointed out that there is a latent demand for very pure silicon for use in the manufacture of light aluminum-silicon alloys.

Ferrocromium and Stainless Steel.

The depression in the United States in mining chromite, which started at the close of the war, continued through 1921 and the industry is decidedly flat. However, pre-war conditions in chromite are being restored, with Rhodesia and New Caledonia as the leading producers. Expansion of mining operations in the Macri district, Asiatic Turkey, is planned to the extent of a production of 100,000 tons annually. The three largest mines are American owned. Chromite mining in Bosnia and Serbia will be resumed by the Jugo-Slovakian Government. The deposits of the Umwecke Hills, Rhodesia, have been examined and reported upon by the Rhodesian Geological Survey.

California concentrates, 50 per minimum, opened at 55c. to 60c. per unit and declined to 45c. to 55c. in June. Thereafter, 40 to 45 per cent foreign ore brought \$20 to \$25 per net ton, Atlantic ports. Prices for the various grades of domestic ferrocromium declined steadily all year from 16c. to 17c. per lb. of contained Cr for the 6 to 8 per cent C grade to 11c. and from 17c. to 18c. for the 4 to 6 per cent C grade to 11c. to 12c.

PATENTS OF THE YEAR

Several patents have been taken out for the preparation of low carbon ferrocromium. These include British patents 145,709 and 145,711, June 26, 1920; 152,990, Jan. 12, 1921; and 148,456, July 10, 1921; and United States patent 1,365,901. In one case low carbon ferrocromium is made by the interaction of the high carbon alloy, chrome ore and oxides which readily yield oxygen, in the electric furnace.

Walter (British patents 156,561 and 157,054, May 4, 1920) suggests ferrocromium-silicon alloys and a method for their manufacture. Low carbon ferrocromium is essential in the manufacture of stainless steel. Both stainless steel and stainless iron, so-called, received a great deal of attention in the past year. The production of a steel possessing acid-, heat-, and oxidation-resisting properties obviously has a great future, and apparently only the fringe of possibilities in these materials has been touched. Stainless iron (in fact a very low carbon stainless steel) has been put upon the market by three British firms. Various high chromium alloys for oxidation-resisting and other purposes have been patented recently (Canadian patents 206,785, Dec. 21, 1920, and 207,477, Jan. 11, 1921; United States patents 1,365,091, 1,375,081, 1,375,672, and 1,375,673.) Fahrenwald has suggested iron-chromium alloys for non-corrodible gun barrels, and there may be possibilities in this direction, at least for small arms. The number of such arms that become useless each year because of rusting or pitting is enormous.

Ferrotungsten.

Tungsten mining in the United States is now dormant, owing to the low prices for foreign ores and the general quietness in the ferroalloy industry. Consumption of tungsten in 1921 was very small because of the general inactivity and the slack demand for most metal products. Domestic scheelite sold at \$4 to \$4.50 for 60 per cent WO₃, f.o.b. mines, in January last, and the price gradually declined to \$3. Foreign wolframite

brought \$3 to \$3.50, New York. Chinese ore was offered at \$2.50. Some of the tin-tungsten mines in foreign countries were shut down on tungsten but operated on tin; for example the Kaubauk Burma Wolfram Mines, Ltd.

Hess has described the unique tungsten deposits near Oruro, Bolivia, while Brown has similarly dealt with the deposits of Burma. Bowater has described the dressing of tungsten ores at the Burma Queensland Corporation, Wolfram Camp, North Queensland. Blanch (German patent 330,987, March 28, 1920) has patented a process for treating tungsten ores, consisting briefly of decomposing with an alkali chloride, roasting and treating with sulphuric acid.

Prices of ferrotungsten and tungsten powder have been steadily on the down grade. The 70 to 80 per cent alloy sold at 55c to 60c at the beginning of the year, and closed at 40c to 45c per lb. of contained W. Prices were less than half those in 1920. Foreign alloy was offered freely. Head (Canadian patent 208,990, March 1, 1921) suggests the preparation of tungsten by heating a mixture of sodium tungstate, ammonium chloride and charcoal at 1000 to 1150 deg. C. Lohman (British patent 157,780 Jan. 10, 1921) patents a process for the removal of carbon from tungsten by heating it at approximately the melting point in an atmosphere of hydrogen. Alexander (British patent 155,739, April 6, 1920) patents the use of tungsten tablets for adding tungsten to steel. In recent years ferrosilicon (85 per cent Si) has been used considerably in England instead of aluminum powder for the reduction of tungsten and ferrotungsten.

Ferrovandium

Ferrovandium was in better supply in 1921 than in 1920, and although there was a slight scarcity at times the demand was less. The Vandium Corporation of America is planning an installation for the treatment of the mine waters at Minasragra that carry an appreciable quantity of vandium heret fore lost in Lake Punrun. The recovery from this source, it is estimated, will be \$500,000 yearly. Research looking to the recovery of vandium oxide from western phosphates, and from coal, hydrocarbon shales and natural asphalts has been suggested as a proper activity for the Government. Vandium occurs in the ashes of some domestic coals to the amount of 38 per cent. The vandium-bearing asphaltites have come in for further interest. There are a number of deposits of such asphalts in the world, and it is possible that they may become sources of vandium. A large area in the provinces of Pasco, Yauli, and Jauja, Peru, contains a series of deposits that give an average of 1 per cent, V_2O_5 , and the ashes of which give an average content of 50 per cent. The old Chichi silver mine at Culiacan, Mexico, has been found to contain considerable vandium in the form of lead vanadate.

The Course of Prices

Vandium ore, minimum 18 per cent V_2O_5 , sold at \$1 to \$1.50 per lb. of contained V_2O_5 , while carnotite containing 1.5 per cent U_3O_8 and 5 per cent V_2O_5 brought \$1.50 and 75c. per lb. for the respective oxides, the ore containing 2 per cent U_3O_8 and 5 per cent V_2O_5 , sold at \$2.25 and Mackay (British patent 157,555, Oct. 18, 1919) and Copelin (United States patent 1,381,802) have brought out processes for the treatment of vandium ores.

Ferrovandium, 30-40 per cent V, sold at \$5.75-\$6.75 per pound of contained V, with differentials depending upon the silicon content, during the first part of the year, but the price fell to \$4.25 to \$4.50. Cadenhead and Goodwin (Canadian patent 208,623, Feb. 15, 1921) have patented a process for treating vanadiferous iron ore in which the ore is furnace with a reducing agent and a suitable flux to produce a pig iron having a maximum quantity of vandium therein. In the suit

of the Bethlehem Steel Co. vs. the Churchward International Steel Co., the Churchward patents relating to vandium steels were held void for want of invention.

Ferromolybdenum

Molybdenum had another quiet year in 1921 but structural molybdenum steels are being taken up more and more, and the properties and possibilities of these steels are gradually being better understood. The flotation method has been adapted to treat the majority of molybdenum ores and will probably be the principal one used in the future. The Elnore oil process has been used almost exclusively in Norway, but has not found favor elsewhere. Deep molybdenum ores, containing 50 per cent Mo, have been found in New Mexico in the past year. In Canada, the molybdenum industry at Quyon, Que., is now quite dead. Molybdenite, 85 per cent MoS_2 , was quoted at 55c. to 60c. per lb. of MoS_2 , New York, all year. Forland (Canadian patent 207,832, Jan. 25, 1921) has a process for treating molybdenum sulphide ores with chlorine gas, thereby forming molybdenum chloride which is condensed.

Molybdenum for Structural Steel

In regard to molybdenum steels, it has been pointed out by Mathews that the structural type will not wholly displace any other type of steel but that these steels have established a place among the alloy steels found useful to the aircraft, motor and general engineering trades. The structural molybdenum steels appear to have a wide safe heat treatment range as determined by static tests. Below 1 per cent, molybdenum gives no trouble from volatilization, but volatilization difficulties are bad in high-speed molybdenum steels. In the manufacture of molybdenum structural steels in the open-hearth furnace, the experiments of Schmid indicate that it is best to add ferromolybdenum in the furnace. Mathews finds that ferromolybdenum, molybdenum powder, and calcium molybdate are equally satisfactory for making fixed additions of molybdenum to steel. According to a patent (German patent 337,961, March 3, 1920), briquettes of calcium molybdate are made by mixing molybdenum trioxide and calcium chloride with water, pressing the mix into shapes and drying. The use of molybdenum, with or without copper, in iron for the production of rust-resisting alloys is patented by Charls (United States patents 1,363,564, 1,355,589, and 1,355,590). Ferromolybdenum sold at \$2 to \$2.50 per lb. of contained Mo in 1921.

Ferrotitanium, Ferrouanium and Ferrozirconium

The year was a quiet one in ferrotitanium, ferrouanium, and ferrozirconium. Further experiments have been made in smelting the titaniferous iron ores of Canada, while Heskett has given a résumé of experiments carried out by the New Zealand Iron Ore Smelting & Mfg. Co. on titaniferous magnetite (9 per cent. TiO_2). Sicard (United States patents 1,374,035 and 1,374,036) has patented processes for producing low-carbon ferrotitanium by smelting a high-carbon alloy with an excess of titanium oxide. The prices for ilmenite and rutile were practically stationary last year. Ilmenite, 52 per cent, TiO_2 , sold at 1.25 to 1.50c. per lb. while 95 per cent rutile brought 15c. Ferrocarnotitanium, 15 to 18 per cent, was quoted at \$200 to \$225 per ton, f.o.b. Niagara Falls, N. Y.

The carnotite ore of Colorado supplies the domestic raw material for the manufacture of ferrouanium as in previous years. Polushkin, in the Carnegie Scholarship memoirs of the Iron and Steel Institute, has discussed the alloys of iron and uranium, and has made microscopic examination and tensile tests of uranium steel. The recovery of uranium is best when ferrouanium is added to the ladle in making steel. Uranium oxide, 96 per cent, brought \$2.25 to \$3 per lb. in 1921.

Quotations for carnotite have been given above under ferrovanadium. Ferrouranium, 35 to 40 per cent., sold at \$6 to \$7 per lb. of contained U.

The Bureau of Mines, by the issue of its Bulletin 186, has made available much data on the occurrence, properties and preparation of zirconium, and this publication should be of much value to alloy makers. Recently as much as 3 per cent of some of the auriferous sands of Idaho has been found to consist of zircon mixed with monazite. Schoeller has discussed the removal of titanium and other impurities from zirconia by the process based on the preparation of crystallized zirconium oxychloride. North and Loosli British patent 155,299, Dec. 15, 1920) have patented a process for reducing zirconium oxide by mixing it with the theoretical amount of carbon and heating under increased pressure in an electric furnace. Sicard (United States patent 1,374,037) has patented a process for the preparation of low-carbon ferrozirconium by decarburizing a high-carbon alloy with titanium oxide, and a process (United States patent 1,374,038) for the manufacture of zirconium steel by treating steel with a zirconium-silicon alloy. In 1921, zircon sold for 3c to 5c per lb.

Minor and Complex Ferroalloy

Much experimental work carried out recently on minor and complex ferroalloys has been reported in the patent literature. Ferroaluminum and complex ferroaluminums, e.g., ferrosilicon-aluminum, are receiving further attention, and the direct manufacture of the latter in the electric furnace from iron-bearing aluminum silicates is a commercial possibility. Penniman and White (United States patent 1,369,298) suggest ferrosilicon-aluminum, made by reducing compounds of aluminum, silicon and iron, such as feldspar, in an

electric furnace with iron and carbon. Hadden (British patent 165,166, March 17, 1920) has patented an aluminum-uranium-magnesium alloy for deoxidizing steel, while Vos (Canadian patent 206,713, Dec. 21, 1920; British patent 162,917, May 5, 1920, and United States patent 1,382,147) has patented an aluminum-rich aluminum-magnesium alloy for the same purpose. Calcium silicide is now being manufactured in fairly large quantities in France for use as a steel deoxidizer, and it is growing rapidly in favor in connection with electric-furnace steel making practice. Pistor *et al.* (United States patent 1,376,113) patented a ferrosilicon-magnesium alloy for use as a deoxidizer.

The use of 4 to 5 per cent nickel in high silicon cast iron for electrical resistance grids is reported, and Bauer and Piowarsky have examined the effects of cobalt and nickel on cast iron. It appears that a content of 1 per cent nickel is desirable but that cobalt has deleterious effects. Some tests have been made at Sheffield, Eng., of one of the nickel-base (Ni-Si-Al-W-Mo-Zr) alloys, known as cooperite, for cutting tools. The Australian nickel firm, Ballande & Son, is proceeding with its proposals for the installation of electric furnaces for the manufacture of ferronickel.

Many complex alloys for various purposes have been patented recently but these need not be reviewed here. It has been suggested that niobium be used in steel alloys, alone or with other metals, e.g., tungsten or tantalum, and alloys prepared from electrolytic carbon-free iron and containing 3 to 10 per cent Cu for resisting corrosion are also suggested.

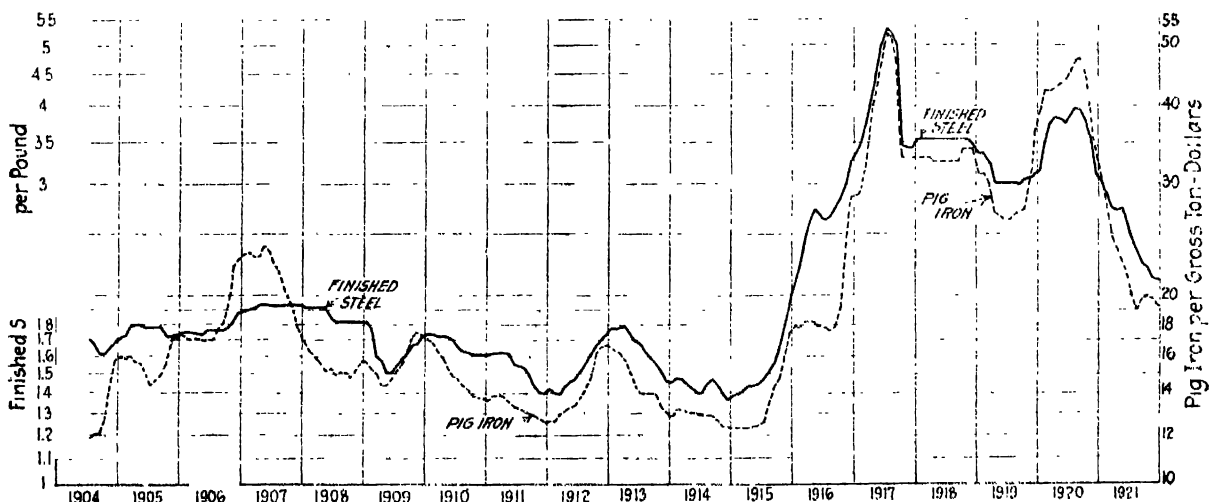
The publication last year of the methods of the chemists of the United States Steel Corporation for the sampling and analysis of ferroalloys is of general interest.

Prices of Iron and Steel and Other Products

Analysis of Basic Facts Shows Steel Lower Than All Other Commodities Save Those from the Farm and Certain Other Metals

BECAUSE of persistent mis-statements of financial and other writers finding their way into print, THE IRON AGE published last September a diagram showing how the composite price of finished steel compared with the prices of ten groups of wholesale products, which are quoted month by month by the United States Bureau of Labor Statistics. It was shown by that diagram that, in spite of false repre-

sentations to the contrary, finished steel was lower at that time than any of the Labor Bureau groups with the exception of farm products and of the metals and metal products group, including steel itself. Not only was steel much lower than the others, but it was considerably lower than the average of all. Another thing which that chart showed was that the 1920 peak of finished steel was lower than eight of the ten Labor



Course of Prices of Finished Steel and Pig Iron Since 1904, Based on THE IRON AGE Composites. Pig iron went higher in such boom years as 1906-7 and 1920 than did steel

Bureau groups, the other two being the metals group, which includes steel, and the chemicals and drugs; but it should be noted that the latter group was far higher in September than was steel.

These figures have now been brought down to date and somewhat amplified, so that the two accompany-

with beams, the present price is higher than in 1913, six of the items being still more than double their prices of eight years ago. It will also be noted that, while the price of beams in the fall of 1920 was more than double the 1913 and the present price, yet in the case of every one of the other fifteen products shown, the relative price in 1920 was considerably higher than the price of beams. One of the items was, in 1920, more than seven times its 1913 price; eight others were more than three times the 1913 price, one of these being more than four times.

In all of the items shown in the two diagrams, the 1913 average is the base of the comparison, this being considered as the "100 per cent" price. Above this base is a shaded area, representing the excess of the present price over that of 1913. Above the shaded area, again, is a white area, representing the excess of the 1920 peak price over the present price. From this it follows that the entire height of each bar represents the 1920 price, and the height to the top of the shaded area represents the present price.

It requires only a little study of the facts in the case to show conclusively that iron and steel prices to-day are lower than the prices of most of the other large items entering into the business of the United States. Only when we come into the field of non-ferrous metals, and into the field of farm products, do we find any considerable bulk of material selling lower to-day than finished steel.

The Association of Friends of the Academy of Mining at Freiberg, Saxony (Gesellschaft der Freunde der Bergakademie Freiberg), was founded on Dec. 3, 1921. The aim of this association is, in part, to help the academy in fulfilling its task as regards research work and teaching. The chairman of the association is Dr. K. Sorge, chairman of the Reichsverbandes der deutschen Industrie (Union of German Industries). The association asks alumni to become members.

The General Electric Co., Schenectady, N. Y., has distributed a bonus among employees totaling five per cent of earnings for the past six months, ending Dec. 31, and including all workers in the service of the company for the past five years or more. The last supplementary compensation of this character was made on June 30 last, with aggregate distribution of \$1,067,899 to 24,772 employees.

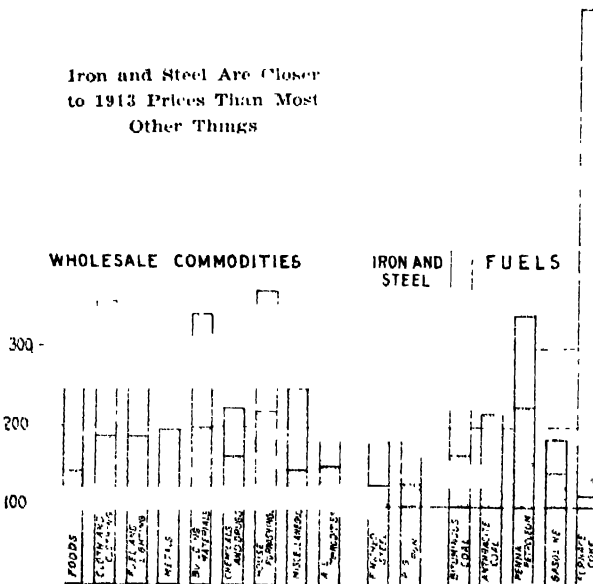
At the annual meeting of the Manufacturers' Association of Connecticut, held at New Haven, Dec. 29, the following officers were elected for the ensuing year: President, E. Kent Hubbard, Middletown (re-elected); vice-president, John H. Goss, Waterbury; and treasurer, Robert C. Buell, Hartford.

Item	Prices Quoted—			Index Number, 1913 = 100—	
	Average 1913	Peak 1920	Present Figure	Peak 1920	Present Figure
Farm products				246	114
Food, etc.				287	142
Cloths and clothing				356	186
Fuel and lighting				284	186
Metals and metal products				195	119
Building materials				341	197
Chemicals and drugs				222	162
House-furnishing goods				371	218
Miscellaneous				217	145
All commodities				272	149
FINISHED STEEL	1.663c.	3.974c.	2.662c.	239	124
PIG IRON (com posite)	\$14.70	\$47.84	\$18.68	325	127
STEEL BEAMS	1.50c.	3.10c.	1.50c.	207	100
Fuels					
Bituminous coal	\$1.34	\$10.00	\$2.20	746	164
Anthracite coal		8.00	8.25	209	216
Penna. petroleum	1.79	6.10	4.00	341	223
Gasoline	16.8c.	31c.	24c.	185	143
Pumace coke	\$2.41	\$17.75	\$2.75	735	114
Building Materials					
Yellow pine	28.50	67.50	45.00	237	158
Red oak	6.20	19.85	14.10	320	227
Lime	4.43	11.85	9.16	268	207
Plate glass	31.8c.	82c.	70c.	258	220
Shingles, red cedar	\$1.97	\$6.67	\$3.06	334	156
Textiles and Clothing					
Cotton	12.84c.	43.75c.	18.8c.	341	146
Sheeting	7.3c.	28.5c.	12.6c.	390	173
Raw silk	\$3.65	\$16.25	\$7.50	445	205
Worsted suitings	1.38	5.42	2.57	392	186
Women's shoes	2.17	8.25	5.60	379	257
Food					
Mess pork	20.93	47.00	25.00	225	119
Smoked ham	16.60	37.70	27.60	227	166
Potatoes	61.4c.	4.43	1.53	721	250
Flour	\$4.61	16.25	7.50	353	163
Milk	3.5c.	8.5c.	6.9c.	243	197

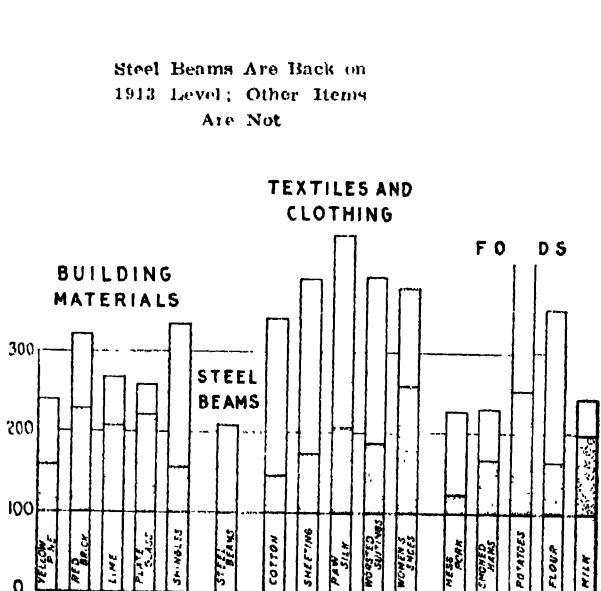
ing charts show not only the relation of finished steel to the ten groups of the Labor Bureau, but also compare finished steel and pig iron with five representative items of fuels, all of which, with the exception of coke, are to-day much higher than steel. The second chart compares three groups of individually priced items with steel beams. These three groups are building materials, textiles and clothing, and foods, with five items in each group.

It will be noted that beams are to-day exactly at the same price as in 1913. Consequently, in the diagram, there is no shaded area above the 1913 level for beams. In the case of all the other items compared

Iron and Steel Are Closer to 1913 Prices Than Most Other Things



Steel Beams Are Back on 1913 Level; Other Items Are Not



CONTENTS

JANUARY 5, 1922

Review of Year 1921 in Iron and Steel	1
Lowest Output in Relation to Capacity---Mining Operations and Ore Shipments, Pig Iron Markets, Coke, Semi-Finished Steel, Plates, Shapes and Bars, Wire Products, Sheets and Tin Plate, Pipe, Old Material, Cast-Iron Pipe, Non-ferrous Metals, Labor Troubles, Earnings	
Manganese Steel Made in Electric Furnace	4
Brighter Prospects Indicated for 1922	9
Enameling Cast Iron and Steel Materials	13
Operation of Basic Electric Furnaces	17
How the Government Is Helping Business	22
La Salle Steel Co. Completes Cold Drawing Plant	27
Electrolytic Iron a Commercial Product	32
Pig Iron and Heavy Melting Steel Prices	36
New Foundry for Casting Chilled Rolls	38
Production and Yield of Rolling Mills	43
Steel Plant Installed for Sheet Mill	47
Practical Aspects of Electric Gray Iron	51
Charts and Tables of Price Fluctuations	57
The Year in Iron and Steel Metallurgy	80
Status of the Electric Steel Industry	85
Hope for Improvement in Export Business	88
British Iron and Steel in 1921	90
German Industry Had Prosperous Year	92
Quiet Year in Ferroalloys and Their Ores	94
Prices of Iron and Steel and Other Products	97
Railroad Buying for 1922 Undetermined	104
Selling American Machine Tools in Europe	107
December Pig Iron Production	110
New Iron and Steel Works Construction	112
Electric Developments in 1921	16
Soliloquy of Steel	20
Rate Investigation	31
Purchasing Agents' Meeting	37
Machinery Export Trade	42
New England Iron League Dinner	42
Car Orders at Low Point	46
Proposed Changes in Engineering Con- tracts	52
To Investigate Coal and Other Industries	52
Railroad Buying in 1921	83
Editorials	100
Moving Toward Prosperity---Read- justment in 1921---The Machine Tool Outlook---Efficiency Again in Repute ---Progress in Electric Metallurgy	
Labor Notes	103
Increased Use of Wood Block Floors	103
Hardwood Decision	106
Tariff Bill Delay	111
Iron and Steel Markets	118
Comparison of Prices	119
Prices Finished Iron and Steel, f. o. b. Pittsburgh	128
Non-Ferrous Metal Markets	129
Personal Notes	130
Obituary Notes	131
Machinery Markets and News of the Works	133
New York Jobbers' Prices	140

ESTABLISHED 1855

THE IRON AGE

EDITORS:

A. I. FINDLEY

WILLIAM W. MACON

GEORGE SMART

CHARLES S. BAUER, *Advertising Manager*

Member of the Audit Bureau of Circulations and of
Associated Business Papers, Inc.

Published every Thursday by the IRON AGE PUBLISHING CO., 239 West 39th Street, New York

E. J. Fink, *President*

PRINTED IN U. S. A.

George H. Griffiths, *Secretary*

Owned by the United Publishers Corporation, 239 West 39th
Street, New York. H. M. Sweetland, *Pres.*; Charles G. Phillips,
Vice Pres.; A. C. Parsons, *Treas.*; F. J. Frank, *Secy.*

BRANCH OFFICES: Chicago: One Building; Pittsburgh:
Park Building; Boston: 410 Unity Building; Philadelphia:
1420 14th Avenue; Building; Cleveland: Guardian Building.

Detroit: 317 West Fort St.; Cincinnati: Mercantile Library
Bldg.; Washington: 816 Fifteenth St., N. W.; San Fran-
cisco: 320 Market St.; London, Eng.: 11 Haymarket, S.W. 1.
Subscription Price: United States and Possessions, Mexico,
Cuba, Shanghai, \$6.00; Canada, \$8.50; Foreign, \$12.00 per
year. Single copy 50 cents.

Entered as second class matter June 18, 1879, at the Post Office at New York, New York, under the Act
of March 3, 1879

Moving Toward Prosperity

It was said in these columns one year ago that there was hope in the fact that the people of the United States were again on the road to prosperity. Looking back over 1921 one sees very little that appropriately could be linked up with the word prosperity. Yet it is even plainer to-day than it was one year ago that when in 1920 the American people began to realize that for six years they had been traveling away from prosperity, they then had taken the first step on the return road.

The war years had been years of wasteful expenditure by the Government of billions it had borrowed from the people. Then followed two years in which the spending of wealth rather than its production was the controlling purpose. The collapse in 1920 brought home the lesson that war prices, war profits and war wages were an unhealthy combination. Then began the painful process of readjustment, called also deflation. It continued throughout 1921 and promises to go on during 1922.

Apart from the war's destruction of accumulated wealth, its worst economic effect was the belief it left in the minds of many men that a new era had come in which by getting a large wage for less work the worker had reached his best estate. The past year has been showing how great a delusion that was and how the worker has been crippling his own buying power. To the extent to which the delusion has been driven out, the discipline of these months of depression has been wholesome.

One year ago, also, producers and dealers were much given to argument over high prices—argument that either repelled the charge of profiteering, or pointed out how producers or distributors in some other line were guilty of that thing and thus were delaying the return of prosperity. To-day, while the inequalities in the fall of prices and wages are well recognized, there is much serious work upon the problem of so reducing unit cost as to persuade the consumer that he can buy with safety.

The phase of the cycle has been reached in

which money has become cheaper. The beginnings are seen of the next phase, in which cheap money promotes the buying of securities. And next in line is larger buying of cheapened commodities. Thus the events of 1921 have gone far toward demonstrating that while the upheavals of the war have changed many things, they have not abolished the basic laws that have governed the return of prosperity after every other crisis in finance and industry.

On other pages is traced in some detail the process of readjustment in iron and steel—the industry that is fundamental to all the country's manufacturing activities. Economies are coming into play that were impossible with the state of mind of owner and workman what it was in the years of the war and the two years following. In the metal-working industries, of which iron and steel are the raw materials, there is the same disposition to meet the requirements of the new situation by enforcing production economies. In the machine tool branch, in which the year has been especially disastrous, the effort to meet the situation is evidenced by some steps in redesigning and in a few cases by the introduction of lines of manufacture, apart from tools, not followed heretofore.

War effects have been held so largely responsible for all that has happened to industry that too often the tendency has been to drift under the influence of events. Thus fluctuating exchange, the precipitous drop in exports, Germany's default, high freights, tariff uncertainty, excessive taxes, over-capacity and undigested product have been put in high control in many cases, while individual initiative has abdicated. But more recently there have been signs of stirrings that point to renewed activity in many directions in the coming year. Progress may not be rapid and there may be interruptions, but there should be no mistaking the fact that industry is traveling the road that leads to prosperity.

Reports are that a few strong industrial establishments are planning to manufacture for stock. Such companies are fortunate in not having to

carry manufactured product into 1922. They feel that deflation in the raw materials they use has pretty nearly run its course. They are asking, however, for lowest possible prices, with the understanding that the savings effected will be offered to the potential buyer. They expect to approach purchasers who were negotiating in the latter part of 1920, and believe they have a fair chance of making sales, seeing at how much less the given machine or apparatus can now be had than the prices quoted when the collapse of 1920 came. There are plants which need additional or more efficient equipment and they have been postponing against the coming of favorable market conditions. It may be that the makers who are seeking business in the way indicated have actually an optimistic view of early 1922 and intend to be forearmed with low-priced materials and a backlog of orders. The international character of one of the concerns has made an impression on sellers, who consider these attempts to stimulate activity as of more than ordinary importance.

Readjustment in 1921

A year ago readjustment had only begun and it was patent that the readjustment process was necessary in everything. To-day it can be said that in many quarters readjustment is now completed or well advanced. The inventory of the things that have not been readjusted is much shorter than the inventory of those that have.

In steel prices the liquidation has gone far. Steel prices are approximately one-fourth higher than the average prices of 1913, while commodities in general, as shown by the Bureau of Labor's index number of wholesale prices, are approximately one-half higher. Steel prices are indeed only one-half higher than they were at the low point at the end of 1914, a price level which did not enable the Steel Corporation, with all its economies, to earn all its bond interest in the following January. With lower wages, lower freight rates, lower taxes and lower cost of general supplies the steel industry could reduce prices still further; but making allowance for these items steel is selling at the lowest price in the whole history of the industry.

Not so much can be said for the cost of consuming steel or putting it into employment as can be said for the price of steel f.o.b. mill. On an average, the various things that are made of steel cost more, in proportion to their pre-war cost, than does the steel itself. This is largely due to incomplete liquidation in labor cost of fabricating or working steel. In some cases wares made of steel are offered to the buying public at prices that make a favorable comparison with pre-war prices, but in those cases the result has been achieved by improvements and refinements in manufacturing processes.

The three great cases in which there has been a lag in the liquidating process are all cases of wages—wages on the railroads, in the building trades and in coal mining. These, disregarding influences that arise from conditions existing outside the United States, are the three conspicuous

obstacles to resumption of industrial and commercial activity with pre-war vigor and confidence. The low buying power of the farmer is also an obstacle, but that is in another category, namely of over-deflation, in which it stands by itself. The expense in operating railroads that is due to wage rates above the average, and to working conditions that prevent many railroad employees from rendering full service for the wages they receive, is helping to keep freight rates up when there is a practically universal demand that they should come down.

In the building trades there has been some liquidation in wages and working conditions, but not enough. In this line of activity there has been a particularly clear illustration of the principle that some buyers can wait better than others. Construction work can be divided, very roughly, into two classes, that which is imperative and that which can wait. The home builder has been taking hold in 1921, for he has only so many years to live and is willing to bear a loss if necessary to save some of those years. The purely investment builder is not so subject to this influence and has been disposed to wait.

As to the third obstacle, the high cost of producing coal under the United Mine Workers wage scales, the termination of the present agreement on March 31 seems destined to witness a contest of no small size for the purpose of liquidating the cost of producing coal. Events of the past week indicate that the "central competitive field" is going to pieces, which means evidently that the operators will refuse to negotiate such a national agreement as they have had in the past, and instead will offer to negotiate with the miners in the respective districts; also that they will refuse to continue the check-off.

Despite the obstacles remaining, business already has found a basis on which it can expand in a moderate and conservative way. It is already on the road to improvement, and all indications are that the way will become clearer and clearer as the year 1922 grows older.

The Machine Tool Outlook

Among the numerous reviews of the past year and prophecies for 1922, a contribution of special interest and value is that of Frank A. Scott, vice-president of the Warner & Swasey Co., Cleveland, in the *New York Evening Post*. While not attempting to belittle any of the difficulties of the present situation, and while frankly stating that in September, 1920, the American machine tool industry entered upon a period of depression more severe than had ever been known, he gives his reasons for believing that it will reassert itself in the foremost position among machine tool manufacturers of the world.

Mr. Scott speaks of the extraordinary demand for machine tools which followed the armistice, to meet the needs of the automobile and other metal-working industries which were endeavoring to resume their places as producers of peacetime instead of war-time products. But by the fall of 1920 there was full realization of the seri-

ous situation which confronted the industry and "from the pinnacle of its greatest success and prosperity it descended during 1921 to the lowest level, contrasting its present productive power with the existing demand, that has been known since the making of machine tools grew large enough in volume to be called an industry."

As to the older and better established companies, Mr. Scott takes an optimistic view, saying that they have nothing to fear on account of the present discouraging period and are even now confidently predicting the outcome. Their products are well known, their organizations are seasoned and their designs represent the intelligent development of years of experience. He points out that the increased production of pig iron in foreign countries will make necessary much greater use of machine tools in order to finish the iron for use. The older companies will naturally move into the new fields of demand, but Mr. Scott does not speak with confidence of the new companies with trade names unknown, with products designed during the war pressure and unseasoned by years of experience. Many of them must go the way of other short-lived war-time industries. He says that in the new industrial era competition will again be the ruling force. Machine tools of even a few years on the market must give way to those of new design, for machine tools of even five years ago cannot compare with the new machines and the expert application of their possible service worked out by the engineering science of to-day.

In the new designing Mr. Scott believes that this country will take the lead; that it will be again a case of the "survival of the fittest," with the old and experienced manufacturers winning in the battle; that with courage and willingness to rise to the extraordinary demands of the situation success may be attained. It is clear that in the next few years the inventive genius and selling ability of machine tool manufacturers will be put to the test in an entirely unprecedented way.

Efficiency Again in Repute

Granting that most commodity prices are tending downward, it behooves an industrial establishment to limit its financial obligations to as short terms as possible. The products of manufacture some years hence will not bring as much as now, and a greater turnover will consequently be necessary then to meet maturing indebtedness. This is, of course, on the assumption that the average normal percentage of profit is secured. By the same token lending institutions will bargain not merely for good rates but for long rather than short period accommodations, seeing that the dollar paid at maturity will have increased buying power.

History shows that a deflation movement may extend for years after the sharp initial cuts from top prices. Economists believe that the story of events following the violent shaking of the world's commercial structure in 1920 and 1921 will be history repeated. Thus marked or sustained recov-

eries of commodity prices are not expected, and the burden of keeping the products of a plant in a strong competitive position will fall in no small part upon the purchasing department.

Prices obtained for the manufactured article will be sharply competitive as deflation continues. Profits will come more than in recent years from savings in raw material costs. Efficiency must be the watchword, not merely in manufacture, where it has always been appreciated if not practised, but also in selling as well as buying, for no longer can what is saved in the factory, a cent at a time, be thrown away in dollars in selling, a hundred cents at a time. What particularly needs emphasis now is that these times of readjustment must develop equal efficiency in every department of industry, from purchasing through to selling. In proportion as the need of that brand of efficiency gets recognition, we shall see progress toward real and lasting prosperity.

Progress in Electric Metallurgy

Two important developments mark the progress of electric furnace metallurgy in 1921. One is the larger use of the electric process for making manganese steel castings and the other the increased production of iron castings from electrically melted iron.

For years the cupola and the converter have been the melting and refining mediums for manganese steel castings. Recently the largest producer of manganese steel adopted the electric process for its entire operations and one or two new companies have been formed to make manganese steel castings electrically. An article elsewhere discusses exhaustively the metallurgy of electric practice in manganese steel castings and points out the advantages, prominent among which is the recovery of manganese steel scrap with little loss of the manganese.

The movement toward electric gray iron castings has gained momentum. Prominent in the new installations of electric furnaces last year, as recorded in our annual review, are the projects for making various gray iron products electrically. We have discussed already the metallurgy of this process and its advantages. Recognizing its importance, a large technical society will conduct a symposium on electric gray iron at its spring meeting.

In the industry as a whole, healthy progress was made last year in spite of the depression. The increase of about 9 per cent over 1920 in number of furnaces installed or contracted for was beyond expectations. While plain steel products have accounted for part of this growth, gray iron castings and manganese steel have been leading factors.

The fact that in a year of stagnant business such an industry could grow as it has holds good promise for the future. There is widespread interest in the possibilities of the electric furnace for gray iron and there will be further expansion in this field along with the normal growth of the steel phase of electric metallurgy.

MORE TROOPS CALLED

Less Disorder at Newport, Ky., and Hope of Settlement at Early Date

Governor Morrow, of Kentucky, has ordered two additional companies of national guardsmen to Newport, Ky., where they have assumed strike duty at the plant of the Newport Rolling Mill Co. There are 330 soldiers now stationed in Newport and the Governor has let it be known that the entire guard will be called out, if necessary, to maintain order. Since the arrival of the soldiers, much of the lawlessness resorted to has been stamped out, although occasionally employees of the plant are waylaid and beaten at out of the way points.

As a result of a public meeting held on Dec. 27 at the First Baptist Church in Newport, it is possible a solution of the labor difficulties now existing at the Newport Rolling Mill Co.'s plant may be found. This meeting was attended by 2000 citizens of Newport and was addressed by W. N. Andrews, president of the rolling mill company, and E. W. Miller, president of Local No. 5 of the Amalgamated Association of Iron, Steel and Tin Workers. Rev. W. B. Harvey, pastor of the church, made a proposition to both sides as a basis for settlement of their difficulties. The first clause called for recognition of the unions by the company, and other clauses stated that the union shall accept the basic rate of 28c. an hour for common labor, and that no strike shall be called for any reason within less than one month after notification shall have been given to the company that a strike is contemplated. The agreement also provides that two months' grace shall be given at the expiration of any contract between the unions and the company before a strike shall be called or the men cease to work. It is understood that a proposal from the company for the withdrawal from the Amalgamated Association of the unskilled and semi-skilled union workers will be the opening wedge in new negotiations for settlement of the difficulties.

Speaking at the meeting, Mr. Andrews stated that the loss in wages to the employees of the company since the mill closed down on July 1, last, was \$4,775,000. Since January, 1919, the employees of the company had lost 53 weeks work while the company was trying to negotiate wage scales with the Amalgamated Association. Mr. Andrews also said that the company was not opposed to union principles, but found that it could not compete with other plants because of wages and other conditions imposed by the Amalgamated Association.

Mr. Miller had very little to say as to the differences between the company and the men, up to the time the break in the negotiations came. He created a stir when he declared that he believed the troubles at the mill were not caused by members of the union or by the operators, but that members of the I. W. W. were in Newport and were trying to stir up strife.

Coal Operators and Miners Will Confer

PITTSBURGH, Jan. 3.—Declination of the coal operators in southern Ohio and in the Pittsburgh district to accept the recent invitation of the officials of the United Mine Workers of America to meet and discuss a new wage scale and working conditions is not taken here to mean that the operators in either district propose to abandon all agreements with the coal miners' union and to seek to set up the "open shop" principle. On the contrary, when the miners have formulated their ideas and are ready to present them, a meeting will be held as formerly. A meeting of the United Mine Workers of America for the purpose of drawing up a new scale and a set of working conditions was scheduled for last September, but was postponed until Feb. 14, this year. The recent effort to meet with the operators was for the purpose of finding out how the operators felt and to get their ideas prior to the Feb. 14, meeting.

The operators, in declining to enter this preliminary meeting, did so because they see the possibility of a

good many important developments between now and the end of the present agreement on April 1, and since this contract was made with the Government a party, there is a desire to avoid doing anything which might be opposed by the Government. Pittsburgh district operators do not believe that the new agreement should establish common scales and working conditions for central and western Pennsylvania, West Virginia, eastern and southern Ohio and Indiana and Illinois. The other districts do not compete with Illinois and Indiana and furthermore, Pennsylvania and West Virginia operators of union mines do compete with a good many non-union mines. It is probable that the new arrangement will segregate into districts what is now included in the central competitive district. It is too soon to state definitely whether the check-off system will be eliminated, but it can be said that there is a strong sentiment among operators in favor of its elimination.

Increased Use of Creosoted Wood Block Floors

The use of treated wood block floors in 1920 showed an increase of over 80 per cent over the 1919 figures, according to the Service Bureau of the American Wood Preservers' Association. Creosote oil and a creosote coal-tar paving oil were used as preservatives, with an average absorption of approximately 9 lb. per cu. ft. Incomplete statistics for 1921 show an increase over the 1920 figures and a tendency toward the absorption of a little less oil per cubic foot for interior floors. The desire for a permanent, resilient floor with high wearing qualities is given as the reason for the increased demand for floors of this type for factories, machine shops, foundries, warehouses and mills of various kinds.

Buys Wainwright Corporation

ST. LOUIS, Jan. 3.—The McQuay-Norris Mfg. Co., manufacturer of piston rings, has acquired the plant and business of the Wainwright Engineering Corporation, Connorsville, Ind., manufacturer of pistons and piston pins. W. K. Norris, president of the former company, announces that the acquisition is preliminary to the entry of his company into the piston and pin business at Connorsville, under the name, the McQuay-Norris Mfg. Co. of Indiana. Sales will be handled by the St. Louis company.

The General Electric Co., Lynn, Mass., is to ask all persons connected with the plant to contribute 1 per cent of their earnings, weekly, to provide a fund to relieve former and present employees from suffering and want during the winter. A relief committee of employees and officers has been formed and plant additions, repairs and yard work will be started at once to provide employment for those out of work.

The American Steel & Wire Co., Worcester, Mass., in the interest of economy, has suspended the publication of its monthly shop paper, the *Bulletin*, which contained news of interest to the 5000 employees of the three Worcester works.

THE IRON AGE AND ITS READERS

A unique contribution to the columns of THE IRON AGE appears on pages 20 and 21 of this Annual Review Number. Henry David Hubbard, the author, is secretary of the Bureau of Standards at Washington, and since 1901 has been in charge of the publications of the bureau as compiling editor. He is also the writer of the annual review of physics for the International Year Book.

In presenting his Soliloquy of Steel Mr. Hubbard has been aided by his talent as an illustrator, and most effectively we believe our readers will agree.

Railroad Buying for 1922 Undetermined

Presidents of Roads Say That Much Will Depend on Recovery in Traffic and Earnings and on Reductions in Wages

IN response to inquiries from THE IRON AGE, presidents of some of the leading railroads of the United States have indicated in statements published below what their policies are to be regarding purchases of rolling stock, shop equipment, construction of bridges, stations, shops, etc., during the coming year. With many of the roads plans are still in an undetermined stage. The extent of purchases will depend largely on recovery

in traffic, which fell off in December; ability to make sufficient earnings to put into improvements, and likewise their success in reducing the high wage rates with which they were saddled under Federal control. Some of the roads which are in good financial condition have already engaged upon betterments which will come out of their 1922 budgets, but a majority of those replying have only indefinite plans in mind at this time.

By Ralph Budd

President Great Northern

Except for material absolutely necessary to maintain the railroad properties, I feel that the orders placed for iron and steel products depend very largely upon the showing of earnings made by the railroad companies. While October, 1921, was a fairly good month, November was not so good and December will show a still greater decline. This, to a large extent, is because the October earnings reflect an early movement of agricultural products.

If you will permit me to express the opinion, I would say that I think it a very doubtful policy for the heads of some of the furnace companies to pursue the course of attacking ore rates in the hearing now taking place at Chicago, by making the argument that whether the railroads can afford to reduce rates or not, they should do so to stimulate steel business. If, as you say, the prosperity of the iron and steel companies will depend to a large extent on railroad orders for 1922, I should say the iron and steel business is not being helped any by attempting to reduce rates, which will surely affect the purchasing power of the railroads adversely. It should be borne in mind that the railroads are no more prosperous than the steel companies or other industries, and that they did not make any large earnings during the war, so that while there has not been so much reduction in railroad rates since the war, the reason is that railroad rates did not reach such a high percentage above normal during the war as some other things did; and it should also be borne in mind that the average freight rate is about 65 per cent higher than it was in the decade prior to 1910, while the average price of all commodities is about 67 per cent higher than was the case during the above mentioned period.

By W. B. Storey

President Atchison, Topeka & Santa Fe

We have recently ordered 2,500 refrigerator cars which will go into our 1922 budget, the cost of these cars amounting to \$8,000,000. We do not contemplate any other large equipment purchases during the year, but are likely to spend \$2,000,000 additional. Our extensions of and additions and betterments to our plant may call for an additional expenditure at least as large as the average for each of the past two years, or about \$10,000,000. Our budget for the coming year has not yet been presented, so that these figures indicate only in a very general way what our program is likely to be. We have no details available which would indicate how much of this is likely to be of special interest

to the steel industry, nor is our budget ever worked out in such a way as to furnish this particular information separately.

By Charles Donnelly

President Northern Pacific

I have your letter, inquiring whether we have in contemplation any program involving during the year 1922 the purchase on a large scale of equipment, rails, shop machinery, etc. In reply, I have to state that we have not. Whether, as the result of the developments of the next three or four months, we may adopt a somewhat limited program of this character I cannot now say, but at present no plans are under consideration for purchases on any very considerable scale.

By W. G. Besler

President Central Railroad Co. of New Jersey

We have just placed an order with the American Locomotive Co. for 25 heavy Mikado engines. We are studying our requirements with respect to rails, ties, lumber, etc., and will determine later on the extent of our orders for this class of material. We are not prepared to do so at present.

By H. F. Byram

President Chicago, Milwaukee & St. Paul

I regret that there does not seem to be anything very encouraging in the outlook for increased purchases of iron and steel by the railroads until the general business of the country revives. Improvements on the railroads of the country practically have been at a standstill for several years and it is the improvements in equipment and facilities which require the largest proportion of steel and steel products.

The meager volume of business handled by the railroads during the past year, and which still continues, does not require any additional facilities in either the road or equipment of a railroad. In fact, the present facilities are more than adequate to handle promptly and satisfactorily all the business offered, and the high labor cost left to us as a legacy from the period of Federal control has so narrowed the spread between expenses and earnings as to leave little room for providing surplus funds which might be invested in anticipation of the return of business prosperity, which we all hope is not far away. But, until these difficulties are overcome or reconciled and the needs of the railroads for increased capacity are more pronounced than at

present, there is not likely to be an increased demand by the railways for iron and steel products.

By J. S. Pyeatt

President Gulf Coast Lines

We do not contemplate the purchase of any new equipment during the coming year. Delivery has been completed recently of new freight and passenger cars and locomotives, aggregating \$3,500,000, which we believe will enable us to meet our requirements for another year. Our purchases of rail and other material and supplies we anticipate will be normal during the year 1922.

By William Sproule

President Southern Pacific

Business throughout the country is marking time waiting until prices have dropped to a fairly normal basis. This means that the pre-war state of mind is returning and purchasers are not willing to proceed on a relatively high scale of prices.

By William H. Finley

President Chicago & North Western

I believe that the buying power of the railroads is one of the big factors in business activity. It is unfortunate, however, that the financial condition of the railroads does not indicate that they will be warranted in making any large purchases at present. We are considering the matter very carefully, but cannot make any definite plans owing to the decline in our income. Like the careful mariner when in troubled waters, we are constantly on the lookout, taking soundings to determine the safety of our position and will be prepared to place orders as soon as we are assured that the ebbside has turned.

By J. L. Lancaster

Receiver Texas & Pacific

Under existing conditions it will not be possible for the Texas & Pacific Railway to make extensive purchases of additional locomotives, cars, rails and tools for repair shops, or undertake to any great extent construction of bridges, shop buildings and railroad stations.

By Carl R. Gray

President Union Pacific System

Our budget has not yet been finished for 1922, and will not be definitely acted upon for 60 or 90 days. I anticipate that in this section, at least, the railroad business will be quiet and on something like our present levels until spring, when I hope for an improvement.

By S. M. Felton

President Chicago Great Western

I do not believe there will be any extensive buying by the railroads during the coming year. Much depends on business conditions. Railroad traffic has been falling off very sharply during the last few weeks and unless there is some decided improvement there certainly will be very little buying, beyond that which is necessary for maintenance and renewals. In the first place, we have a demand from all sides for a reduction in our rates; in order to meet this we are trying to get our

wages down, but so far have not accomplished what is necessary. It is certain that unless railroad operating expenses can be materially reduced and traffic improves, there will not be any money for the purchase of additional locomotives, cars, etc. There will be, as is always the case, some scattered purchases by lines that are financially strong, but a great number of the roads are not in a position to make any large investments and many of them are still waiting for a settlement of their claims against the Government for under-maintenance during the period of Federal control. If reasonable sums should be paid out by the Railroad Administration in settlement of these claims the money would undoubtedly be invested in repairs and renewals of equipment and in rehabilitation work generally, and to that extent would be helpful. I am sorry I cannot give you a more favorable report of the situation.

By Percy R. Todd

President Rangor & Aroostook

During the past year this company purchased six heavy Consolidation freight locomotives, 30 Hart ballast cars, and a new 120-ton wrecking derrick, and in October ordered 200 steel underframe box cars, which have not yet been built; this will about exhaust our financial ability in the way of ordering new equipment, therefore we have no extensive program in this direction for next year.

By J. H. Hustis

President Boston & Maine

We have no plans for the coming year for any important permanent construction of bridges, line extensions, shop buildings or stations. We shall probably order certain equipment, but the order will not be large and final decision has not been made in the matter, so that I am unable to make any announcement at this time. As to the railroad outlook for 1922, I can only say that I believe it will continue to be a period of readjustment.

By W. L. Mapother

President Louisville & Nashville

The Louisville & Nashville Railroad Co. has certain extensive plans for addition and betterment expenditures, including equipment, but the existing business and financial conditions serve to preclude the possibility of any immediate or early decision and announcement.

[Since the above was written the Louisville & Nashville has come into the market for 50,000 tons of rails, which will be rolled at the Alabama mill.—EDITOR.]

By F. D. Underwood

President Erie Railroad

The purchasing power of railroads is not being developed as fast as we could hope. Personally I see but small hope of an increase in business until the prospects of another crop in the United States are assured. There is at present a great surplus of equipment, which fact will minimize orders for next year.

By William A. Winburn

President Central of Georgia

You ask our program for additional cars, rails, etc., and our plans for permanent construction requiring iron and steel. The latter has been provided for. It

is our purpose to purchase during the coming year about 4000 tons of steel and five hundred box cars.

By J. J. Bernet
President Nickel Plate

Our company has not outlined any program or budget for buying in the year 1922. While we have been going along in a normal sort of way, we have not made any plans for anything unusual during the coming year.

By M. M. Bremner
President, Minncapolis & St. Louis

To my mind it is very difficult to forecast what may be expected from the railroads in the year 1922 with respect to purchases of locomotives and cars and in the way of permanent construction.

Undoubtedly, there is a great need for more equipment and much maintenance of roadway and existing equipment has been deferred during the past year and temporary expedients have been resorted to because of lack of funds to do things in a proper way.

To my mind what the railroads will do in the way of purchases will depend entirely on the business outlook. But very few railroads are in a position at the present time to borrow money on terms that are at all favorable, and the result is they must depend upon their revenues until such time as their credit is re-established. Just at the present time we are passing through a very severe slump in business with a very serious impairment of revenues. Whether this slump is temporary in character or will continue for some time to come, it is impossible at the present time to determine. My own view is that it will continue for from sixty to ninety days.

Dependent as the railroads are upon their earnings, there is little encouragement for them to extend their purchases, confronted as they are with increasingly insistent demands for reductions in rates, regardless of their ability from a revenue standpoint to stand the reductions. Already the Interstate Commerce Commission has ordered a reduction in the rates on grain and grain products, which will mean a very serious impairment of the revenues of the Western carriers and this may be but a forerunner of further reductions.

I believe that if the agitation with respect to decreased rates could be stopped and no encouragement from official sources be given thereto, there would soon be a decided improvement in general business conditions. The fact is that in nearly all lines of industry, at the present time, shippers and consignees are holding back, believing that rates will be reduced and that by holding off they will make an additional profit for themselves by the amount of the reduction, whatever it may be. If no hope of a reduction was before them, they would probably adjust their business affairs to the present level of rates and business would go on as usual.

Constant agitation with respect to a matter such as freight rates, which enter into practically every transaction of life, cannot be otherwise than harmful. What the business world needs is stability and this cannot be brought about if this agitation is to go on.

Will Sell Flat Cars

WASHINGTON, Jan. 3.—The Emergency Fleet Corporation will receive bids up to Jan. 12, at its offices in Washington, for 309 standard gage flat cars, ranging from 25 to 40 tons in capacity; 15 box cars with a capacity of 30 tons each; 35 gondolas with capacities ranging from 20 to 40 tons; and 7 locomotives. This equipment is located at Briston and Hog Island, Pa., and is offered for sale "as is where is."

THE HARDWOOD DECISION

Co-operation Somewhat Disturbed by Action of the Supreme Court

WASHINGTON, Jan. 3.—The majority opinion of the Supreme Court in the hardwood case has had the anticipated result of somewhat disturbing co-operation between trade associations and the Department of Commerce. One association has given notice that it will not submit further statistical data to the Department of Commerce for use in the Monthly Survey of Current Business, issued under the direction of the Bureau of the Census. Other associations have denoted that they are uncertain as to whether they will co-operate further, being apprehensive of the effect of the decision of the Supreme Court. The chief difficulty disturbing this co-operation, which has been carefully urged and built up upon the initiative of Secretary of Commerce Hoover, has been the doubt left as to the actual effect of the decision.

It is evident that careful analysis of the opinion has left the general impression that it affects the activities of only a small portion of trade associations of the country, but many associations which feel that they are not affected, are at the same time, left in a state of doubt pending the clear interpretation of the decision by the Government. For this reason, it is believed that some of them, at least, will hesitate to co-operate with the Department of Commerce until Attorney General Daugherty presents an official statement expressing his views in the matter. As has been previously stated, however, apparently even this will not satisfy representatives of some associations, who think that the only remedy assuring their legality lies in the enactment of legislation, though passage of such legislation, if undertaken, probably would require a long time.

Secretary Hoover's View

Secretary Hoover has reiterated his view that the decision will have a bearing on only a small number of trade associations, estimating that it will not involve over 10 per cent of the total. This calculation is based on the survey made sometime ago by the Department of Commerce as to the activities of the 1700 or 1800 trade associations of the country.

Nathan B. Williams, Associate Counsel of the National Association of Manufacturers, takes the same view that Mr. Hoover expressed and thinks that trade associations should continue their legitimate statistical activities and supply data to the Department of Commerce for public use. In an interview with THE IRON AGE Mr. Williams said:

"As a result of the Supreme Court decision in the hardwood case, some apprehension has become manifest as to the legality of the activities of trade associations who have been supplying current statistical information to the Department of Commerce, for use in its Monthly Survey of Current Business.

"This anxiety appears to be the result of the popular impression as to just what practices were condemned by the Supreme Court of the United States in the case of the American Hardwood Manufacturers' Association, decided Dec. 19, 1921.

"Early in August of this year Secretary Hoover issued a statement with respect to trade associations and their work, wherein he said:

For some weeks the department has been making a careful study of the purposes and activities of trade associations. We find that the vast majority of such associated activity is a constructive contribution to national welfare.

The department wishes to co-operate with such associations as wish it in the collection of information as to production, stocks of raw and other materials, percentage of industry in active operation, total orders, and other accomplished facts of interest to them and in the making of the information available to the whole public.

The making of such information currently public acts alike to protect legitimate business enterprises and the public interest.

Selling American Machine Tools in Europe

Difficulties Encountered in all Countries Due to Disparity in Exchange and to German Competition, Which May Correct Itself

BY E. M. HARTRIDGE*

WHEN the armistice was signed, opinion was very much divided as to the future of the machine-tool markets in Europe. The same is true to-day with the future as clouded and uncertain as it was three years ago. It is becoming more and more difficult to sell American tools in Europe and unless the American manufacturers awake to this fact and take energetic measures they will gradually lose all the prestige and business that has taken years to build up.

In France, just after the armistice, there was considerable buying due to the conversion of munition factories into peace-time productivities. Also, there were the destroyed plants in the north of France on which rebuilding work was commenced almost immediately. The pre-war factories naturally returned to the manufacture of articles they were engaged in before the war, but with the added feature that their productive capacity as a whole was greatly increased. Many new factories had also sprung up during the war and they all had extensive plans for the future. Everybody wanted to keep his factory running at full war-time production and there was a feverish rush to get started on new programs and to get ahead of the other fellow.

For a time things looked rosy and there was a brisk demand for American tools, as the surplus machines and the war stocks of the United States Government had not yet begun to be thrown on the market, nor had the German competition commenced. Soon, though, things began to happen. The bottom commenced to drop out of the French as well as other European exchanges. There was a scarcity of coal and raw materials, and labor began making impossible demands. The worst, though, was when the factories were ready to produce and it was found that there were not sufficient markets to keep them busy. It was impossible to develop markets quickly enough to keep the greatly increased productive capacity of these pre-war factories going and at the same time to absorb the output of all the numerous new factories which had sprung up during the war. The automobile business in particular was greatly overdone. The result was that something was bound to happen and it did. There was a general slump followed by failures and shutting down of factories. The older and more firmly established industries have, as a rule, weathered the storm, but even with them it has been a severe struggle. All this has had the effect of automatically eliminating the surplus production in France and has sent many laborers and mechanics back to the farms where they are badly needed.

Little Buying of American Tools

The reaction will undoubtedly be a healthy one with a gradual industrial growth of France in keeping with the present market demands and those that might be developed. At the present time, there is very little buying of American tools. With francs at 14 to 15 to the dollar, it takes courage even to quote prices on American tools. The smaller and provincial concerns do not know anything about exchange and they look upon American manufacturers—and the dealers who sell American tools—as being profiteers and robbers on account of prices being so high when translated into depreciated currency values. It is not an unusual occurrence for salesmen to be actually abused and insulted when quoting on American tools. Of course, the larger manufacturers are more familiar with the

exchange problem and are more lenient in their criticisms, but even they say frankly that they will not buy American tools at the present prices if they can possibly help it. The result is that American machines are only bought when it is impossible to buy elsewhere.

German competition—if it can be called such at the prices at which they are selling—is becoming steadily more and more demoralizing and French manufacturers are turning to Germany to supply their demands. This particularly as the French Government encourages buying in Germany on account of the favorable exchange and also as, through the Wiesbaden agreement, it has undertaken to receive payment of reparations in commodities instead of money.

There is still considerable demand for machine tools in the north of France in re-establishing destroyed factories, but such buying is largely financed by the French Government with the result that Germany is getting the greater part of this business and only rarely is an order secured for an American tool. For the first half of the year 1921 it is reported that France bought machines in Germany to the amount of 306,500,000 francs, which figures are indeed formidable, particularly when it is considered that from the latest available figures only about 20 per cent of the concerns operating in the North in 1914 are completely restored. There are other concerns partially restored, so that it might be said that the industries in the North are on the whole about 50 per cent restored. From the present indications it looks as if the Germans will get the remainder of this business unless the American manufacturers awake to the seriousness of the situation.

Buying in Germany to Rehabilitate Plants

During a recent visit to the north of France, I had the opportunity to visit and discuss the situation with the managing director of one of the largest and oldest works in that section, whose opinion is highly respected throughout the metal working industry. Before the war and until recently, this concern had largely favored American tools but lately had begun buying in Germany. When asked about this, the managing director explained that they simply could not continue paying such high prices for American tools when the same tools could be bought in Germany for less than half the price. The result is that they, as well as others, have recently been buying very heavily in Germany such machines as vertical turret lathes and boring mills, radial drills, planers, etc. Many of these machines have arrived and are now working and giving satisfaction. A 5½-ft. radial drill was pointed out which cost only 22,000 francs, whereas the price of a similar best make of American tool would be around 60,000 francs to-day. A 42-in. German vertical turret lathe costs 50,000 francs, while the prices on the best American tools of the same capacity range from 113,000 to 150,000 francs. One of the best German makers of grinders quotes 10,000 francs delivered France for a 12 x 36-in. machine while prices quoted on the best American tools vary with different makes from 30,000 to 45,000 francs. These are only a few examples, and in consequence everybody in the North—as well as elsewhere in France—is buying from Germany.

The dealer who confines his efforts solely to the sale of American tools is helpless to do much in the face of this situation except to continue making extra efforts and using all the strategy at his command, which may be occasionally rewarded by a small order

*Vice-president, Allied Machinery Co. of America, Paris, France.

when a tool cannot be obtained quickly enough from Germany or because it is not considered worth while going to Germany for a single machine. The dealer can talk quality until he is out of breath but to-day prices are invariably the final deciding factor. Even if in desperation the dealer quotes below actual cost—as is frequently the case nowadays in his efforts to get orders—his prices are still far above the German prices. It is sometimes possible to obtain an order in competition with the Germans if the difference in price is only about 25 per cent, but when the difference is so great as it is to-day, it is practically impossible to compete. There is not only the German competition in France at the present time but there is also a large quantity of surplus American tools which has been thrown on the market, and is being sold at ridiculously low prices. Until these surplus machines are finally absorbed, this kind of competition will be continually encountered.

Belgian Market Also Depressed

The same general remarks as the above hold true for Belgium, Italy, Spain and Switzerland with slight variations. Belgium had hardly got started manufacturing when the slump came and as she did not have the momentum to carry her along, the depression has been felt more in Belgium than it has in France. Also, on account of the large Army stocks of American tools dumped in Belgium by the United States Government, there has been comparatively very little buying outside of this source. Moreover, the German competition is felt very keenly in Belgium, and it was felt in Belgium sooner than in France.

Italy has gone through practically the same stages as France has—although, of course, on a smaller scale—with the added features of having had serious labor troubles. Everybody is familiar with the way the Communists took possession of the factories and only turned them back to the owners after having failed to operate them successfully. That this has demoralized the country to a large extent is shown in the general lack of confidence of capital to invest in industrial enterprises as long as the socialistic laboring element dominates the situation as it has in the past, and as it still does to a large extent. As a result, recovery is slow and many of the larger manufacturing industries are still entirely shut down. Italy is also handicapped by having to buy practically all of her raw materials and coal which cost dearly on account of transportation and the depreciated value of the lira. The German competition is also particularly keen in Italy—even more so than in France—as the bars have been entirely let down to German goods which are beginning to flood the country. However, Italy is making strenuous efforts to recover.

Spain Not Strong Industrially

As for Spain, there is not much to say. The present depression has hit this country as well as other parts of the world. The future of the manufacturing industries in Spain is very uncertain and is on an unstable basis, and it is a question whether they will be able to compete with surrounding countries such as England, France and Germany. Spain was not a manufacturing country before the war and it was only the war that gave her a start in this direction. There is very little machine tool buying being done in Spain and what there is is mostly for the cheapest kind of tools of Spanish, German and other makes. The Germans are very active in Spain and have dumped large quantities of cheap machine tools on the market which sell at very low prices. This makes it very difficult to compete with American tools.

Switzerland has probably been hit harder than France, Spain, Belgium or Italy. Before the war Switzerland sold her products largely in the surrounding countries, but now that the exchange of these surrounding countries is so greatly depreciated, they cannot afford to buy in Switzerland, which has been simply flooded with German goods, including machine tools and small tools. There is probably more unemployment in Switzerland in proportion to its size than in France, Belgium or Italy. This means that there is practically

no demand for American machine tools in Switzerland and probably will not be until the factories in Switzerland are busy again.

Situation May Mend Itself

As for the German competition, it is true that this is very serious, but the situation is not as bad as might appear on the surface. As the economists point out, the Germans cannot do all the work of the world now any more than they could before the war, as their capacity is no greater now than it was then. They were very busy and effective in competition before the war and yet the rest of the world found enough to do. They are no more formidable in industrial ability and equipment now than they were then. The so-called advantages of the Germans on account of the depreciation of the mark—which has upset all relative values—is causing the German authorities and financiers the greatest anxiety.

In terms of paper marks, many salaries in Germany are still only four to six times higher than the peacetime level, although wages generally have risen to 15 times that amount. But at the same time the ratio of paper money values to gold is about 70. This will probably result in a tremendous conflict between labor and capital on the wage question during the winter and spring. The German Government, which derives a great part of its revenue from taxes on German production, is also hard hit because it is unable to collect an amount commensurate with the decline in values. The German financial structure is in serious danger of collapsing if strenuous measures are not taken to readjust relative values, and the result will be that prices will have to be greatly increased. The Germans are also under serious handicap from the requirements that 26 per cent of the value of all of their exports must be paid into the reparation fund. The tendency of this, of course, will be to pass this on to the purchaser. Germany is gradually waking up to the fact that she cannot replace the tools and other goods at the prices at which she is now selling. It has just been announced that export restrictions are being placed to prevent the wholesale shipment of goods out of the country which is now going on, and to preserve stocks of raw materials. There are also rumors of establishing a special currency—based on the value of a gold mark—for purchases intended for export in order to avoid a general increase of prices on goods intended for internal consumption as now threatened. Therefore the future is not as bad as it may appear now. It is the next six months or a year that will be the critical period and it will largely depend on the American manufacturers whether they will hold the European markets or lose them to the Germans.

American Manufacturers Must Wake Up

From the above it can be seen that the situation in Europe to-day which confronts the American manufacturers, as well as the dealers who sell exclusively American tools, is very serious indeed. The selling organizations which American manufacturers are depending on for their foreign business are real pioneers and must be good merchants as well as good salesmen and engineers. Even in face of the serious German competition they must continue to carry large stocks and finance shipments, as well as take all the risks of fluctuating exchanges, bad credits, and all the other evils which make it more difficult to do business in Europe to-day than ever before, or probably than it ever will be again. Without proper support it takes courage for a dealer to stay loyal to the American manufacturer and to continue to sell American tools exclusively in the face of the present difficulties. In fact, many dealers following the course of least resistance, have turned to selling German machine tools. The American manufacturers should appreciate the courage and sacrifices of the dealers who remain loyal and in turn should assist them in every way. Not only should they give them the lowest prices possible, but they should look upon their foreign agents as a part of their own selling organization, giving them the same facilities as to their own organization.

Manganese Steel Made in Electric Furnace

(Continued from page 8)

By means of baffles and flues this flame is so controlled that it follows the roof of the furnace, and the charge is heated by radiation. This ability to prevent the flame from impinging on the castings is very important. As manganese steel can not be cut with a tool all finishing must be done by means of grinding wheels. If the flame were to strike the castings some would be heated much hotter than others, and the scaling would seriously affect the dimensions of the finished work. A small variance is allowed for this and is taken care of by the pattern maker. Unequal heats would cause great trouble after the quenching operation, resulting in warped and twisted castings, and might even cause rejections, due to tearing and checking caused by the unequal contraction.

The castings are loaded on the cars in a regular and even manner, castings of as nearly the same size as possible making up the charge. These are brought up gradually to 1800 deg. Fahr. and are allowed to soak until heated evenly clear through. The car is then pulled and the charge quenched in water as quickly as is possible. Large tanks are used for this purpose, so arranged that a constant circulation of cold water is obtained. When the charge is cold they are withdrawn and finished ready for shipment, after being inspected and straightened where necessary.

This is one of the peculiarities of manganese steel. All other steels when quenched in this manner would become glass hard. Manganese steel becomes slightly softer in Brinell number, and changes from a brittle metal to one of abnormal toughness, having a merit number (tensile strength \times elongation) of about 7,000,000. As a means of regulating the heat in the furnace Segar cones are used. While these are not as efficient as a good system of recording pyrometers, they give good results.

Physical and Chemical Testing

At about the middle of the pour several different sets of test bars are made.

Breaking test.—A bar 18 in. long, and 3 in. square is cast and used for the breaking test. This bar is treated and placed on sharp supports 16 in. apart. A heavy weight is then dropped on this bar, which must stand a definite amount of blows to meet the specification. The test used is to drop a ball, weighing 4000 lb., eight times from a 6-ft. height, making an equivalent of 192,000 foot pounds.

Pulling or strength test.—A bar is cast large enough to make a standard section pulling bar when ground down to size. This is then pulled in a similar manner to carbon steel on any class of testing machine. Manganese steel has a peculiar property here. Under the pull it begins to stretch at one point. Then instead of continuing its stretch there, it begins at another point. As soon as the elongation is constant over the whole section undergoing the test, it continues this operation until ruptured. This results in a rather low elastic limit as compared to the great strength and elongation. Tests from manganese steel have shown as high as 150,000 lb. per sq. in., with an elongation of over 50 per cent. Manganese steel, when forged or worked in any manner, shows vast improvement over the ordinary cast tests. Cold working raises its tensile strength and elastic limit but lowers its elongation. Tests of cold worked material have shown as high as 250,000 lb. per sq. in. tensile strength, with an elastic limit of 230,000 lb. per sq. in.

Bending test.—This is the most important test given and is made on every heat. Several bars are cast on end; one for the chemical analysis; one to be treated in the laboratory and bent; and one for each load of

castings from the heat when treated. These bars are 12 in. long, $\frac{1}{2}$ in. thick and $\frac{1}{4}$ in. wide. One of the bars is taken to the laboratory and brought up to 1800 deg. Fahr. in a small electric oven. It is then quenched in water and bent until it breaks. This shows the character of the steel from the heat. The same operation is performed on the bars which go through the regular process with the castings. These are then compared and serve as a check on the treating operation. Large numbers of these bars will bend flat on themselves without any sign of checking. All bendings are made on the cold stock. From several hundred tests over a period of two years, on electric furnace manganese steel, it was found that the best bends were those where the manganese ran from 12 to 13 per cent. Regardless of the carbon, silicon, or phosphorous contents on these heats, the test bar always bent flat on itself without any visible checking on the outside of the bend. This is a pretty rigid test to meet with a steel having over 100,000 lb. per sq. in. tensile strength.

Sampling

High speed steel bars $\frac{1}{2}$ in. round and about 3 in. long are forged down to the shape shown at A, as shown in an illustration. These are then given a rough grinding to the shape B. The semi-finished drill is then heated slowly in a forge fire to a dull red, or about 1500 deg. Fahr., and then heated rapidly to a white heat. The temperature is then about 2300 deg. Fahr. and the end of the tool is just beginning to drip and looks greasy. The tool is then suddenly quenched, point down, in kerosene for three seconds and then quenched to a black in water. The tool is ground lightly on a wet wheel and is then ready to drill.

A very heavy drill press is used where high leverage can be obtained and the sample is drilled from one of the bending test bars cast on the heat desired.

The drillings are then screened to remove any fine particles of dirt and looked over carefully for any small chips which may have fallen from the drill, and are taken to the laboratory for analysis.

Influence for Consolidation

Youngstown, Ohio, Jan. 3:—Prospect of continued operating losses for some time to come with leading independent steel makers is expected to exert a strong influence toward consolidation. Assembling of valuation data on plant, coal and ore holdings is now under way, and when completed will furnish the basis for more definite discussion as to merger terms. Losses encountered in 1921 by independent interests have served to stimulate the movement for an amalgamation, with the benefits of reduced costs of operation, shipping advantages and sizable overhead reduction.

In a message to its employees, a leading independent producer in the Mahoning Valley points out that "not a steel company in the United States made any money in 1921. On the other hand, many of them lost vast amounts. The balance sheets of many large companies will show an actual loss of millions of dollars. Only the fact that all had enjoyed prosperity for several years prevented absolute bankruptcy in many cases."

"The year 1921 was not a pleasant one for workers in the steel industry nor for most of those who work and conduct business of one kind or another in this country. It was one of the worst years from an industrial standpoint that the industry has ever known."

"The scarcity of work and the great reduction in earnings seemed even worse than they were when compared with conditions for several years past, and it required a good deal of philosophy to accept them without complaint. Nevertheless, we can find some comfort in the fact that these conditions were general and everybody had to suffer from them in about the same degree. Where wages were not reduced, there was little work, and where people did not have to labor, but depended on dividends, they suffered even more than the man whose capital is his labor."

LARGE GAIN IN IRON OUTPUT

Six Furnaces Blown In, One Blown Out

December Production 6013 Tons Per Day Larger Than That of November

Despite the temporary banking of several furnaces, usual over the holiday period, the upward swing in the pig iron output of the country continued its momentum in December. The gain per day last month was over 6000 tons as contrasted with 6968 tons per day in November over October and with 7465 tons per day in October over September. The December total is only about 400,000 tons under the February output and is the third largest month in the year.

The production of coke and anthracite furnaces for the 31 days in December amounted to 1,649,086 gross tons, or 53,196 tons per day, as compared with 1,415,481 tons or 47,183 tons per day for the 30 days in November according to data collected largely by telegraph. The increase in December over November was 233,605 tons, or 6013 tons per day.

The total number of furnaces in blast on Jan. 1 is 125 as compared with 120 on Dec. 1, with 96 on Nov. 1, with 82 on Oct. 1, with 70 on Sept. 1, and with 69 on Aug. 1, the low point for the year. In December six furnaces were blown in and one blown out.

A computation of the capacity in blast Jan. 1 is difficult because of the telegraphic and other methods of obtaining the data, due to the holidays and the temporary banking of furnaces. The December output of manganese-iron alloys was 3953 tons, one furnace having been blown in on this product during the month. Of this total 50 tons was spiegeleisen.

Daily Rate of Production

The daily rate of production of coke and anthracite pig iron by months, from December, 1920, is as follows:

Daily Rate of Pig Iron Production by Months—Gross Tons	1920			1921		
	Steel Works	Merchant	Total	Steel Works	Merchant	Total
December	66,037	20,185	87,222	62,327	15,618	77,945
January, 1921	58,060	11,127	69,187	42,691	8,777	51,468
February	33,854	5,914	39,768	33,054	6,340	39,394
March	23,444	6,050	29,494	23,086	4,803	27,889
April	26,037	4,743	30,780	27,189	5,661	32,850
May	33,365	6,850	40,215	37,960	9,223	47,183
June	41,173	12,023	53,196			

The figures for daily average production, beginning with January, 1915, are as follows:

Daily Average Production of Coke and Anthracite Pig Iron in the United States by Months Since Jan. 1, 1915—Gross Tons										
	1915	1916	1917	1918	1919	1920	1921			
Jan.	51,659	102,746	101,643	77,799	106,525	97,264	77,945			
Feb.	69,813	106,356	91,473	82,835	105,006	102,720	69,187			
Mar.	66,575	107,667	104,882	103,648	99,685	108,900	51,468			
Apr.	70,550	107,592	111,165	109,607	82,607	91,327	39,768			
May	73,015	108,422	110,238	111,175	68,002	96,312	39,394			
June	79,361	107,053	109,002	110,793	70,495	101,451	35,494			
July	82,691	104,017	107,820	110,354	78,340	98,931	27,889			
Aug.	89,666	103,346	104,772	109,341	88,496	101,529	30,780			
Sept.	95,085	106,745	104,465	113,942	82,932	104,310	32,850			
Oct.	100,822	113,189	106,550	112,482	60,115	106,212	40,215			
Nov.	101,244	110,394	106,859	111,802	79,745	97,830	47,183			
Dec.	103,333	102,537	92,997	110,762	84,944	87,222	53,196			

The furnaces blown in during December include the following: Brooke furnace in the Schuylkill Valley; Sheridan furnace in the Lebanon Valley; B Federal furnace in Illinois; one furnace of the Colorado Fuel & Iron Co. in Colorado, No. 2 Hattie Ensley furnace of the Sloss-Sheffield Steel & Iron Co. in Alabama, and the furnace of the St. Louis Coke & Chemical Co. in Illinois. Three of these furnaces were blown in after Dec. 23; the other three were blown in Dec. 5, Dec. 12 and Dec. 19, respectively.

Only one furnace was blown out during December, one of the Johnstown furnaces of the Cambria Steel

Co. in western Pennsylvania. Several furnaces were banked over the holidays.

Production of Steel Companies—Gross Tons

Returns from all furnaces of the United States Steel Corporation and the various independent steel companies, as well as from merchant furnaces producing ferromanganese and spiegeleisen, show the following totals of steel making iron, month by month, together with ferromanganese and spiegeleisen. These last, while stated separately, are also included in the columns of "total production."

Production of Steel Companies—Gross Tons

	Total Production			Spiegeleisen and Ferromanganese		
	1919	1920	1921	1919	1920	1921
Jan.	2,430,022	2,232,455	1,932,159	32,787	23,957	22,228
Feb.	2,209,470	2,181,679	1,625,695	28,105	28,038	29,012
Mar.	2,277,507	2,480,668	1,323,443	26,844	85,275	41,294
Apr.	1,838,677	1,968,542	1,015,621	17,308	27,628	24,310
May	1,586,805	1,128,720	1,024,678	14,604	33,407	9,232
June	1,655,944	2,209,770	882,312	14,354	34,761	4,536
July	1,906,604	2,230,567	715,664	14,805	36,789	5,524
Aug.	2,108,566	2,254,943	807,144	17,419	36,985	3,878
Sept.	1,828,613	2,247,250	815,692	20,631	39,546	3,289
Oct.	1,295,690	2,392,644	1,034,312	20,238	34,786	3,902
Nov.	1,727,656	2,150,075	1,138,789	19,964	26,944	3,525
Dec.	1,916,249	2,047,167	1,276,381	15,718	28,023	3,953

Output by Districts

The accompanying table gives the production of all coke and anthracite furnaces for December, and the three months preceding:

Pig Iron Production by Districts, Gross Tons

	December (31 days)		November (30 days)		October (31 days)		September (30 days)	
	1920	1921	1920	1921	1920	1921	1920	1921
New York	126,734	91,535	65,502	50,970				
New Jersey	5,026	4,525	4,745	4,870				
Lehigh Valley	31,388	30,020	27,614	27,566				
Schuylkill Valley	41,450	35,850	28,176	28,126				
Lower Susquehanna and Lebanon Valleys	26,106	19,356	20,581	21,903				
Pittsburgh district	390,908	357,851	295,741	250,128				
Shenango Valley	52,793	50,555	35,430	8,649				
Western Penna.	56,593	67,432	61,742	60,073				
Maryland, Virginia and Kentucky	18,917	14,754	15,827	16,046				
Wheeling district	72,660	44,966	36,520	18,706				
Mahoning Valley	188,391	165,562	157,512	125,705				
Central and Northern Ohio	167,307	156,767	140,914	110,327				
Southern Ohio	15,534	13,893	14,485	8,200				
Illinois and Indiana	299,186	252,566	229,009	171,380				
Atch., Minn., Mo., Wis., Colo. and Wash.	37,149	20,059	11,940	14,641				
Alabama	117,886	108,125	99,948	73,739				
Tennessee	1,064	1,665	990	none				
Total	1,640,997	1,415,481	1,246,676	985,529				

Diagram of Pig Iron Production and Prices

The fluctuations in pig iron production from 1913 to the present time are shown in the accompanying chart. The figures represented by the heavy line are those of daily average production by months of coke and anthracite iron. The dotted curve on the chart represents monthly average prices of Southern No. 2 foundry pig iron at Cincinnati, local No. 2 foundry iron at furnaces in Chicago, and No. 2X at Philadelphia. They are based on the weekly quotations of THE IRON AGE.

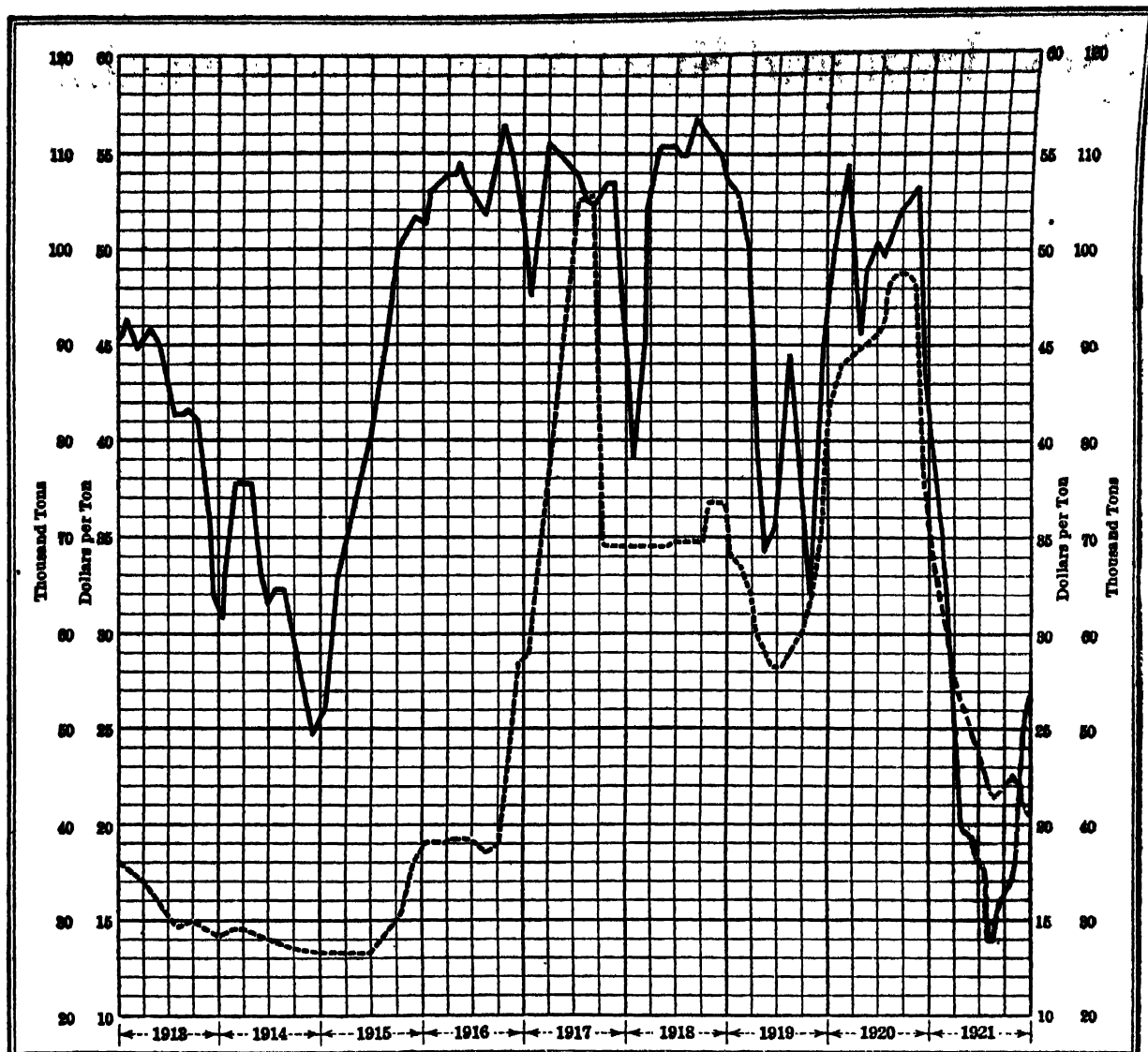
Production of Coke and Anthracite Pig Iron in the United States by Months, Beginning Jan. 1, 1917—Gross Tons

	1917		1918		1919		1920		1921	
	1917	1918	1918	1919	1919	1920	1920	1921	1921	1921
Jan.	3,150,938	2,411,768	3,802,269	3,015,181	2,416,292					
Feb.	2,656,247	2,319,299	2,940,168	2,978,879	1,987,257					
Mar.	3,251,352	3,213,091	3,090,243	3,376,907	1,595,522					
Apr.	3,384,960	3,288,211	2,478,218	2,789,797	1,193,041					
May	3,417,840	3,446,412	2,108,066	2,986,682	1,221,221					
June	3,270,055	3,323,791	2,114,863	3,048,540	1,064,883					
July	3,342,438	3,420,988	2,428,541	3,067,043	864,555					
Aug.	3,247,947	3,389,585	2,743,388	3,147,402	954,193					
Sept.	3,138,954	3,418,270	2,487,965	3,129,828	985,529					
Oct.	3,303,038	3,486,941	1,868,558	3,292,597	1,246,076					
Nov.	3,205,794	3,354,074	2,392,450	2,984,908	1,415,481					
Dec.	2,882,918	3,433,617	2,633,268	2,703,855	1,649,086					

Ttl. yr. *38,185,981 38,508,047 30,582,878 36,414,114 16,543,686

*These totals do not include charcoal pig iron. The 1920 production of this iron was 323,396 tons.

The Kelly Nail & Iron Co. reports that its Sarah furnace at Ironton, Ohio, will blow in the first week in January.



The Full Line Represents the Daily Production of Pig Iron and the Dotted Line Is the Average of the Price Per Ton of No. 2 Southern Pig Iron at Cincinnati, Local No. 2 Iron at Chicago and No. 2X Iron at Philadelphia

WILL DELAY TARIFF BILL

Probable Effect of Death of Senator Penrose— Senator McCumber Will Be Chairman

Washington, Jan. 3.—The death of Senator Penrose of Pennsylvania, chairman of Committee on Finance, is not expected to change plans for preparing the tariff bill nor will it be likely to change the policy as to the system of valuation for imposing duties or prospective rates. Senator McCumber of North Dakota, who will succeed to the chairmanship, is in sympathy with the protective policy of Senator Penrose and, if anything, is more of a protectionist with respect to agricultural products than the late senator from Pennsylvania was. One important result of the death of Senator Penrose is to swing the powerful position of chairmanship of the committee from a senator from an industrial State of the East to one from an agricultural State of the West.

Coming from Pennsylvania, Senator Penrose undoubtedly showed more interest in and understanding of the steel schedule than has been manifested by Senator McCumber, but it is believed the latter is largely in accord with the views of Senator Penrose toward the schedule. Senator McCumber plainly is of the opinion that manufactured products require fair protection but that the same is also true of agricultural products. In this connection, it is recalled that the late

Senator Penrose during hearings on the steel schedule declared that the requests for protection made by steel producers were more modest than those of any other interest.

It is a source of interest as to whether the vacancy in the committee will be filled by a senator from an industrial State or one from an agricultural section. The death of Senator Penrose may have the effect of further delaying passage of the tariff bill, for it is well recognized that his remarkable ability and strong personality were being relied upon to aid in getting the bill through the Senate as quickly as possible.

COMING MEETINGS

January

American Engineering Council. Jan. 5 and 6. Meeting at Cosmos Club, Washington. Secretary, L. W. Wallace, Washington.

February

American Boiler Manufacturers' Association. Feb. 13. One-day winter meeting. Fort Pitt Hotel, Pittsburgh. Secretary, H. N. Covell, 181 Dikeman Street, Brooklyn, N. Y.

American Institute of Mining and Metallurgical Engineers. Feb. 20-25. Spring meeting. Engineering Societies Building, New York. Secretary, Frederick F. Sharpless, 29 West Thirty-ninth Street, New York.

New Iron and Steel Works Construction

Open Hearth Capacity, Completed or Projected, Smallest in Years—Blast Furnace Additions Less Than in 27 Years

NEW low records, both in open-hearth and blast furnace capacity completed and in new capacity under construction as the year ended, were made in 1921. Because of the year's severe depression, as well as the large war-time additions to the country's producing capacity, expansion was not to be thought of, and only a part of the work under way early last year was finished. This is true of both open-hearth and blast furnace construction.

In blast furnaces it is necessary to go back at least 27 years to find any parallel, while in open-hearth building the capacity completed and projected is not only less than that of a year ago but is much smaller than anything recorded in over 10 years.

The high record for new capacity completed was in 1917—97 open-hearth furnaces having an estimated output of 4,326,500 gross tons per year. In new capacity projected and under way the record was 72 furnaces in 1916, representing a capacity of 4,515,000 tons per year. In pig iron the maximum records were 14 furnaces completed in 1917 and 25 new furnaces under way in 1916.

New Open-Hearth Capacity in 1921

In 1921 the new open-hearth capacity completed amounted to only 247,500 gross tons. This compares with 675,000 tons added in 1920 and with 625,000 tons added in 1919—the leanest years at that time in many. The summary below shows 8 open-hearth furnaces completed in 1921 as compared with 20 in 1920 and 9 in 1919. The 1921 additions in the form of a table follows:

	No. of Furnaces	Annual Capacity Gross Tons
Independent Companies	8	247,500
United States Steel Corporation ...	0
Total	8	247,500*

*Includes Bessener plant (one 15-ton converter and a 600-ton mixer) of the Steel & Tube Co. of America at Indiana Harbor, Ind.

The additions to open-hearth capacity in 1921 were the following:

Kansas City Bolt & Nut Co., Kansas City, Mo., one 50-ton furnace; Follansbee Brothers Co., Toronto, Ohio, four 40-ton furnaces; National Steel Foundries, Milwaukee, Wis., two 25-ton furnaces and Adirondack Steel Foundries, one 25-ton furnace. The Central Iron & Steel Co., Harrisburg, Pa., enlarged one 50-ton to a 90-ton furnace last year.

The United States Steel Corporation made no additions to its open-hearth capacity at any of its plants last year. This was also true of 1920.

Open-Hearth Construction for 1922

Open-hearth furnaces under construction, most of which will probably be completed in 1922, number 6, which compare with 15 projected in 1921 and with 22 in 1920. In 1916 there were 91 furnaces projected but their estimated capacity of 4,265,000 tons per year was less than that of the 72 projected for 1917. The total estimated capacity of the furnaces projected for completion in 1922 is only 217,500 gross tons. This compares with 430,000 tons planned for 1921, with 875,000 tons for 1920 and with 1,130,000 tons for 1919.

New installations contemplated for 1922 are as follows:

Mansfield Sheet & Tin Plate Co., Mansfield, Ohio, four 75-ton furnaces; Kansas City Bolt & Nut Co., one 50-ton furnace and Ohio Steel Foundry, Lima, Ohio, one 25-ton furnace. The Central Iron & Steel Co., Harrisburg, Pa., plans to enlarge one 40-ton to a 90-ton furnace this year.

The United States Steel Corporation makes no mention in its report of any additions to its melting capacity in 1922.

Expressed in the form of a table the proposed new open-hearth capacity is as follows:

	No. of Furnaces	Annual Capacity Gross Tons
Independent Companies	6	217,500
United States Steel Corporation ...	0
Total	6	217,500

New Blast Furnace Construction

The record of additions to pig iron making capacity, exclusive of charcoal furnaces, is the smallest since 1914. Last year only one furnace was completed and it has not yet been blown in; in 1914 also only one furnace was completed. In 1920, there were 6 furnaces completed but in 1919 only 2. In 1918 the records show 8 furnaces completed and in 1917 there were 14. The one furnace completed last year represents a capacity of 180,000 gross tons of pig iron per year.

For 1922 our statistics show that there are two furnaces under construction for probable completion this year. These represent an estimated new capacity of 310,000 tons per year.

In the annual review issue of THE IRON AGE, Jan. 7, 1915, it was stated that new pig iron making capacity, completed and projected, was the smallest in 20 years. At that time only one furnace had been completed the year under review and there were three furnaces projected. With only one furnace completed in 1921 and two under way for completion in 1922, the present status of expansion is the smallest in 27 years.

The following table gives the details of new blast furnaces completed in 1921 and at present under construction:

Company	Completed in 1921	Under Construction or Projected
Trumbull Cliffs Furnace Co., Warren, Ohio	1	.
E. W. Mudge & Co. (Claire No. 1), Sharpsville, Pa. ....	.	1
Hamilton Furnace Co., Hamilton, Ohio .....	.	1
Total	1	2

Several companies rebuilt or are rebuilding their furnaces or plan to do so which will add materially to their capacity and efficiency. The new furnace of the Hamilton Furnace Co. and of E. W. Mudge Co., while replacing old furnaces, are being erected on new foundations.

The Steel Corporation

New construction completed during 1921 and that under way as of Jan. 1, 1922, by subsidiary manufacturing companies of United States Steel Corporation, is as follows:

Carnegie Steel Co.

Completed

Edgar Thomson Works: Additions to crane facilities in Nos. 2 and 3 foundries and foundry roll and machine shop; facilities and equipment for repairing plant locomotives; additional 1000-k.w. motor generator set in power house, and replacement of condenser air pumps in blast furnaces and No. 1 mill engine rooms.

Duquesne Works: Improved slag handling method at blast furnace No. 6.

Homestead Works: Six 125-ton pouring cranes at open-

hearth plant No. 8; hydraulic pumps and pressure system at 32-in. slabbing mill to serve the 32-in., 72-in., 84-in. and 140-in. mills and open-hearth plants Nos. 1 and 2; rebuilding two 5-hole banks of pit furnaces and installing transfer car at 32-in. slabbing mill and motor drive for 33-in. finishing mill.

Carrie Furnaces: Five 40-ton hot metal ladles and cars and six cinder ladles and cars.

Schoen Steel Wheel Works: Additional wheel-finishing machinery.

Ohio Works: New boiler plant and reinforcing bin system at blast furnaces Nos. 1 to 4.

McDonald Mills: 18-in. band mill and 10-in. hoop mill.

New Castle Works: Dry gas cleaner for blast furnace No. 1.

Farrell Works: Reconstruction of blast furnace No. 2 and electric handling equipment for cinder and refuse on pouring side of open-hearth department.

Clairton Works: Equipping six blooming mill boilers to burn coke breeze; twenty flat cars for open-hearth department and two additional primary coolers at by-product coke plant.

Under Way

Edgar Thomson Works: Six roll lathes for roll shop and a Greenawalt sintering plant No. 2 at briquetting plant.

Duquesne Works: Reconstruction of blast furnace No. 3 and stock yard.

Homestead Works: Tar burning system for open-hearth plant No. 3.

Carrie Furnaces: Increasing height of blast furnace No. 5.

Ohio Works: Reconstruction of three open-hearth furnaces.

Mingo Works: Three new hot blast stoves at blast furnace No. 2 and dry gas cleaner for blast furnace No. 3.

Illinois Steel Co.

Completed

South Works: Three waste heat boilers at No. 3 duplexing open-hearth plant.

Gary Works: Enclosing billet and blooming mill chipping yards; 200-ft. extension to electrical repair shop and additional equipment, and three coal unloading machines and enlarging unloading building at by-product coke plant.

Under Way

South Works: Gas engine driven electric power station.

Joliet Works: Rebuilding four batteries of ovens and re-generator walls at by-product coke plant.

Milwaukee Works: Extending building and crane runway at 9-in. merchant mill No. 2.

Gary Works: 12-in. and 20-in. strip mills.

Universal Portland Cement Co.

Completed

Buffington, Ind.: Additional kiln unit in burner building at mill No. 6.

Universal, Pa.: Coal drying and pulverizing plant; dust collecting system on kiln and dryer stacks and raw material building and dwelling houses and recreation center for employees.

Under Way

Buffington, Ind.: Dust collecting system in raw material building at mill No. 6 and water filtering and softening plant to serve mills Nos. 3, 4 and 6.

Universal, Pa.: Increasing raw material grinding capacity and clinker storage.

Minnesota Steel Co.

Completed

Duluth Works: Additions to 28-in. rail mill and extending ore, coal and stone storage yard.

Under Way

Duluth Works: Rod and wire mill and townsite extension and additional dwellings for employees.

Lorain Steel Co.

Completed

Johnstown Works: Extensions to iron and steel foundries buildings and new pattern storage building.

Under Way

Johnstown Works: Electric steel foundry with 4-ton electric furnace.

National Tube Co.

Completed

Lorain Works: two lap weld mills, additional coupling shop machinery and extension to machine shop; extending

blacksmith shop building and installing 1000-ton hydraulic forging press and 15-ton electric overhead traveling crane; stoker equipment for six boilers in by-product coke plant boiler house.

National Works: Ore thawing house at blast furnaces.

Continental Works: Equipment for making couplings, ½-in. and ¾-in. sizes.

Ellwood Works: Equipment for forming automobile axles, torque tubes, etc.

Under Way

Lorain Works: Rebuilding blast furnace No. 4; additions at slag crushing plant, and modernizing coupling finishing machinery.

National Works: Rebuilding blast furnace No. 2; remodeling pig casting machine.

Christy Park Works: Extensions to "horn" welding department to increase capacity.

American Steel & Wire Co.

Completed

Cuyahoga Works: Facilities for handling and storing hot rolled flats at Nos. 1 and 3 strip mills; patenting furnace and equipment for spring wire.

Newburgh Steel Works: New water cooling towers at reservoir.

Central Furnaces: Additions to slag crushing plant.

H. P. Works: New boiler plant.

Waukegan Works: New boiler plant.

Scott Street Works: Water filtration plant.

Braddock Works: Four additional annealing furnaces.

Worcester, North Works: Additional electro-galvanizing equipment.

Under Way

Cuyahoga Works: New machine and electric repair shop buildings with equipment and additional storehouse facilities.

American Works: Additional pot annealing facilities.

Salem Works: Twenty double blow roofing nail machines.

Braddock Works: Additional cleaning house facilities and rearranging equipment.

Trenton Works: Extension to rope shop and equipment to manufacture special rope for export.

Worcester, North Works: Continuous cold rolling equipment for flat wire.

Worcester, Electrical Cable Works: Extension to building, additional equipment and rearranging old facilities to modernize plant and to increase capacity of electrical cable department.

Donora Steel Works: Improved cinder handling facilities in open-hearth department.

Donora Wire Works: Building and equipment to manufacture electric-welded concrete reinforcement.

American Sheet & Tin Plate Co.

Completed

Gary Works: Motor drive for finishing stand at No. 2 plate mill.

American Works: Three 685 w.t. boilers with stokers and auxiliary facilities.

Laughlin Works: New hot mill engine and drive.

Chester Works: Rebuilding hot mill furnaces Nos. 1 to 5 and equipping furnaces Nos. 1 to 8 with stoker equipment.

Under Way

Vandergrift Works: New pickling and galvanizing department buildings and equipment; new engines and drives for mills Nos. 1, and 2 and new furnaces for 8 hot mills.

American Bridge Co.

Completed

Pencoyd Works: Additional generating capacity for electric power.

Under Way

Pencoyd Works: New cranes and crane runway over charging floor and pouring side in open-hearth department.

Tennessee Coal, Iron & Railroad Co.

Completed

Ensley Works: Dry gas cleaner for blast furnace No. 3.

Fairfield Works: Additions to finishing end at bar and structural and plate mills and tie plate finishing department.

Pratt Mines: Opening and equipping No. 18 mine—Hamilton slope.

Under Way

Ensley Works: Rebuilding blast furnace No. 1 and 5000-kw. frequency changer at No. 1 power house.

Federal Shipbuilding Co.

Completed

10,000-ton capacity floating dry dock and auxiliary facilities.

Bethlehem Steel Corporation

The subsidiary companies of the Bethlehem Steel Corporation report the following improvements and additions completed in 1921 and under way at the close of the year at their various plants:

Bethlehem Plant, Bethlehem, Pa.

Completed in 1921: Ore and limestone bins and trestles for open hearth No. 2; converting machine shop No. 5 to a fabricating shop for light sections; machine for cutting herring bone gears; new gas blowers for exhaust house at coke plant.

Under Way: Centrifugal casting machine for brass foundry; extension to 28-in. billet mill building.

Steelton Plant, Steelton, Pa.

Completed in 1921: Generator set in power house; crane run-way for steam blowing engine building; service building at steel foundry.

Under Way: Fitting 35-in. mill manipulators with electric drive; installation of 6-ton electric furnace at steel foundry.

Lebanon Plant, Lebanon, Pa.

Completed in 1921: 300 kw motor generator set; additions and improvements at boiler house, one 10,000 kw. turbogenerator for power station; two roll turning lathes; factory warehouse and finishing department; one spike machine, seven drag furnaces, 15 automatic bolt threading machines; two machines for nut shop; two over-fired heat treating furnaces.

Under Way: Improvements and extensions to concentrating and sintering plant; cooper shop and galvanizing department; remodeling old nut warehouse building for store-room purposes; wire treating and pickling department; one special knuckle press for hexagon nuts; two thread rollers.

Maryland Plant, Sparrow's Point, Md.

Completed in 1921: One hundred houses and 100 bungalow type dwellings; aeration equipment for town water supply; five gas driven electric generators; extension to ore unloader; gas compressor and motor; 200 ft. extension to billet and sheet bar storage run-way at 40-in. blooming mill; dispensary and employment office at sheet and tin plate plant; stretcher leveler for sheet mills.

Under Way: Concrete anchorage and ties at coal handling dock; seven gas driven blowing engines; tracks at cinder dump; coal crusher for No. 2 open-hearth gas producers; coal crusher for 40-in. blooming mill gas producer; one roller leveler for sheet and tin plate mill.

Mining and Other Operations

The Bethlehem Chile Iron Mines Co., Chile, completed in 1921: Parts for electric power equipment; one light house complete and a new ore crusher and has under way improvements to basin dock and electric railroad.

The Bethlehem Cuba Iron Mines Co., Cuba, completed in 1921: Village improvements; equipment for power plant; one hundred ore cars; one 50-ton electric driven transfer car; one lighter; coal drying and pulverizing plant; concrete sub-structure for gantry run-way; aerial tramway; screening, recrushing and hoisting plant for ore at La Playa.

The Cornwall Ore Banks Co., Cornwall, Pa., completed in 1921: Plant for shaft sinking; one 300-ton electric revolving shovel and new railroad track for stripping and has under way equipment for open cut mining and one centrifugal pump.

Of the coal properties, the Preston Division, West Va., completed in 1921, houses and land for town; additional locomotives, pumps, mine cars and mining machinery; transmission line and feed wire for direct current, and has under way substation and motor barn; thirty 3-ton mine cars; additional tracks and trolley facilities for all mines; one 300 kw. power unit at mines Nos. 21, 24 and 27 and transmission line.

At the Marion Division, West Va., there was completed in 1921 twenty houses and community improvements at mine No. 41; fans and steam engine and motor at mine No. 11; and has under way one 15-ton locomotive at mine No. 41; 30 houses and locomotives, mine cars and pumps at mine No. 42.

At the Hellwood Division, Hellwood, Pa., there was completed in 1921 improvements to mine tipples at mine No. 6;

new mining equipment and tenement houses at mine No. 9; water barns and fire house at all mines; pumps, hoists and mining machines at all mines, and has under way additional mining machinery and transmission lines.

For ocean transportation, the corporation has under way: Three steel combination ore and oil steamers and two steel combination ore and coal steamers of about 20,000 dead weight tons each.

Midvale Steel & Ordnance Co.

The following work has been completed during the past year at the different plants of the Midvale Steel & Ordnance Co.:

Cambria Steel Co., Johnstown, Pa.: Coaling station for yard locomotives, 800-ton per day plant for sintering fine dust; hot metal ladles, trucks and tilting rigs at pig casting plant, also changes at Bessemer plant; two ore bridges for Hinckton Run ore yard; 51 gas producers, entire new equipment of gas valves, ore and limestone bins and sewer system for Franklin open-hearth department; retaining wall from Nos. 10 and 11 blast furnaces to Franklin open-hearth metal mixer; charging machine for Franklin open-hearth; four soaking pit furnaces at Franklin 40-in. blooming mill; eleven 60-in. Sellers turning machines for wheel plant; tube system for tests at Franklin open-hearth; relining stoves on No. 9 blast furnace; coke handling and conveying systems at Nos. 7, 8, 9, 10 and 11 blast furnaces; three 12,000-gal. quenching tanks, together with circulating pumps for Franklin coke plant; plant for the manufacture of the Henggi anti-rail creepers; new motor drives for 8-in. No. 3 and 9-in. No. 1 merchant mill.

Nicetown Works: Alteration of the No. 1 tire mill for rolling large rings, rearrangement and improvement to 8-in. and 12-in. rolling mill equipment and extension to the press plant building, 160 ft. by 172 ft.

Coatesville Works: A 22-in. skelp mill for the tube plant; electric worm driven screw down No. 2 plate mill and 10 steel gondola cars.

Union Coal & Coke Co.: Link belt rotary dumps for Hazelkirk mine; electrification of Hazelkirk and Acme mines; new hoists for Acme mine; two new pumps for Hazelkirk mine; re-install filtration plant at Marianna and the purchase of additional coal lands.

New work under construction for completion in 1922 is as follows:

Cambria Steel Co.: 148 coke ovens complete with by-product and light oil recovering apparatus and by-product plant for present coke ovens, together with benzol plant for all coke ovens; three hot stoves at No. 5 blast furnace; 16-in. water line from Gaultier to Franklin plant; two dry gas cleaners for Nos. 5 and 6 blast furnaces; relining No. 6 blast furnace; motor-driven shear at 14-in. mill; 8000-hp. modern boiler installation for Franklin plant; ore and limestone bins for blast furnaces Nos. 7, 8 and 9; replacement of entire Franklin open-hearth roof; extension of car shop to increase output of standard cars, and also for the manufacture of tank cars; toilets and lavatories at Nos. 7, 8 and 9 blast furnaces; relining Nos. 7 and 8 blast furnaces and three stoves; two wheel facing machines for wheel plant; replacing walls and roof of washery building at Franklin coke plant; new ore bridge at Franklin blast furnaces; fifth soaking pit furnace at Franklin 40-in. blooming mill; further electrification of rolling mill mine; rotary screen conveyor and bins at Carlinn quarries; 300 steel mine cars for rolling mill mine; completing Nos. 5 and 6 mines at Rosedale; town-site and 89 houses adjoining Johnstown City; toilets, lavatory and locker facilities for Cambria plant and steel car department.

Coatesville Works: Waste heat boilers for open-hearth department; two coal-fired heating furnaces with waste heat boilers; roll lifting cylinder for No. 3 plate mill; low pressure water system at tube mill; coke dust screening and loading equipment at blast furnace; relining of No. 1 blast furnace; extension to scrap yard crane runway at tube mill and extension of three bays skelp mill yard.

Union Coal & Coke Co.: Development of new mine near Marianna; link belt rotary dump, new fan and mechanical screening arrangements at Acme mine.

Kansas City Bolt & Nut Co.

The Kansas City Bolt & Nut Co., Kansas City, Mo., reports that at the Sheffield steel mills the new steel plant addition was expected to be in complete operation before the end of 1921. Construction was started in August, 1919, and one 50-ton oil fired open-hearth furnace was lighted in October, 1920. The second furnace was completed and lighted in the spring of this year. Foundations are in for the third furnace, which will

mean an annual production of ingots amounting to 120,000 tons.

The 24-in. breaking down mill, reducing 10-in. x 10-in. ingots to billets, started in January, 1921, and has run continuously 8 hr. per day. At present only the first stand of this mill is operating. Three additional stands for finishing merchant bars and structural shapes have been installed, but the cooling bed has not been completed. A continuous heating furnace serving this mill is also oil-fired.

The finishing mills have just been completed. Billets are conveyed automatically from the 24-in. mill to a reheating furnace; from this furnace they enter a four-stand 12-in. Morgan continuous roughing mill, thence to a five-stand 10-in. merchant mill equipped with repeaters, and sizes 9/16 in. round and lighter will be repeated to a two-stand 8-in. Morgan high-speed finishing mill. Finished bars will be delivered from the 10-in. or 8-in. mill to an automatic cooling bed and conveyed from there to the shears and shipping department. These mills are all electrically driven and all buildings are equipped with overhead cranes.

This plant is separate from but operated in conjunction with the iron mills and bolt and nut department. The annual tonnage of finished product will depend largely on the degree of refinement, but will be approximately as follows: Merchant bars, concrete reinforcing bars and forging billets, 75,000 tons. The remainder will be made up of machine bolts and nuts; heat-treated track bolts and spikes; pull and sucker rods for the oil fields; special car forgings and galvanized pole line hardware.

In 1922 the cooling bed for the finishing end of the 24-in. mill will be completed, which will produce angles, channels and I-beams, and should the demand increase, space has been provided for two additional 50-ton open-hearth furnaces, making a total of five furnaces.

Inland Steel Co.

The Inland Steel Co., Chicago, practically completed in 1921 the following changes and additions:

250-ton powdered coal plant;
Railroad splice bar department;
Finishing department for 28-in. structural mill material, including three 10-ton and two 15-ton cranes;
Calcining plant for No. 1 (Old open hearth plant);
Completion of changes in plate mill to 100 in. wide rolls, and additional housings, making a tandem mill and nearly doubling its capacity;
2 plate mill heating furnaces;
7 boilers, aggregating 7000 hp;
Additional cranes and shears for sheet mill operations.

For 1922 no new construction is planned except rail finishing, details of which have been already published. Although no additions have been made to the blast furnace or open-hearth capacity, the company states that the output of finished products will show an increase of about 33 1/3 per cent.

Worth Steel Co.

The Worth Steel Co., Claymont, Delaware, in August, 1921, put in operation its No. 2 plate mill having rolls 42 in. x 120 in. This new mill, together with the company's No. 1 mill, enables it to produce a complete line of plate sizes from 3/4 in. in thickness up to 4 in. or heavier and all widths up to 150 in. In January, 1921, the company lighted its No. 6 soaking pit and its No. 7 soaking pit in October, having previously started its No. 5 soaking pit in December, 1920. Pit No. 8 is practically finished and can be made ready to light at any time this year when business will warrant it. Stacks are also in position for No.'s 9 and 10 soaking pits and for No.'s 5, 6 and 7 open-hearth furnaces. These latter additions to the plant can be finished at any time when required within two or three months.

The first unit of the new Worth plant was completed and put in operation late in August and early in September, 1918, and consisted of one 3-high train of rolls 44 in. x 160 in., served by 4 soaking pits and also a steel plant having three 100-ton open-hearth furnaces and in 1920 the company enlarged its open-

hearth building so that it could install additional furnaces to double the original capacity; it also added to its rolling mill buildings so as to take care of No. 2 mill which was being built in 1920. Open-hearth furnace No. 4 was finished and lighted in July, 1920. The company also started building in 1920 an up-to-date flanging department which was put in operation in April, 1921.

Central Iron & Steel Co.

The Central Iron & Steel Co., Harrisburg, Pa., in 1921 rebuilt one open-hearth furnace, increasing its capacity from 50 to 90 tons. The open-hearth department now consists of one 50-ton and four 90-ton furnaces and work is in progress to enlarge the sixth furnace to 90-ton capacity.

Installations have also been completed for soda ash treatment of boiler water to a capacity of 600,000 gal. per 24 hr.

Central Steel Co.

The Central Steel Co., Massillon, Ohio, last year completed the erection of a 12-in. and an 18-in. merchant bar mill having a combined capacity of 18,000 tons per month. This company added a new finishing mill building, a new annealing department, pickling house and store room to its Massillon rolling mill plant. The sheet capacity of this unit was increased to 60,000 tons. To its National Pressed Steel plant it added a warehouse and an addition to the steel lumber mill building. A new mill for the cold rolling of steel lumber sections was installed and also a new furnace for heating slabs for the hot strip mill. The company's hot rolled strip steel capacity was increased to 90,000 tons per year, and its steel lumber capacity to 60,000 tons per year. A metal lath department was also added for the manufacture of diamond mesh lath.

Ashtabula Steel Co.

The Ashtabula Steel Co., Ashtabula, Ohio, which began the erection of a steel plant during 1920, slowed down on construction work last year because of general business conditions, but this plant is approaching completion. The company, however, does not expect to begin operations before late in the Spring. The plant will have 5 roughing stands, 8 sheet mills and 2 stands of cold rolls, all driven by a 1600-hp. engine, 8 combination sheet and pair furnaces, 6 sets of shears, a double continuous annealing furnace, 2 galvanizing pots and a corrugating machine. Powdered coal will be used exclusively for firing the boilers and furnaces.

Otis Steel Co.

The Otis Steel Co., Cleveland, last year completed and placed in operation a new sheet mill plant as a part of its Riverside Works. This plant contains 8 roughing and 8 finishing mills, 8 double sheet and 8 pair furnaces fired with powdered coal, 6 cold rolls, 2 pickling machines, 6 bar annealing furnaces and 1 galvanizing pot. The plant has an annual capacity of 60,000 tons of sheets in all finishes.

United Alloy Steel Corporation

The United Alloy Steel Corporation, Canton, Ohio, completed the installation and placed in operation, last year, a 12-in. 2-high continuous Morgan bar mill consisting of two 18-in. and four 16-in. roughing stands and 4 finishing stands. The equipment includes 2 Morgan gravity discharge heating furnaces and a double Morgan combination inclined gravity and horizontal type cooling bed. The mill is driven by a 3000-hp. adjustable speed motor. The rolling capacity of the mill is 120,000 tons per annum. It is designed particularly for alloy steel.

Mansfield Sheet & Tin Plate Co.

The Mansfield Sheet & Tin Plate Co., Mansfield, Ohio, has under construction four 80-ton open-hearth furnaces, a 32-in. three-high blooming mill and a 24-in. sheet bar mill which are expected to be ready for operation early this year.

Trumbull Steel Co.

The Trumbull Steel Co., Warren, Ohio, last year increased the capacity of its strip steel department by the completion of a 9-in. strip mill which was placed in operation about May 1 and is erecting a 14-in. strip mill which will be ready for operation in the Spring.

Republic Iron & Steel Co.

The Republic Iron & Steel Co., Youngstown, Ohio, completed and put in operation in 1921 the eight new sheet mills which it built at Niles, Ohio. This is the only new capacity added last year and there are no plans for additional new capacity for 1922.

John A. Roebling's Sons Co.

John A. Roebling's Sons Co., Trenton, N. J., in 1921 added to its equipment new wire rope making machinery as required to properly balance methods of manufacture, increased rope wire drawing capacity and equipment to reduce cost of handling materials. The company has under construction a new shop for the electro-galvanizing of wire which will materially increase present capacity and which is expected to be in operation early this year.

Follansbee Brothers Co.

Follansbee Brothers Co., Pittsburgh, will have ready for operation early in January its new mill at Toronto, Ohio, built especially for the manufacture of sheet steel. This plant will have four 40-ton open-hearth furnaces and 10 hot mills, with the necessary cold rolling and finishing departments.

Utah Steel Corporation

The Utah Steel Corporation in 1921 installed a continuous billet heating furnace, designed by Arthur G. McKee & Co., replacing two coal-fired, hand-operated, 4-door heating furnaces. The new furnace is equipped to burn either producer gas or oil. It also installed a 5-ton Barber-Foster overhead traveling crane to serve this furnace from the billet dock. Also there was installed a large oil storage tank, oil-burning equipment for open-hearth furnaces, as well as for the ingot and billet heating furnaces. It is now possible to use either fuel oil or producer gas as may be most economical at the time.

"This year," says the company, "we increased our capitalization to \$5,000,000 and are now financing for the construction of a 400-ton blast furnace, the installation of sheet mills and a galvanizing department, with capacity for the manufacture of 50,000 tons per annum of blue annealed, black and galvanized sheets and light plate. We expect to start construction work on both the sheet mills and the blast furnace early in the spring. Our construction program also contemplates the addition of three stands of rolls to our present 22-in. mill, and the installation of a 1500-hp. motor to drive it in place of the present steam engine drive. This mill will be used for the manufacture of sheet bar as well as finished bar products."

Gulf States Steel Co.

The Gulf States Steel Co., Birmingham, Ala., in 1921 completed the installation of two 2000-kw. alternating current, low-pressure turbogenerating units, driven by the exhaust steam from the company's rod mill engines. During 1921 the company has also completed the slope at its Shannon ore mine, together with all outside and inside equipment, and its mine is now in regular operation producing all the ore necessary for the company's blast furnace.

Universal Steel Co.

The Universal Steel Co., Bridgeville, Pa., is installing and expects to have ready for operation early in 1922 the following equipment:

- One—1000-ton high-speed forging press and boiler plant equipment.
- One—5-stand 14-in. 3-high bar mill.
- One—5-stand 10-in. 3-high guide mill.
- One—3-stand 8-in. 3-high guide mill.

The above mills are to be complete, with all accessories and motors to drive them. A complete and modern laboratory building is also under erection as well as a new pumping and filtering plant to serve the foregoing new equipment.

Apollo Steel Co.

The Apollo Steel Co., Apollo, Pa., completed in 1921 the construction of four sheet mills and two 2-high jobbing mills, during the latter part of the year. These new mills will be put into operation as soon as market conditions justify.

Harrisburg Pipe & Pipe Bending Co.

The Harrisburg Pipe & Pipe Bending Co., Harrisburg, Pa., has under construction a new 10-in. guide mill which will be completed about Jan. 15. It is designed to roll rounds, flats, squares and shapes of both ordinary carbon and alloy steels.

Heppenstall Forge & Knife Co.

The Heppenstall Forge & Knife Co., Pittsburgh, Pa., completed in 1921 the installation of oil storage tanks of approximately 200,000-gal. capacity and remodeled 15 heating furnaces in its forging department, changing the fuel from coal to oil.

At its Bridgeport, Conn., plant it is now remodeling four furnaces, changing the fuel from coal to oil, and has installed oil storage capacity of 50,000 gal.

Other Steel Works Additions

The National Enameling & Stamping Co., Granite City, Ill., in 1921 completed the installation of a 24-in. bar mill for sheet bars, having a capacity of 1200 tons per day.

The Judson Mfg. Co., Emeryville, Cal., in 1921 installed continuous furnaces and long hot beds and plans in 1922 to install double-end oil furnaces. It is expected that the annual rolling mill production of the company for 1922 will be about 90,000 tons.

The Adamson Machine Co., Akron, Ohio, in 1921 completed an extension to its power house having a floor area of approximately 1000 sq. ft.

The Washburn Wire Co., Phillipsdale, R. I., had under way the modernizing of its blooming mill.

The West Leechburg Steel Co., Pittsburgh, Pa., expects to install in 1922 a new 16-in. electrically driven continuous strip mill together with the necessary auxiliary equipment, including pickling department and warehouse.

The Jones & Laughlin Steel Co., Pittsburgh, at its Soho Works installed in 1921 a 32-in. universal mill, furnished by the Mackintosh-Hemphill Co.

NEW ROLLING MILL WORK *

Installations of new rolling mill capacity during 1921 and that planned for 1922 are as follows:

Calumet Steel Co.

The Calumet Steel Co., Chicago Heights, Ill., placed in operation in 1921 new motor driving equipment for its mills. Its two 14-in. mills are operated by two 1000-hp. variable speed, Kraemer type motors installed by the Westinghouse Electric & Mfg. Co. Its 8-in. mill has been equipped with 500 hp. constant speed motor.

Eddystone Steel Co.

The Eddystone Steel Co., Crum Lynne, Pa., added to its plant during 1921 the following:

A 60-in. 3-high plate mill, for rolling plates up to 50 in. wide and down to No. 16 gage.

A continuous blue annealing furnace, for production of blue annealed steel sheets from No. 8 gage down to No. 16 gage and up to as wide as 48 in.

It is planned to install a 72-in. 3-high plate mill during 1922, or as soon as business conditions revive.

These two mills will give the company a capacity of about 25,000 tons of open-hearth steel plates and blue annealed steel sheets per year.

Hudson City Steel Corporation

The Hudson City Steel Corporation, with offices in the Woolworth Building, New York, expects to build in 1922 a new cold rolled strip mill near Beacon, N. Y. This will consist of:

Ten mills in the form of two tandems or four mills each 10 in. x 12 in. and 12 in. x 14 in. respectively.

Two finishing mills, 10 in. x 12 in. and 12 in. x 14 in. respectively.

Two slitters and two straight and cut machines.

Two electric annealing furnaces and necessary equipment required for the annealing and pickling departments, together with necessary equipment for machine shop and blacksmith shop.

Indiana Rolling Mill Co.

The Indiana Rolling Mill Co., New Castle, Ind., in 1921 completed the installation of a new 28-in. sheet mill of three stands; in connection with this there was also installed a new Corliss engine and a new furnace for re-heating slabs. A new office building, two stories, with a basement, is also nearing completion.

Electric Steel & Forge Co.

The Electric Steel & Forge Co., Cleveland, last year completed and placed in operation a 12-in. rolling mill for the manufacture of hot rolled tool steel and special alloy and carbon steel bars and billets. The equipment includes three oil-fired heating furnaces.

Other New Rolling Mill Work

The Parkesburg Iron Co., Parkesburg, Pa., in 1921 besides making thorough repairs replaced five boilers with new ones in its power plant.

The Fort Dodge Culvert & Iron Mills Co., Fort Dodge, Iowa, expects to add in 1922, a 16-in. breakdown mill.

The Milwaukee Rolling Mill Co., Milwaukee, Wis., completed early in 1921, its new sheet plant which was fully described in THE IRON AGE, June 23, 1921.

The Empire Rolling Mill Co., Cleveland, last year installed a 1-pot galvanizing plant.

Additions to Foundries

The Pittsburgh Rolls Corporation, Pittsburgh, in 1921 completed a new roll shop, 295 x 65 ft., for the production of large size rolls. It is equipped with two 50-ton electric driven cranes as well as a number of new lathes and machinery which are also electrically driven. Fuel oil storage tanks, having a capacity of 250,000 gallons, have also been built.

The Ohio Steel Foundry Co., Lima, Ohio, last year put in two large sand handling units, consisting of reciprocating and belt conveyors with elevators and sand conditioning equipment, doubling the company's molding capacity. In 1922, the company expects to build an additional open-hearth furnace doubling the steel producing capacity.

The Adirondack Steel Foundries Corporation, Watervliet, N. Y., in 1921 completed the installation of a 25-ton open-hearth basic furnace.

The National Steel Foundries, Milwaukee, Wis., completed in 1921 the installation of two 252 ton tilting open-hearth furnaces. These, as well as features of the plant, were described in THE IRON AGE, Oct. 20, 1921.

Blast Furnace Work

The Trumbull Cliffs Furnace Co., Warren, Ohio, last year completed a 600-ton blast furnace which will supply pig iron for the Trumbull Steel Co., with which the furnace company is allied. The stack is 92 ft. high and 22 ft., 6 in. in diameter at the bosh. The plant includes a pig casting machine and combined ladle and pouring house. A description of this plant appeared in the Sept. 15, 1921, issue of THE IRON AGE.

The Hamilton Furnace Co., Hamilton, Ohio, has nearly completed a new 450-ton blast furnace for producing basic, malleable and foundry iron. Its dimensions are 90 ft. high with a bosh diameter of 20 ft. Its rated capacity is 175,000 tons per year.

E. W. Mudge & Co., Sharpsville, Pa., has under construction for completion in 1922 a 500-ton blast furnace to be known as Claire No. 1. It replaces, on a new foundation, the old smaller Claire furnace. It is 87 ft. high with a bosh diameter of 19.6 ft. The furnace was started in June, 1920, the old furnace operating 288 days of that year. This was dismantled in 1921 and some of the usable parts incorporated in the new furnace. The new furnace is completed all but lining and it is expected that this will be accomplished in 1922.

The United States Steel Corporation as well as the Bethlehem Steel Corporation and the Midvale Steel & Ordnance Co. are rebuilding several blast furnaces, in some cases increasing their capacity.

Blast furnace No. 2 of the LaBelle Iron Works of the Wheeling Steel Corporation, Steubenville, Ohio, was remodeled in 1921. The Martins Ferry furnace of the same corporation at Martins Ferry, Ohio, is being remodeled as is also the Standish furnace of the Chateaugay Ore & Iron Co., Standish, N. Y.

Puddlers' Wages Reduced

YOUNGSTOWN, OHIO, Jan. 3.—Average sales of bar iron shipped during the 60-day period preceding Dec. 20 by mid-Western independent mills affiliated with the Western Bar Iron Association were on a basis of 1.65c. per lb., as compared with a 1.70c. average two months earlier. This was disclosed at the bi-monthly examination of sales sheets to determine the puddling rate for the January-February period. Puddlers' rate will be reduced to \$8.22 for the first two months of the year, from \$8.43, the rate paid during November and December, while finishing hands will be cut two per cent, as a result of the settlement.

The new puddling rate compares with a peak in 1920 of \$18.76 per ton, paid when bar iron was selling at an average of 3.50c. per lb. During the year there has been a progressive decline at each bi-monthly settlement in the average bar iron price and consequently in the tonnage rates.

January-February shipments this year were on an average of 2.80c.; March-April, 2.55c.; May-June, 2.30c.; July-August, 1.85c.; September-October, 1.70c. and November-December, 1.65c. This averages 2.14c. per lb. for the year and current prices are therefore substantially below the average.

Settlement in the sheet and tin plate divisions will be conducted about Jan. 10. Wages in these divisions for November and December were based upon an average selling price of 2.75c. for Nos. 26, 27 and 28 gage black sheets, and \$5 for tin plate per base box, disclosed two months ago. In the meantime, there has been a definite decline in tin plate to \$4.75 per base box, shortly after the last examination, and tin mill workers will therefore receive a moderate reduction.

Foundrymen and Stove Molders Agree

After a conference lasting three weeks, representatives of the Stove Foundrymen's National Defense Association and the International Molders' Union of North America came to an agreement regarding the wages to be paid in the stove industry during the year 1922. The agreement provides that beginning Jan. 1, 1922, there will be a reduction of 10 per cent on all work, and in addition a 5 per cent reduction is to be made on board prices on some branches of furnace and steel and hot water work. The reduction on board prices on furnace, steel and hot water work was made to maintain a uniform percentage on all work in the shop. The minimum wage for day workers during 1922 will be the same as that effective during 1921; the rate being \$6 for eight hours work. No other changes were made in the conference agreement. The agreement was in the nature of a compromise, the Stove Foundrymen's Association demanding that where board prices had been arbitrarily raised since January, 1918, these prices be reduced to the 1918 board prices. In addition to this, the association demanded a 20 per cent reduction on stove plates and a 30 per cent reduction on furnaces, cores, hot water and all other work.

Iron and Steel Markets

NEW CAR ORDERS

More Than 25,000 Placed and Pending

December Pig Iron Output Beyond Expectations—Steel Prices Favor Buyers

The steel trade enters upon the new year in a spirit of qualified hopefulness. It expects 1922 to be better than 1921. The fact is emphasized that the country has been swept bare of steel and that consumers, having used up considerably more material in 1921 than the mills shipped them, now have the mills as their sole dependence. While capacity will continue well in excess of demand, a 60 per cent operation at some time in the new year is not considered too much to expect.

Nineteen twenty-one goes down in the records as a 38 per cent year in steel. Ingot production probably exceeded 19¼ million tons, against 40,881,000 tons in 1920.

The immediate future of demand and prices is not clear. Steel producers have ceased to predict large railroad buying, but as it amounted to only about 15 per cent of the total in 1920 and less than that percentage in 1921 they feel safe in counting on better things in 1922.

Chicago reports give encouragement as to car orders. About 25,000 freight cars are expected to be placed in that district early in the year, whereas for the whole country 1921 yielded only 20,000. The Burlington will probably close for 7300 cars this week and the Illinois Central will take early action on 2200. The Seaboard Air Line, besides buying 25 locomotives, has placed 2000 to 2500 cars with the Fairfield, Ala., plant. For the Norfolk & Western 4000 cars are under negotiation. The Union Pacific has increased its recent inquiry for 1500 freight cars to 5500.

Rail buying is not on the scale of a year ago. Upwards of 400,000 tons are under contract for 1922 and the Pennsylvania order is an early prospect.

After the holiday shutdowns of the larger steel companies operations are somewhat larger, the Steel Corporation running this week at somewhat more than 45 per cent. For independent companies the average is probably nearer one-third.

Holiday bankings of blast furnaces amounted to much less than was looked for. Production in December was 1,649,086 tons, or 53,196 tons per day, as compared with 1,415,481 tons in November, or 47,183 tons per day. The daily increase was about 6000 tons, or 13 per cent.

Six furnaces blew in last month and one blew out, the number active on Jan. 1 being 125, against 120 one month previous.

Pig iron sales have been very light and no inquiries of importance have developed. Southern pig iron has receded another 50c. to \$16.50, Birmingham, and malleable has been marked down 50c. in the Pittsburgh district.

Reports of pending reductions in plate, shape and bar prices by a leading producer have been strongly denied. The 1.50c. basis on these products is that which commonly prevails on contracts made to cover definite work, but exceptions are well marked.

New fabricated steel projects, including some large investment enterprises, total close to 14,000 tons, and the week's awards amount to about half as much. The New York Central has put out an inquiry for its first quarter needs, upward of 6000 tons, including 500 tons of billets, 3000 tons of bars, plates and shapes, 750 tons of nails and staples, 600 tons of sheets, 3000 tires and 5000 car axles, with other miscellaneous items, such as boiler tubes, frogs and switches.

Industrial building is rare, but 5000 tons has been placed at Pittsburgh—3000 tons for a new rod and wire plant of the Wheeling Steel Corporation at Portsmouth, Ohio, and 2000 tons for new Steubenville, Ohio, works of the same company.

New iron and steel capacity under construction at the beginning of 1922 is the smallest in many years. Only 6 open-hearth furnaces are planned for 1922, with an annual capacity estimated at 217,500 gross tons, and only two blast furnaces, with a capacity of 310,000 tons. Last year only 8 new open-hearth furnaces and one Bessemer converter were added, with 247,500 tons annual capacity, and one blast furnace, capacity 180,000 tons. The blast furnace capacity completed last year or under way is the smallest in 27 years.

Pittsburgh

PITTSBURGH, Jan. 3.

Seasonal quiet rules in the iron and steel market, but there also is a pretty general sentiment that before the new year is far advanced business will be materially better, as stocks of iron and steel in consuming and distributing quarters are believed to be extremely moderate. At the same time, there is no indication of an immediate abandonment on the part of buyers of their recent policy of purchasing close to actual needs. While it is contended that present prices completely discount freight rate reductions and wage adjustments among certain kinds of labor, which up to date have not been affected in the general liquidation of the past year, buyers are not convinced that when these things are actually accomplished still lower prices will not be seen. The forecast finding the most general acceptance is that orders carrying early shipment instructions will be numerous enough during the first quarter of the year, but that there will not be a great deal of contracting or anticipatory buying before summer.

There has not yet been much change in the opera-

A Comparison of Prices

Advances Over the Previous Week in Heavy Type, Declines in Italics

At date, one week, one month, and one year previous

For Early Delivery

Pig Iron,

Per Gross Ton:	Jan. 3, 1922	Dec. 27, 1921	Dec. 6, 1921	Jan. 4, 1921
No. 2X, Philadelphia...	\$21.34	\$21.34	\$22.34	\$34.79
No. 2, Valley furnace...	19.50	19.50	20.50	33.00
No. 2, Southern, Cin'ti...	21.00	21.50	22.00	39.50
No. 2, Birmingham, Ala.†	18.50	17.00	17.50	35.00
No. 2 foundry, Chicago*	19.00	19.00	20.00	32.00
Basic, del'd, eastern Pa.	20.25	20.25	21.00	33.85
Basic, Valley furnace...	18.25	18.25	19.00	30.00
Bessemer, Pittsburgh...	21.96	21.96	21.96	33.96
Malleable, Chicago*	19.00	19.00	20.00	32.50
Malleable, Valley...	19.50	20.00	20.00	32.00
Gray forge, Pittsburgh...	20.96	20.96	21.46	33.96
L. S. charcoal, Chicago...	31.50	31.50	31.50	43.50
Ferromanganese, del'd	60.00	60.00	60.00	100.00

Rails, Billets, Etc.,

Per Gross Ton:	Jan. 3, 1922	Dec. 27, 1921	Dec. 6, 1921	Jan. 4, 1921
O.-h. rails, heavy, at mill.	\$40.00	\$40.00	\$40.00	\$47.00
Bess. billets, Pittsburgh...	28.00	29.00	29.00	43.50
O.-h. billets, Pittsburgh...	28.00	29.00	29.00	43.50
O.-h. sheet bars, P'gh...	29.00	30.00	30.00	47.00
Forging billets, base, P'gh	32.00	32.00	32.00	48.50
O.-h. billets, Phila.	33.74	33.74	34.74	49.24
Wire rods, Pittsburgh...	36.00	38.00	38.00	57.00
Skelp, gr. steel, P'gh...	1.50	1.50	1.50	2.65
Light rails, at mill.	1.55	1.55	1.55	3.00

Finished Iron and Steel,

Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Iron bars, Philadelphia...	1.85	1.85	1.95	3.35
Iron bars, Chicago...	1.60	1.60	1.65	2.68
Steel bars, Pittsburgh...	1.50	1.60	1.50	2.35
Steel bars, Chicago...	1.60	1.60	1.60	2.73
Steel bars, New York...	1.88	1.88	1.80	2.73
Tank plates, Pittsburgh...	1.50	1.60	1.60	2.65
Tank plates, Chicago...	1.60	1.60	1.60	3.03
Tank plates, New York...	1.83	1.83	1.88	3.03
Beams, etc., Pittsburgh...	1.50	1.60	1.50	2.45
Beams, Chicago...	1.60	1.60	1.65	2.83
Beams, New York...	1.88	1.88	1.88	2.83
Steel hoops, Pittsburgh...	2.00	2.00	2.00	3.05

*The average switching charge for delivery to foundries in the Chicago district is 70c. per ton.
†Silicon, 1.75 to 2.25. ‡Silicon, 2.25 to 2.75.

The prices in the above table are for domestic delivery and do not necessarily apply to export business.

Sheets, Nails and Wire,

Per Lb. to Large Buyers:	Jan. 3, 1922	Dec. 27, 1921	Dec. 6, 1921	Jan. 4, 1921
Sheets, black, No. 28, P'gh	3.00	3.00	3.00	4.35
Sheets, galv., No. 28, P'gh	4.00	4.00	4.00	5.70
Sheets, blue an'd, 9 & 10	2.25	2.25	2.25	3.55
Wire nails, Pittsburgh...	2.50	2.50	2.75	3.25
Plain wire, Pittsburgh...	2.25	2.25	2.50	3.25
Barbed wire, galv., P'gh.	3.15	3.15	3.40	4.10
Tin plate, 100-lb. box, P'gh	\$4.75	\$4.75	\$4.75	\$7.00

Old Material,

Per Gross Ton:	Jan. 3, 1922	Dec. 27, 1921	Dec. 6, 1921	Jan. 4, 1921
Carwheels, Chicago	\$15.50	\$15.50	\$16.00	\$21.00
Carwheels, Philadelphia	16.50	16.50	17.00	25.00
Heavy steel scrap, P'gh.	14.50	14.50	14.00	15.00
Heavy steel scrap, Phila.	11.50	11.50	11.50	14.50
Heavy steel scrap, Ch'go	11.50	11.00	11.50	15.00
No. 1 cast, Pittsburgh...	16.25	16.00	16.50	25.00
No. 1 cast, Philadelphia	16.50	16.50	17.50	22.50
No. 1 cast, Ch'go (net ton)	12.50	12.50	13.00	17.00
No. 1 RR. wrot, Phila.	14.50	14.50	15.50	20.00
No. 1 RR. wrot, Ch'go (net)	10.50	10.25	10.50	14.00

Coke, Connellsville,

Per Net Ton at Oven:	Jan. 3, 1922	Dec. 27, 1921	Dec. 6, 1921	Jan. 4, 1921
Furnace coke, prompt...	\$2.75	\$2.75	\$2.75	\$5.25
Foundry coke, prompt...	3.75	3.75	4.00	6.50

Metals,

Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Lake copper, New York...	13.87½	13.87½	13.75	13.75
Electrolytic copper, N. Y.	13.62½	13.62½	13.50	12.75
Zinc, St. Louis...	4.82½	4.82½	4.87½	5.60
Zinc, New York...	5.17½	5.17½	5.37½	6.10
Lead, St. Louis...	4.40	4.37½	4.45	4.75
Lead, New York...	4.70	4.70	4.70	4.75
Tin, New York...	32.75	32.75	31.75	36.00
Antimony (Asiatic), N. Y.	4.50	4.50	4.50	5.20

Composite Price, Jan. 3, 1922, Finished Steel, 2.062c. Per Lb.

Based on prices of steel bars, beams, tank plates, plain wire, open-hearth rails, black pipe and black sheets	Dec. 27, 1921, 2.062c. Dec. 6, 1921, 2.135c. Jan. 4, 1921, 3.057c. 10-year pre-war average, 1.684c.
---	--

Composite Price, Jan. 3, 1922, Pig Iron, \$18.60 Per Gross Ton

Based on average of basic and foundry irons, the basic being Valley quotation, the foundry an average of Chicago, Philadelphia and Birmingham	Dec. 27, 1921, \$18.68 Dec. 6, 1921, 19.47 Jan. 4, 1921, 31.97 10-year pre-war average, 15.72
---	--

tions of steel plants in this and nearby districts, following the holiday interruption. Prices do not change much, but if there is a definite tendency, it is in favor of buyers. No shading of sheet prices yet has developed, but there still is considerable uncertainty as to prices of most of the other finished products. This is particularly true of the heavier lines, although a report that the Steel Corporation soon would announce lower prices of plates, shapes and bars is strongly denied. The Dec. 15 reduction in steel pipe prices is reported to have frightened buyers to some extent, and fear also is expressed as to the effect of a reduction of 50c. per barrel in the price of Pennsylvania crude oil upon the immediate demand for oil country goods. Manufacturers of wire products, in contradiction to reports, said to have emanated from purchasing agencies, declare that the Dec. 21 prices are not being shaded.

The pig iron market shows very little life and light steel plant and foundry operations find full reflection in the demand for scrap iron and steel. The coke market has been enlivened by the consummation of a number of contracts for furnace coke for January, first quarter and first half delivery. About 800,000 tons are in-

volved, a feature of the business being that almost half will be supplied from by-product grade.

Pig Iron.—Both inquiries and sales have been few and small in the past week. Sales of more than a carload are unusual and producers find difficulty in interesting melters in their future requirements, even by giving intimations of a willingness to accept concessions from current quotations. Follansbee Brothers Co. again is seeking 1000 tons of basic, but this company is able to get iron at a source near its plant for so much less than prices quoted by western Pennsylvania and Valley furnace interests that the latter have little chance to secure the business. Such lots of foundry iron as have lately been moved have been at \$19.50 to \$20, Valley furnace, for No. 2 grade. There has been no business to support a change in basic iron from \$18.25, Valley furnace, and Bessemer still is quoted at \$20, although this price would be shaded as much as 50c. per ton on an order involving a round tonnage. Malleable iron still is held by some makers at \$20, but the best bid recently made has been \$19.50. Sales of iron from Valley furnaces for December, as compiled by W. P. Snyder & Co., Pittsburgh, show \$18.6875

for basic and \$20 for Bessemer, as compared with \$19 and \$20, respectively, in November.

We quote Valley furnace, the freight rate for delivery to the Cleveland or Pittsburgh district being \$1.96 per gross ton:

Basic	\$18.25
Bessemer	20.00
Gray forgo	\$18.00 to 19.50
No. 2 foundry	19.50 to 20.00
No. 3 foundry	19.00 to 19.50
Malleable	19.50 to 20.00

Ferroalloys.—Small lot sales for early delivery are fairly common in ferromanganese and 50 per cent ferrosilicon, but as a general rule at prices which are nearer buyers' than sellers' valuations. The quotation of the local producer of ferromanganese still is \$60, Pittsburgh, but it is reported that on some recent transactions a price as low as \$59, Pittsburgh, has been accepted. This interest is rather more aggressive for business than it was a short time ago, the explanation being that it has some high-priced ores which it is anxious to liquidate. Meanwhile, other domestic makers are holding to \$58.35, Atlantic seaboard, for 78 to 82 per cent material, this price also being quoted for the same grade of material by English producers. That price, however, means a delivered cost at Pittsburgh common freight points, well above that of the local producer, who naturally is getting the bulk of the business. Most of the recent business in 50 per cent ferrosilicon has been supplied from a tonnage sold to middlemen some time ago by a Niagara Falls maker at low prices. As low as \$54, delivered, has been done on some of this material and this makes it difficult for makers seeking higher prices to secure orders. It is believed, however, that most of this tonnage now has passed into consumers' hands and there are expectations of a firmer market before long. A central Ohio steel company recently inquired for 300 tons of 16 to 19 per cent spiegel-eisen, bids against which ranged from \$28.50 to \$32, delivered. Practically no 20 per cent spiegel-eisen now is available, as there has been little production during the year by commercial producers, and stocks have been pretty well liquidated.

We quote 78 to 82 per cent domestic ferromanganese at \$59 to \$63.67 delivered; 78 to 82 per cent foreign ferromanganese, \$58.35, c.i.f. Atlantic seaboard; German, for 76 to 80 per cent, \$54, seaboard. Average 20 per cent spiegel-eisen at \$30 delivered, Pittsburgh or Valleys; 16 to 18 per cent spiegel-eisen, \$26 to \$30 delivered Pittsburgh; 50 per cent ferrosilicon, domestic, \$54 to \$57, freight allowed. Bessemer ferrosilicon is quoted f.o.b. Jackson and New Straitsville, Ohio, furnaces as follows: 10 per cent, \$38.50; 11 per cent, \$41.80; 12 per cent, \$45.10; 13 per cent, \$49.10; 14 per cent, \$54.10; silvery iron, 6 per cent, \$27; 7 per cent, \$28; 8 per cent, \$29.50; 9 per cent, \$31.50; 10 per cent, \$33.50; 11 per cent, \$36; 12 per cent, \$38.50. The present freight rate from Jackson and New Straitsville, Ohio, into the Pittsburgh district is \$4.06 per gross ton.

Billets, Sheet Bars and Slabs.—Interest in the market is low and with sales few and small quotations largely are appraisals of what might be done. It is patent that \$29 is as high as can be done on 4-in. billets, and that if a fair-sized tonnage was offered, it could be placed at \$28. On sheet bars and slabs, makers are asking \$30, but \$29 is more representative of to-day's possibilities.

We quote 4 x 4 in. soft Bessemer and open-hearth billets at \$29 to \$30; 2 x 2 in. billets, \$29 to \$30; Bessemer and open-hearth sheet bars, \$30; slabs, \$29 to \$30; forging billets, ordinary carbons, \$32 to \$33, all f.o.b. Youngstown or Pittsburgh mills.

Nuts and Bolts.—Makers here have experienced no appreciable increase in business, and the common expectation is that trading will continue irregular and unsatisfactory until the year has further progressed and fundamental conditions have been corrected to a point where buyers will feel safe in anticipating their needs. That stocks are light in second hands is evident from the fact that there is considerable eagerness on the part of buyers to secure prompt shipments. There is somewhat better observance of quoted discounts than was the case recently. Discounts are given on page 128. Instead of arbitrary and individual extras for oversize tapping of nuts, a majority of makers now are quoting 2c. per lb. extra for tapping 1/32-in. outside of United States standards for hot pressed and cold punched, in sizes 9/16-in. and smaller and 1c. per lb. extra for sizes 5/8-in. and larger.

Wire Rods.—Some makers are experiencing a fairly good business in small lots with some export sales included in recent transactions. The public quotation still is \$38 for the base size of soft rods, but it is ad-

mitted that this price is largely a negotiation quotation and that actual sales have been done at \$1 to \$2 per ton less. Prices are given on page 128.

Structural Material.—The past week has been featured by at least two good-sized awards, these being the new rod and wire plant of the Wheeling Steel Corporation at Portsmouth, Ohio, taking 3000 tons, and several mill buildings and crane runways for the Steubenville, Ohio, works of the same company, involving 2000 tons. Both orders went to the McClintic-Marshall Co., which also has taken the contract for an extension to the refinery building and the new calcining building for the International Nickel Co., Huntington, W. Va., the two jobs taking 500 tons. This company also will fabricate steel for North Pier No. 3 for the Frederick Snare Corporation, New York, taking 175 tons; a 5-story storage building at Harrisburg placed through the Hughes-Foulkrod Co., Pittsburgh, requiring 285 tons; and a 7-span bridge for the Chicago, Burlington & Quincy Railway Co., Chicago, taking 325 tons. The market on plain material holds fairly steady with the bulk of the business moving at 1.50c. Prices are given on page 128.

Spikes and Track Bolts.—Demands still are few and small and prices rather unsteady. Large spikes are quoted at \$2.25 base per 100-lb., but there has been some recent business as low as \$2.20 and like concessions are appearing in small spikes, on which the regular or public quotation is \$2.40 base per 100-lb. Track bolts have eased off about \$5 per ton with carload lots available at from \$3.25 base per 100 lb. and even as low as \$3. Prices are given on page 128.

Plates.—The market here is extremely narrow, for the reason that consumers being served from other centers have something of an advantage on local tank builders and fabricating interests, in the matter of delivered prices. It is claimed that some business is being taken at 1.60c., but the more common price is 1.50c., on other than retail quantities.

We quote sheared plates, 1/4 in. and heavier, tank quality, at 1.50c. f.o.b. Pittsburgh.

Cold-Finished Steel Bars and Shafting.—There is no special change in the general situation, buyers still being inclined to order sparingly and then only for supplies to round out depleted lines. It is believed that stocks in consumers' hands are pretty well liquidated, and that if there are no really large orders in the near future, at least demands will be more numerous than they have been in the past 60 to 90 days. Prices take an unusually wide range. On what are regarded as desirable tonnages, as low as 1.90c., and even 1.85c., has been done, but on the bulk of such business as has come out 2c. is minimum and some business actually has been entered as high as 2.25c. where the order has been rather difficult of execution. Ground shafting is unchanged at \$2.50 base per 100-lb. f.o.b. mill.

Steel Skelp.—The market is inactive but fairly steady at 1.50c. There is a little export business, but this is not especially desirable since it means taking less than 1.50c.

Iron and Steel Bars.—The market on steel bars has pretty definitely settled to 1.50c., Pittsburgh, although the claim is made that 1.60c. prevails on some business. Demand is for small lots for immediate delivery. Activity also is lacking in iron bars, which are quotable on sales at 2c. to 2.10c., although the asking price of most makers is 2.15c., base.

We quote steel bars rolled from billets at 1.50c.; reinforcing bars, rolled from billets, 1.45c. to 1.50c. base; reinforcing bars, rolled from old rails, 1.40c. to 1.45c.; refined iron bars, 2c. to 2.10c. in carloads, f.o.b. mill, Pittsburgh.

Rivets.—Demand still is entirely hand-to-mouth and there is little indication of an early departure from this policy. Makers insist that present prices more than discount the decline in rods and bars, but in spite of that fact there is more or less shading of quotations chiefly by those not recognized as regular makers of rivets. Companies making a full line of rivets are quoting \$2.40 base per 100-lb. for large structural and ship rivets and \$2.50 per 100-lb. for large boiler rivets. Competition, however, has resulted in prices from \$3 to \$5 per ton below those figures. Prices and discounts are given on page 128.

Coke and Coal.—The last week of the old year saw the conclusion of negotiations for furnace coke contracts involving a total tonnage of approximately 300,000. The Sharon Steel Hoop Co., Sharon, Pa., which has been operating its furnace at Lowellville, Ohio, for the past six months on by-product coke, for the next six months, will use beehive oven fuel; this contract is for six months and calls for a total of about 70,000 tons. The coke for the new Trumbull-Cliffs furnace, Warren, Ohio, which goes into blast Jan. 15, will be supplied by the Youngstown Sheet & Tube Co., the contract to run from Jan. 15, to July 1, and to involve 90,000 tons. The Youngstown Sheet & Tube Co. also has taken the contract for 10,000 tons a month for the first three months of the year for the Shenango Furnace Co., Sharpsville, Pa., and will furnish 14,000 tons a month for February and March, for the furnace of the A. M. Byers Co., Girard, Ohio. A Connellsville district producer, now supplying the Adrian furnace, DuBois, Pa., will continue to supply the requirements of that furnace for the first three months of this year, which amount to 9000 tons a month. The Colonial Iron Co., Riddlesburg, Pa., has closed for the first quarter with a Connellsville producer, this contract calling for 8000 tons a month. Several contracts for January shipment also have been closed, one of these being for 10,000 tons and another for 6000 for Eastern furnaces. The business has definitely established the contract market on first quarter tonnages of beehive oven furnace fuel at from \$3 to \$3.25 per net ton ovens, or 25c. per ton below what producers asked at the outset of negotiations a few weeks ago. Spot foundry coke is quotable about \$1 per ton above furnace grade.

Iron and Steel Pipe.—Slowing down in the demand incident to the end of the year seems to have been accentuated by the most recent reduction in prices, and since to-day brought the announcement of a reduction of 50c. per barrel in the price of Pennsylvania crude oil, the first reaction since the market turned upward several months ago, there is some apprehension about early orders for oil country goods. Most makers have accumulated a fair amount of business, however, and mill operations still are relatively high. Discounts are given on page 128.

Hoops and Bands.—Activities still are limited, probably because of the uncertainties which exist as to prices. The common quotation on hoops is 2c., base Pittsburgh, and so far the effort to obtain a lower price has not been successful, although the contention of buyers that a spread of \$10 per ton between the present base prices of steel bars and hoops is too wide is not disputed. The asking price on bands also is 2c., but business at this price has been difficult to obtain, because buyers claim to have quotations as low as 1.75c. If such quotation has been made, it is believed to have come from manufacturers having bar mills and who have based the price on bars plus the old card differential of 25c. per 100 lb. for bands.

Hot-Rolled and Cold-Rolled Strips.—Effective Jan. 1, the American Steel & Wire Co. named a price of 3.50c., base Pittsburgh, for cold-rolled strips, and this price is being met by independents, although a few still are asking 3.75c. There is no change in hot-rolled strips, which still are quoted anywhere from 2c. for the more desirable tonnages, up to 2.25c. for those more difficult of execution.

Wire Products.—Widespread circulation of reports that the Dec. 21 prices were not being strictly adhered to and that concessions of 10c. to 15c. per keg were being made to large buyers of nails, although stoutly denied by leading manufacturers, have tended to intensify the dullness usual to this time of year. Important manufacturers here insist that there has been no shading of the \$2.50 base per keg for bright nails nor \$2.25 base per 100 lb. for plain wire.

We quote wire nails at \$2.50 base per keg, Pittsburgh, and bright basic and Bessemer wire at \$2.25 base per 100 lb., Pittsburgh.

Steel Rails.—Demand for light rails is extremely limited, as usual at this time of the year. Demands

from contractors are small and the coal companies seem to have long since provided against their winter requirements. These rails rolled from new steel commonly are quoted at 1.60c., but this price is being obtained only for small lots and a price of 1.55c. is not hard to obtain. Practically all orders for standard rails call for delivery during first six months. Ordinarily contracts run for the full year. Evidently the railroads are expecting further price concessions.

We quote 25 to 45-lb. sections, rolled from new steel, 1.55c. to 1.60c. base; rolled from old rails, 1.50c. base; standard rails, \$40 per gross ton mill for Bessemer and open-hearth sections.

Tin Plate.—New orders continue few, but container manufacturers are specifying freely and shipments are showing up unusually well for this time of the year. The situation in canned foods is much more favorable than it was at the beginning of 1921, for in contrast with that time stocks are reported to be very light in distributors' hands. The packers have rather big stocks, but their position in this respect is better than it was a few months ago. There is good observance of the regular quotation of \$4.75 per base box on standard coke tin plate. On export business prices are somewhat firmer than they were a short time ago, due to the fact that competition from Welsh makers is not as sharp as it has been.

We quote standard production coke tin plate at \$4.75 per base box f.o.b. Pittsburgh for carload lots.

Sheets.—Independent mill operations are low again this week, as a number which shut down for the holidays have not yet accumulated enough business to start up. The American Sheet & Tin Plate Co. is running about 65 per cent, largely because of the receipt of some rather sizable orders for light gage sheets for shipment to Japan. Prices are given on page 128.

Old Material.—The market is inactive as far as purchases by melters are concerned, but maintains a very firm tone because of light available supplies and the expectation that before the month ends there will be an increase in steel works operations and consequently in consumption. Already some dealers have received releases against suspended shipments and during the past few days several of the steel companies have been feeling the market out. Heavy melting steel cannot be bought for less than \$14.50, delivered, and sales at that price usually refer to single carloads which the owners are obliged to move promptly. On round tonnages, \$15 is the real minimum, and stocks in dealers' yards are not available at less than \$16. The market is dull and nominal on foundry grades and on those kinds of material going to special uses. The Baltimore & Ohio Railroad will receive bids until noon, Jan. 9, for 17 cars and 9660 gross tons of scrap; also for 300 lb. of high speed steel. The Pennsylvania Railroad, Central Region, list, on which bids will close Jan. 5, offers 12,862 net tons and the Eastern Region list, bids on which close to-morrow, offers approximately 20,000 net tons, including 5000 tons of rails.

We quote for delivery to consumers' mills in the Pittsburgh and other districts taking the Pittsburgh freight rate, as follows:

Heavy melting steel, Steubenville, Follansbee, Brackenridge, Monessen, Midland and Pittsburgh.....	\$14.50 to \$15.00
No. 1 cast, cupola size.....	16.25 to 16.75
Re-rolling rails, Newark and Cambridge, Ohio; Cumberland, Md.; Huntington, W. Va., and Franklin, Pa.....	15.50 to 16.00
Compressed sheet steel.....	12.00 to 12.50
Bundled sheets, sides and ends.....	10.50 to 11.00
Railroad knuckles and couplers.....	15.00 to 15.50
Railroad coil and leaf springs.....	15.00 to 15.50
Low phosphorus standard bloom and billet ends.....	18.00 to 18.50
Low phosphorus plates and other grades.....	17.00 to 17.50
Railroad malleable.....	13.00 to 13.50
Iron car axles.....	24.00 to 25.00
Locomotive axles, steel.....	22.00 to 23.00
Steel car axles.....	15.50 to 16.00
Cast iron wheels.....	15.00 to 15.50
Roller steel wheels.....	15.00 to 15.50
Machine shop turnings.....	9.00 to 9.50
Sheet bar crop ends.....	14.50 to 15.00
Heavy steel axle turnings.....	11.00 to 11.50
Short shoveling turnings.....	10.00 to 10.50
Heavy breakable cast.....	14.00 to 14.50
Stove plate.....	13.00 to 13.50
Cast iron borings.....	10.00 to 10.50
No. 1 railroad wrought.....	11.50 to 12.00

Chicago

CHICAGO, Jan. 3.

December bookings of an important local mill were larger than those of any month since April. Much of the tonnage taken was traceable directly or indirectly to the railroads and oil fields. Considerable additional business is expected from the same sources, as both car builders and tank fabricators are figuring on large inquiries which are expected to be closed soon. A number of rail orders also will probably be placed soon, although it is notable that rail buying is not on the scale of a year ago. Business from miscellaneous sources which was exceptionally light during the last month of 1921 is also expected to revive, now that inventory taking is out of the way, as stocks of jobbers and manufacturers alike are generally low. Public improvements and private building projects which have been held in abeyance are expected to go ahead in view of the favorable terms under which money can now be borrowed for legitimate enterprise. In a word, producers look forward hopefully in the new year, and while they recognize the fact that cautious buying will probably continue the rule until freight rates are reduced and coal miners wages are adjusted, they believe that a slow, but steady, improvement in business is in store for the industry during the coming quarter.

Owing to the fact that much of the tonnage it has recently booked called for deferred delivery, the Illinois Steel Co.'s operations have declined, its steel output being on a 35 per cent basis. The Inland Steel Co., after having shut down a number of mills during the holidays, has resumed operations on a 50 per cent basis. The operations of other mills are irregular.

Pig Iron.—The market was quiet between the holidays and among the few sales made may be mentioned 350 tons of foundry for January shipment to a Michigan point, 200 tons of malleable for first quarter delivery to a local melter, and 125 tons of foundry to a western Illinois consumer for January shipment. The price situation is unchanged. Although a steel works furnace, which is booked ahead through January, refuses to quote lower than \$20, base, on foundry, malleable and basic, iron is available from the leading merchant and other sources at \$19 to \$19.50, base furnace. The Auto Specialties Co., Benton Harbor, Mich., is inquiring for 2000 tons of malleable for second quarter delivery. A Wisconsin melter wants 500 tons of malleable for first quarter delivery. Some resale iron has been disposed of recently and it is reported that a fair quantity is still on the market. No sales of Southern iron are reported, but \$17, base Birmingham, is freely quoted and is intimated that \$16.50 might be done. We note a sale of a carload of charcoal to a local melter and of another carload for export both at \$28, base furnace.

Quotations on Northern foundry, high phosphorus malleable and basic irons are f.o.b. local furnace and do not include a switching charge averaging 70c. per ton. Other prices are for iron delivered at consumers' yards, or when so indicated, f.o.b. furnace other than local.

Lake Superior charcoal, averaging	
sil 1.50, delivered at Chicago.....	\$31.50
Northern coke, No. 1, sil. 2.25 to 2.75.....	\$19.50 to 20.00
Northern coke, foundry, No. 2, sil.	
1.75 to 2.25.....	19.00 to 19.50
Northern high phos.....	19.00 to 19.50
Southern foundry, sil. 1.75 to 2.25.....	23.07
Malleable, not over 2.25 sil.....	19.00 to 19.50
Basic.....	19.00 to 19.50
Low phos., Valley furnace, sil. 1 to 2	
per cent copper free.....	33.00
Silvery, sil. 8 per cent.....	32.82 to 34.82

Ferroalloys.—We note inquiries for one carload each of ferromanganese, spiegeleisen 50 per cent and ferro-silicon from local melters. Otherwise the market is without features.

We quote 78 to 82 per cent ferromanganese, \$66.75, delivered; 50 per cent ferro-silicon, \$60, delivered; spiegeleisen, 18 to 22 per cent, \$36 to \$37, delivered.

Rails and Track Supplies.—Within the past week the Gary mill has booked a number of rail orders from local roads aggregating 30,000 tons. The Louisville & Nashville has placed 50,000 tons with the Tennessee company. There is little inquiry for track accessories

and few orders for light rails are being booked. Light rails rolled from new billet stock are available at from 1.60c. to 1.65c., f.o.b. mill, while rerolled rails can be bought as low as 1.50c. mill.

Standard Bessemer and open-hearth rails, \$40; light rails rolled from new steel, 1.60c. to 1.65c. f.o.b. makers' mills. Standard railroad spikes, 2.15c. to 2.25c., Pittsburgh; track bolts with square nuts, 3.20c. to 3.25c., Pittsburgh; tie plates, steel and iron, 1.875c. to 2c., f.o.b. mill; angle bars, 2.40c., f.o.b. mill.

Railroad Equipment.—The John Morrell Co., packer, Ottumwa, Iowa, has ordered 100 refrigerator cars from the American Car & Foundry Co. The Seaboard Air Line has bought 25 locomotives from the American Locomotive Co., and is reported to have placed 2500 freight cars of various types with the Chickasaw Ship Building & Car Co. The Delaware, Lackawanna & Western is inquiring for five locomotives. The Burlington is expected to close for 7300 freight cars this week and the Illinois Central will take early action on 2200 cars, of which 1500 gondolas are for its own lines and 500 box and 200 gondola cars for its subsidiary, the Central of Georgia. The Great Northern is inquiring for 20 passenger cars. The Great Northern will not take action on its inquiry for freight cars until after Jan. 10. The Union Pacific, which recently put out inquiries for 1500 freight cars, has increased the total to 5500 cars.

Bars.—Outside of encouraging tonnages coming from car builders, little new business in mild steel bars is developing. With inventory taking out of the way, however, jobbers and miscellaneous manufacturers are expected to enter the market to replenish their stocks. The price situation shows no material change. In the reinforcing field few new lettings are reported, although considerable work is in prospect. For a tuberculosis sanatorium for disabled volunteer soldiers at Milwaukee 500 tons are reported to have been awarded to the C. A. P. Turner Co. A local rail carbon steel bar mill will furnish 150 tons for the J. L. Taylor Building, Chicago. On Jan. 13, bids will be taken on the general contract for aeration and sedimentation tanks at the Jones Island sewage disposal plant, Milwaukee. About 5000 tons of reinforcing is involved. Bar iron demand is still of a spasmodic character, and mill operations are irregular. One local mill is now idle, while another has been operating for three weeks and still has another week's work ahead. The price situation is on about the same basis as a week ago, although quotations of 1.60c., Chicago, are commoner than 1.65c. Demand for hard steel bars is so light that it is difficult to ascertain what the ruling market price is.

Mill prices are: Mild steel bars, 1.60c. to 1.75c., Chicago; common bar iron, 1.60c. to 1.65c., Chicago; rail carbon, 1.65c., mill or Chicago.

Jobbers quote 2.68c. for steel bars out of warehouse. The warehouse quotation on cold-rolled steel bars and shafting is 3.35c. for rounds and 4.05c. for flats, squares and hexagons. Jobbers quote hard and medium deformed steel bars at 2.38c. base. Hoops and bands, 3.28c.

Wire Products.—Demand was very light during the last week of 1921, but with inventory taking out of the way, buyers are now expected to come into the market for their needs. The stocks of users, and particularly jobbers, are low and buying for replenishment purposes is looked for. A number of fair-sized inquiries for wire rods have been received from wire mills, and it is said that as low as \$37 has been quoted. For mill prices, see finished iron and steel, f.o.b. Pittsburgh, page 128.

We quote warehouse prices f.o.b. Chicago: No. 9 and heavier black annealed wire, \$3.13 per 100 lb.; No. 9 and heavier bright basic wire, \$3.28 per 100 lb.; common wire nails, \$3.25 per 100 lb.; cement coated nails, \$2.65 per keg. The mill quotation on plain material ranges from 1.60c. to 1.75c., Chicago. Jobbers quote 2.78c. for materials out of warehouse.

Bolts and Nuts.—The market is still quiet and weak, but some replenishment buying is expected during the coming month. For mill prices, see finished iron and steel, f.o.b. Pittsburgh, page 128.

Jobbers quote structural rivets, 3.48c.; boiler rivets, 3.58c.; machine bolts up to $\frac{3}{4}$ x 4 in., 60, 10 and 10 per cent off; larger sizes, 60 and 10 off; carriage bolts up to $\frac{3}{4}$ x 6 in., 60 and 10 off; larger sizes, 65 and 5 off; hot pressed nuts, square and hexagon tapped, \$3.75 off; blank nuts, \$4 off; coach or lag screws, gimlet points, square heads, 65 and 5 per cent off. Quantity extras are unchanged.

Sheets.—Demand is thinning out and it is apparent that buyers are waiting for some weakness to develop in present prices, which are very firm. Mills, however, take the position that inasmuch as sheets are in constant use and consumers' stocks are scraping bottom, it is only a question of time when buyers will be forced to re-enter the market for their requirements.

Mill quotations are 3c. for No. 28 black, 2.25c. for No. 10 blue annealed and 4c. for No. 28 galvanized, all being Pittsburgh prices, subject to a freight rate to Chicago of 38c. per 100 lb.

Jobbers quote: Chicago delivery out of stocks, No. 10 blue annealed, 8.38c.; No. 28 black, 4.15c.; No. 28 galvanized, 5.15c.

Structural Material.—Numerous public improvements as well as other building projects are expected to go ahead this year not only because construction costs have declined materially during the past 12 months, but also because funds for legitimate enterprise are now easily obtainable at reasonable rates. It is also to be noted that railroad construction work is expanding. Out of 29 inquiries recently received by a local fabricator, 16 were from railroads. While much of this railroad work is small, some of it runs into fair tonnages. Recent lettings include:

Blum Building addition, Chicago, 613 tons, to Vanderkloot Iron Works.

Black River bridge, Black River Falls, Wis., 305 tons, to Worden-Allen Co.

Minnesota State bridges Nos. 3660 and 3661, New Ulm, 249 tons, to Illinois Steel Bridge Co.

Huaso and Alamo Creek bridges, San Luis Obispo County, Cal., 219 tons, to Minneapolis Steel & Machinery Co.

Marquette Portland Cement Co., main shop and office building, La Salle, Ill., 350 tons, to Worden-Allen Co.

Wisconsin Highway Commission, 180-ft. span, Tomahawk, Wis., 100 tons, to Worden-Allen Co.

Chicago, Burlington & Quincy, seven deck plate girder spans, 300 tons, to McClintic-Marshall Co.

Chicago, Rock Island & Pacific, seven 90-ft. deck plate girder spans, 570 tons, to American Bridge Co.

Contracts Pending

Cadillac Foundry Co., foundry building, Cadillac, Mich., 301 tons, bids taken by Frank D. Chase, Inc., Chicago.

Pollak Steel Co., South Chicago, Ill., new plant to replace present facilities, about 600 tons.

Great Northern Railroad, bridges, 650 tons.

Cast-Iron Pipe.—Several inquiries have appeared as the new year opens and sellers look for much additional work to come up for bids in the near future. Recent lettings include:

Denver, 343 tons to Colorado Fuel & Iron Co.

Marion, Ind., 76 tons of pipe and fittings to James B. Clow & Sons.

Prospective business includes:

Akron, Ohio, 900 tons, bids in Jan. 6.

Ellis, Kans., 269 tons of 4 and 6-in., Jan. 9.

Woodward, Okla., 80 tons, Jan. 4.

We quote per net ton, f.o.b. Chicago, as follows: Water pipe, 4-in., \$47.10 to \$48.10; 6-in. and above, \$43.10 to \$44.10; class A and gas pipe, \$4 extra.

Plates.—Local mills booked additional tonnage from carbuilders and tank fabricators during the last week of 1921. While orders for plates, shapes and bars came chiefly from these sources during the closing months of the past year, general demand is expected to revive soon, as consumers are bare of stocks and will be forced to buy material to fill their own orders. On the other hand, it seems assured that tank builders and car shops will continue to require large tonnages of steel. The Pierce Oil Co. is now in the market for storage tanks for the new Mexia (Texas) field, involving from 4000 to 8000 tons of plates. Another new oil field is about to be developed near Denison, Texas, with the probable result that there will again be a demand for large storage facilities.

The outlook in car construction is even more encouraging. Fully 25,000 freight cars are expected to be bought by railroads in this district early in the year. Action on a number of inquiries put out late in 1921 was deferred pending a reduction in the prices of patented car specialties, lower quotations on which are expected to be announced early this month.

The ruling mill quotations range from 1.60c. to 1.75c., Chicago. Jobbers quote 2.78c. for plates out of stock.

Coke.—Local by-product foundry coke has been reduced to \$10.75, delivered in the Chicago switching district.

Old Material.—Consumptive buying is at a minimum, but dealers are laying in stocks in anticipation of later demand. These purchases by sellers have tended to strengthen the market somewhat and a few advances are noted below. Railroad offerings include the Baltimore & Ohio, 10,000 tons; the Chicago & North Western, 3300 tons; the Lake Erie & Western, 10 cars; the New York Central and the Michigan Central, blind lists.

We quote delivery in consumers' yards Chicago and vicinity, all freight and transfer charges paid, as follows:

Per Gross Ton	
Iron rails	\$18.00 to \$18.50
Relaying rails	23.00 to 27.50
Cast iron car wheels	15.50 to 16.00
Rolled or forged steel car wheels	13.00 to 13.50
Steel rails, rerolling	12.50 to 13.00
Steel rails, less than 3 ft.	12.50 to 13.00
Heavy melting steel	11.50 to 12.00
Frogs, switches and guards cut apart	11.50 to 12.00
Shoveling steel	11.00 to 11.50
Low phos. heavy melting steel	13.50 to 14.00
Drop forge flashings	7.50 to 8.00
Hydraulic compressed sheet	7.50 to 8.00
Axle turnings	8.50 to 9.00

Per Net Ton	
Iron angles and splice bars	14.00 to 14.50
Steel angle bars	10.50 to 11.00
Iron arch bars and transoms	15.00 to 15.50
Iron car axles	19.00 to 19.50
Steel car axles	12.50 to 13.00
No. 1 busheling	8.25 to 8.75
No. 2 busheling	6.00 to 6.50
Cut forge	10.25 to 10.75
Pipes and flues	7.00 to 7.50
No. 1 railroad wrought	10.50 to 11.00
No. 2 railroad wrought	10.00 to 10.50
Steel knuckles and couplers	11.50 to 12.00
Coil springs	12.50 to 13.00
No. 1 machinery cast	12.50 to 13.00
No. 1 railroad cast	12.00 to 12.50
Low phos. punchings	11.00 to 11.50
Locomotive tires, smooth	10.00 to 10.50
Machine shop turnings	3.50 to 4.00
Cast borings	5.50 to 6.00
Stove plate	12.00 to 12.50
Grate bars	10.50 to 11.00
Brake shoes	10.50 to 11.00
Railroad malleable	11.50 to 12.00
Agricultural malleable	11.50 to 12.00

Cleveland

CLEVELAND, Jan. 3.

Iron Ore.—Several consumers cut off dock shipments Jan. 1, when the higher rail rates for carrying ore to interior furnaces were restored and the movement from docks is expected to be very light during the next few months. Several additional mines in the Lake Superior district have resumed operations.

We quote delivered lower lake ports: Old range Bessemer, 55 per cent iron, \$6.45. Old range non-Bessemer, 51½ per cent iron, \$5.70. Mesabi Bessemer, 55 per cent iron, \$6.20; Mesabi non-Bessemer, 51½ per cent iron, \$5.55.

Pig Iron.—The market was unusually dull during the past week and very little new inquiry is pending. A local interest reports the sale of 1200 tons of foundry iron on the basis of \$20, Valley, for shipment from western Pennsylvania to a Pittsburgh district consumer and a Columbus, Ohio, melter purchased 500 tons of malleable iron. One lake furnace sold 1500 tons of foundry iron in small lots during the week. On foundry iron \$19 has become the more common price with one or more lake furnaces, but for delivery in the immediate vicinity of the furnace \$20 is still the usual quotation. For Cleveland delivery slightly higher prices are still obtainable. A sale of 200 tons by a Cleveland furnace to a local consumer at \$20.50 is reported. Sellers look for a more active market during the month. Prices on low phosphorus iron have declined and the sharp cut made by Eastern producers may cause further concessions. A few small lot sales are reported at \$33 and \$38.50. Southern iron is inactive and is now freely offered at \$17, Birmingham.

Quotations below are f.o.b. local furnace for Northern foundry iron, not including a 56c. switching charge. Other quotations are delivered Cleveland, being based on a \$1.96 freight rate from Valley points, a \$3.36 rate from Jackson and a \$6.67 rate from Birmingham:

Basic	\$20.21 to \$20.71
Northern No. 2 fdy., sil. 1.75 to 2.25	19.00 to 20.00
Southern fdy., sil. 2.25 to 2.75	24.17
Ohio silvery, sil. 8 per cent	32.86
Standard low phos., Valley furnace	33.00

Semi-Finished Steel.—Two or three inquiries for sheet bars in lots of 1000 tons have come out. Common quotations are \$30 for sheet bars and \$29 for slabs, but the market does not appear firm.

Finished Iron and Steel.—With the start of the New

Year a few consumers are seeking to get under cover with contracts and the trade looks for more activity during the next week or two. Sales during the past week were very light, as was to be expected during the holidays. Among new inquiries is one for 500 tons of spring steel. Prices are holding firm at 1.50c. as a minimum for plates, structural material and steel bars. While less than car lots of plates are being sold at that price, local mills are still taking some orders at 1.60c. to 1.65c., which also appeared to be the ruling prices for boiler plates. Some additional plate tonnage has been placed for the repair of lake boats. The Baltimore & Ohio Railroad has taken bids for bridge work requiring 2000 tons of steel. There is no activity in the local building field, but fabricators look for a fair volume of business early in the year. Hard steel reinforcing bars are inactive, being nominally quoted at 1.50c.

Jobbers quote steel bars 2.54c.; plates and structural shapes, 2.64c.; No. 9 galvanized wire, 3.25c.; No. 9 annealed wire, 2.75c.; No. 28 black sheets, 3.75c.; No. 28 galvanized sheets, 4.75c.; No. 10 blue annealed sheets, 3.10c.; hoops and bands, 3.14c.; cold-rolled rounds, 3.85c.; flats, squares and hexagons, 4.35c.

Sheets.—Inquiry has improved slightly for lots up to 100 tons, but sales were very light during the week. Regular mill prices are being firmly maintained.

Bolts, Nuts and Rivets.—The leading local maker who has been holding to higher quotations has reduced prices to 2.25c. for structural, 2.35c. for boiler rivets and 70, 10 and 10 per cent off list for small rivets. Bolts and nuts were inactive during the week, but makers look for some revival in business when inventories are completed.

Coke.—There is some car lot demand for foundry coke, sales being mostly at \$4 and \$4.25 for standard Connellsville make. Foundries are not contracting for first quarter, buying only coke that is needed.

Old Material.—There is some local demand for machine shop turnings from the Bourne-Fuller Co., which will blow in the blast furnace of its Upson Nut plant and has made purchases of this grade at \$8.50. This company has a large accumulation of heavy melting steel, so that the starting of its open-hearth plant is not expected to have an important stimulating effect on steel making scrap. As a whole, the market was unusually dull during the week and dealers made little attempt to do business. Prices are firm and unchanged. Dealers look for considerable activity in scrap early this month. Purchases by Ohio mills have been light recently and outside of Cleveland stocks in consumers' yards are reported to be low.

We quote per gross ton, f.o.b. Cleveland, as follows:

Heavy melting steel.....	\$11.50 to \$12.00
Steel rails, under 3 ft.....	12.50 to 13.00
Steel rails, rerolling.....	14.00 to 14.50
Iron rails.....	12.00 to 12.50
Iron car axles.....	18.00 to 19.00
Low phosphorus melting.....	13.00 to 13.50
Cast borings.....	8.60 to 9.00
Machine shop turnings.....	7.50 to 7.60
Mixed borings and short turnings.....	8.60 to 9.00
Compressed steel.....	8.75 to 9.00
Railroad wrought.....	12.00 to 12.50
Railroad malleable.....	12.50 to 13.00
Light bundled sheet stampings.....	6.00 to 7.00
Steel axle turnings.....	9.00 to 10.00
No. 1 cast.....	15.00 to 16.00
No. 1 busheling.....	8.25 to 8.75
Drop forge flashings, over 10 in.....	7.50 to 8.00
Drop forge flashings, under 10 in.....	5.00 to 8.00
Railroad grate bars.....	12.75 to 13.00
Stove plate.....	13.00 to 13.25
Pipes and flues.....	8.50 to 9.00

Birmingham

BIRMINGHAM, ALA., Jan. 3.

At the close of the year the Birmingham iron market was on a base of \$16.50. The immediate cause of lower base was an open offer by a furnace interest of lots of 500 tons and over at that figure for a limited period. This induced competition by other makers and resulted in recession of market to the new base. While some car loads were sold at \$17 during the last week of the year, makers as a rule accepted the new base and almost all business was done at \$16.50. The tonnage booked was not large, nine of the lower prices having stimulated buying. At the same time makers have come to the new year feeling that it is to be better than last. Thirteen blast furnaces were active in Alabama, Jan. 1 compared with five,

July 1. Of the active, Jan. 1, seven were on merchant iron, four on basic and two on charcoal.

We quote per gross ton f.o.b. Birmingham district furnaces as follows:

Foundry, silicon 1.75 to 2.25.....	\$16.50
Basic.....	18.00
Charcoal, warm blast.....	32.00

Old Material.—Scrap dealers look for better business shortly, but it has not opened up yet. Prices quoted are nominal.

We quote per gross ton f.o.b. Birmingham district yards as follows:

Steel rails.....	\$11.00 to \$12.00
No. 1 steel.....	10.00 to 11.00
No. 1 cast.....	14.00 to 15.00
Car wheels.....	13.00 to 14.00
Tramcar wheels.....	12.00 to 13.00
No. 1 wrought.....	12.00 to 13.00
Stove plate.....	11.00 to 12.00
Cast iron borings.....	6.00 to 7.00
Machine shop turnings.....	6.00 to 7.00

Buffalo

BUFFALO, Jan. 3.

Pig Iron.—Three furnaces participated in the most recent purchase of the American Radiator Co. when 4400 tons was bought. One interest did not seek the business because of price and shipping conditions and only one furnace of four which bid, did not get any part of the order. While the market on the usual run of business remains firm at \$20 base, it is generally assumed that the radiator tonnage sold at less than this figure. Differentials enter into a transaction only when a very high silicon is required. Inquiry is scattered and in the week ending Dec. 31, 25 requests for prices involved a total of 5000 tons. One inquiry for 1700 tons for January and February delivery and another for 800 tons for January delivery, both within the district, are engaging one furnace. Quotations of \$19 to New England points frequently made in December and the latter part of November have not been offered within the week and the general tendency is to maintain the \$20 level.

We quote f.o.b. per gross ton Buffalo as follows:

No. 1 foundry, 2.75 to 3.25 sil.....	\$20.00 to \$21.00
No. 2X foundry, 2.25 to 2.75 sil.....	19.50 to 20.50
No. 2 plain, 1.75 to 2.25 sil.....	19.00 to 20.00
Basic.....	20.00 to 21.00
Malleable.....	20.00 to 21.00
Lake Superior charcoal.....	31.75

Warehouse Business.—Some desirable orders have appeared and the confidence in 1922 business is already reflected to a slight degree. Quick delivery is a requirement on this new business.

We quote warehouse prices f.o.b. Buffalo as follows: Structural shapes, 2.30c.; plates, 2.80c.; plates, No. 8 gage, 3.50c.; soft steel bars and shapes, 2.70c.; hoops and bands, 3.30c.; blue annealed sheets, No. 10, 3.55c.; galvanized steel sheets, No. 28, 5.25c.; black sheets, No. 28, 4.25c.; cold-rolled strip steel, 5.90c.; cold-rolled round shafting, 3.80c.

Finished Iron and Steel.—Improved tone in all lines is found and particularly good orders for immediate shipment have been received in tin plate and wire products. Toward the end of the week which closed Dec. 31, more than the average run of carload business in bars and plates developed. The Buffalo Steel Car Co. bought 250 tons of plates from a Buffalo interest and the price is understood to have been less than 1.50c. Another Buffalo interest is inquiring for 150 tons of sheets—the largest local inquiry of this kind in some time.

Coke.—Prices have weakened through the disinterest of buyers and best grades now can be obtained at \$4 ovens.

Old Material.—Inquiries from outside the district for heavy melting steel, hydraulic compressed and turnings and borings have failed to develop quotations from dealers here.

We quote dealers' asking prices per gross ton f.o.b. Buffalo as follows:

Heavy melting steel.....	\$13.00 to \$14.00
Low phos., 0.04 and under.....	17.00 to 18.00
No. 1 railroad wrought.....	15.00 to 16.00
Car wheels.....	16.50 to 17.50
Machine shop turnings.....	7.50 to 8.00
Cast iron borings.....	7.00 to 8.00
Heavy axle turnings.....	10.50 to 11.50
Grate bars.....	12.00 to 13.00
No. 1 busheling.....	10.00 to 11.00
Stove plate.....	15.00 to 16.00
Bundled sheet stampings.....	8.00 to 9.00
No. 1 machinery cast.....	17.00 to 18.00
Hydraulic compressed.....	10.50 to 11.50
Railroad malleable.....	13.00 to 14.00

Philadelphia

PHILADELPHIA, Jan. 3.

With profound relief the iron and steel trade observed the passing of the old year. It hopes for better things this year, but the first business day of 1922 brought no change in the situation as it has existed in recent weeks. It is, of course, yet too early to foretell what may happen within the next few months, but there continues a degree of optimism that gradual improvement may be expected. Of fresh developments there is none to point the way, the holiday week having been unusually quiet.

Pig Iron.—During the holiday week there was little closing of pig iron business, sales totaling considerably less than in the preceding week. Most of the tonnages were small—under 500 tons. Eastern pig iron makers have stiffened on prices, with the result that a few large inquiries, one particularly of 3000 tons, and another of 2000 tons of foundry grade, have not been closed because the buyers have been unable to obtain the prices that were open to them a week or two ago. No. 2 plain iron now seems firm at a minimum of \$20, furnace, with all sellers, with No. 2X 50c. per ton higher. A few small sales of low phosphorus iron have been made at \$30 for the copper free and \$28 for the copper bearing, with freight rate added.

The following quotations are, with the exception of those on low phosphorus iron, for delivery at Philadelphia, and include freight rates varying from 84 cents to \$1.51 per gross ton:

East. Pa. No. 2 plain, 1.75 to 2.25 sil.	\$20.84 to \$21.26
East. Pa. No. 2X, 2.25 to 2.75 sil.	21.34 to 21.76
Virginia No. 2 plain, 1.75 to 2.25 sil.	27.74 to 28.74
Virginia No. 2X, 2.25 to 2.75 sil.	28.24 to 29.74
Basic deliv. eastern Pa.	20.25
Gray forge	21.00 to 22.00
Malleable	23.00 to 24.00
Standard low phos. (f.o.b. furnace)	30.00
Copper bearing low phos. (f.o.b. furnace)	28.00

Ferroalloys.—Eastern makers continue to quote \$58.35, seaboard, on standard ferromanganese, which is also the British quotation. One or two small inquiries for spiegelisen are in the market. The common quotation is \$25, furnace, for the 18 to 22 per cent grade.

Billets.—Forging billets have been sold at \$32, Pittsburgh. Open-hearth rerolling billets are quite freely quoted at \$28, Pittsburgh.

Old Material.—Dullness continues in the scrap market and prices are virtually unchanged. Forge fire is slightly higher. One Eastern steel company, which had been paying \$12.50 for steel, now offers only \$12. Other sales have been made at \$11.50, delivered. We quote for delivery at consumers' works in this district as follows:

No. 1 heavy molting steel	\$11.50 to \$12.00
Scrap rail	11.50 to 12.00
Steel rails, rerolling	16.25 to 16.75
No. 1 low phos., heavy 0.04 and under	17.00 to 18.00
Car wheels	16.50 to 17.00
No. 1 railroad wrought	14.50 to 15.00
No. 1 yard wrought	12.00 to 12.50
No. 1 forge fire	10.00 to 10.50
Bundled sheets (for steel works)	9.50 to 10.00
No. 1 busheling	12.00 to 13.00
No. 2 busheling	10.00 to 11.00
Turnings (short shoveling grade for blast furnace use)	9.00 to 9.50
Mixed borings and turnings (for blast furnace use)	9.00 to 9.50
Machine-shop turnings (for rolling mill and steel works use)	9.00 to 9.50
Heavy axle turnings (or equivalent)	9.50 to 10.00
Cast borings (for steel works and rolling mills)	11.50 to 12.00
Cast borings (for chemical plants)	13.50 to 14.00
No. 1 cast	16.50 to 17.00
Railroad grate bars	14.00 to 14.50
Stove plate (for steel plant use)	14.00 to 14.50
Railroad malleable	13.50 to 14.00
Wrought iron and soft steel pipes and tubes (new specifications)	11.50 to 12.00
Iron car axles	No market
Steel car axles	17.00 to 18.00

Finished Steel.—Eastern steel mills have done little business within the past week, but are expecting an improving demand within the next few weeks, as many consumers are known to be in need of steel and have been merely postponing purchases until the new year. Jobbers, in particular, are in need of stock. A slightly better demand for plates is reported by one Eastern

mill, which has booked several orders for boiler steel. Prices of plates, shapes and bars are nominally held at 1.50c., Pittsburgh, and, some Eastern companies say they will not shade these prices. As no business of importance has been completed within the past week the mills have experienced little difficulty in adhering to this schedule.

Warehouse Business.—Prices on steel products out of stock are unchanged and for Philadelphia delivery are as follows:

Soft steel bars and small shapes, 2.65c.; iron bars (except bands), 2.65c.; round edge iron, 2.80c.; round edge steel, iron finish, 1½ x ½ in., 2.95c.; round edge steel planished, 3.70c.; tank steel plates, ¼-in. and heavier, 2.75c.; tank steel plates, 3/16-in., 2.925c.; blue annealed steel sheets, No. 10 gage, 3.50c.; light black sheets, No. 28 gage, 4c.; galvanized sheets, No. 28 gage, 5c.; square twisted and deformed steel bars, 2.65c.; structural shapes, 2.60c.; diamond pattern plates, ¼-in., 4.60c.; 3/16-in., 4.785c.; ¼-in., 4.90c.; spring steel, 4.10c.; round cold-rolled steel, 3.25c.; squares and hexagons, cold-rolled steel, 3.75c.; steel hoops, No. 13 gage and lighter, 3.50c.; steel bands, No. 12 gage to 3/16-in., inclusive, 3.25c.; iron bands, 3.90c.; rails, 2.75c.; tool steel, 8c.; Norway iron, 5c.; toe steel, 4.50c.

New York

NEW YORK, Jan. 3.

Pig Iron.—The most satisfactory feature of the market is the insistence of buyers upon prompt delivery, which indicates that there is demand for all the iron that has been bought. Inquiries amounting to several thousand tons are still pending, but no new business of importance has developed and the past week has been a very quiet one.

We quote delivered in the New York district as follows, having added to furnace prices \$2.52 freight from eastern Pennsylvania, \$5.46 from Buffalo and \$6.16 from Virginia:

East. Pa. No. 1 fdy., sil. 2.75 to 3.25	\$22.52 to \$23.02
East. Pa. No. 2X fdy., sil. 2.25 to 2.75	23.02 to 23.52
East. Pa. No. 2 fdy., sil. 1.75 to 2.25	22.52 to 23.02
Buffalo, sil. 1.75 to 2.25	24.46 to 24.96
No. 2 Virginia, sil. 1.75 to 2.25	27.16 to 28.16

Ferroalloys.—New demand for ferromanganese is confined to carload lots and the inquiries for 500 tons, which have been before the market for the past two weeks, have not yet resulted in orders. Quotations are unchanged. A few carload lots of spiegelisen have been sold at the prevailing quotation, but this market also is devoid of activity. The manganese ore market lacks life and quotations are nominal. Demand for 50 per cent ferrosilicon is confined to carload lots at prevailing quotations. Following are prevailing quotations:

Ferroalloys

Ferromanganese, domestic, delivered, per ton	\$60.00 to \$63.00
Ferromanganese, British, seaboard, per ton	\$58.35
Spiegelisen, 20 per cent, furnace, per ton	\$26.00
Ferrosilicon, 50 per cent, delivered, per ton	\$55.00 to \$57.00
Ferrotungsten, per lb. of contained metal, 40c. to 50c.	
Ferromanganese, 6 to 8 per cent carbon, 60 to 70 per cent Cr., per lb. Cr., delivered	11c. to 14c.
Ferrovandium, per lb. of contained vanadium	\$4.50
Ferrocobaltititanium, 15 to 18 per cent, net ton	\$200.00
Ferrocobaltititanium, 15 to 18 per cent, 1 ton to carloads, per ton	\$220.00
Ferrocobaltititanium, 15 to 18 per cent, less than 1 ton, per ton f.o.b. Niagara Falls, N. Y.	\$250.00

Ores

Manganese ore, foreign, per unit, seaboard	20c.
Tungsten ore, per unit, in 60 per cent concentrates	\$2.50 up
Chrome ore, 40 to 45 per cent Cr ₂ O ₃ , crude, per net ton, Atlantic seaboard	\$20.00 to \$25.00
Chrome ore, 45 to 50 per cent Cr ₂ O ₃ , crude, per net ton, Atlantic seaboard	\$30.00
Molybdenum ore, 85 per cent concentrates, per lb. of MoS ₃ , New York	50c. to 60c.

Finished Iron and Steel.—While leading mills claim that they are not attempting longer to meet the severe competition which has marked recent negotiations, little has occurred to establish any stiffening in prices. Buyers firmly believe, for example, that even a carload lot of plates can be bought on the basis of 1.40c., Pittsburgh. A fair run of business is moving. About 1500 tons of plates have been bought for the locomotives to be built by the American Locomotive Co. for the Central Railroad of New Jersey. An eastern Pennsylvania plate maker will supply 1500 to 1800 tons to a leading oil

company. A California oil company is in the market for a 6-in. oil line, taking 650 tons, and 850 tons for a pipe line for another company has probably been closed at this writing. A round lot of tin plates for three months' needs have been purchased by still another oil company. Among railroads, the New York Central has issued an inquiry for first quarter protection as follows, the understanding being that the amounts named are maximum and are not necessarily those which would actually suffice: 500 tons of billets, 3000 tons bars, shapes and plates, 750 tons nails and staples, 600 tons of black, galvanized and blue annealed sheets, 3000 tires, 25,000 boiler tubes, 5000 car axles and also frogs, switches, crossovers and the like. The Seaboard has placed with the Steel Corporation's Chickasaw car plant a total of probably 2000 cars, and while no other new car business is noted, some negotiation is under way on 4000 cars for the Norfolk & Western. The Erie Railroad has placed a total of 35,000 tons of rails. In structural steel lines the largest new project is a 5000-ton structure for the Bank of America on Wall Street. Awards include 400 tons for a factory at Providence for the Textile Finishing Machine Co.; 1400 tons to the American Bridge Co., for Baltimore & Ohio bridges; 500 tons to the Bethlehem Steel Bridge Corporation, for the Gunpowder River Bridge, and 250 tons to the Phoenix Bridge Co., for a ravine crossing of the Palisades Park highway. No decision has yet been announced respecting 2600 tons for the Philadelphia Museum of Art. The Knickerbocker Ice Co. is inquiring for 700 tons for a storehouse.

We quote for mill shipments, New York, as follows: Soft steel bars, 1.88c.; plates, 1.83c. to 1.88c.; structural shapes, 1.88c.; bar iron, 1.98c. to 2.03c. On export shipments the freight rate is now 28 5/8c. per 100 lb., instead of 38c., the domestic rate.

Cast-Iron Pipe.—Bids were opened last week for 500 tons for Providence, R. I., the Warren Foundry & Machine Co., Phillipsburg, N. J., being low bidder; also for 700 tons for New Bedford, Mass., the low bidder being R. D. Wood & Co., Philadelphia. In both instances, sizes ranged from 8 to 16 in. Business is dull, but much better than a year ago. We quote per net ton, f.o.b. New York, carload lots, as follows: 6-in. and larger, \$47.30; 4-in. and 5-in., \$52.30; 3-in., \$62.30, with \$4 additional for Class A and gas pipe.

Coke.—Effective Jan. 1, the by-product coke plants in New England reduced prices from \$10.66 to \$10.40, delivered in New England where the freight rates are less than \$3.40. This is equivalent to \$4.24, Connellsville base.

Old Material.—The market has at least this favorable feature—prices have not declined during the past week, though a drop is expected during the holiday period. Dealers are having many cars rejected because the buyer alleges they do not meet specifications. Then the buyer offers them a dollar or so less and because of the high cost of moving dealers accept his offer. This means that New York dealers have disposed of heavy melting steel at as low as \$6, New York.

Buying prices per gross ton, New York, follow:

Heavy melting steel, yard.....	\$8.00 to \$8.50
Steel rails, short lengths, or equivalent.....	8.50 to 9.00
Re-rolling rails.....	9.50 to 10.00
Relaying rails, nominal.....	28.00 to 30.00
Steel car axles.....	10.00 to 10.50
Iron car axles.....	18.50 to 19.00
No. 1 railroad wrought.....	10.50 to 11.00
Wrought iron track.....	8.50 to 9.00
Forge fire.....	5.00 to 5.50
No. 1 yard wrought, long.....	9.00 to 9.50
Cast borings (clean).....	6.50 to 7.00
Machine-shop turnings.....	4.00 to 5.00
Mixed borings and turnings.....	4.00 to 4.50
Iron and steel pipe (1 in. diam. not under 2 ft. long).....	6.75 to 7.25
Stove plate.....	9.00 to 10.00
Locomotive grate bars.....	9.00 to 10.00
Malleable cast (railroad).....	8.00 to 8.50
Car wheels.....	10.50 to 11.50

Prices which dealers in New York and Brooklyn are quoting to local foundries, per gross ton, follow:

No. 1 machinery cast.....	\$16.50 to \$17.00
No. 1 heavy cast (columns, building materials, etc.), cupola size.....	15.50 to 16.00
No. 1 heavy cast, not cupola size.....	14.00 to 14.50
No. 2 cast (radiators, cast boilers, etc.).....	10.00 to 10.50

Warehouse Business.—The market was practically at a standstill during the week from Christmas to New Year's. About the only noticeable activity was in payments of accounts by customers. No price changes were made, but before the end of January there may be a slight revision of quotations on some items. We quote prices on page 140.

High-Speed Steel.—The market was featureless this week. Prices continue nominally at 85c. per lb. to 95c. per lb. for 18 per cent tungsten high-speed steel, with special brands of some producers selling up to \$1.05 per lb.

Cincinnati

CINCINNATI, Jan. 3.

Pig Iron.—The market was unusually quiet during the holiday period, and few sales were recorded. The majority of these were for carload lots, and in no instance were more than 100 tons involved. The inquiry is also light, some of those mentioned in last week's report not having been closed. There is some inquiry for ferroalloys, however, one being for 800 tons and one for 500. Prices are inclined to be softer in pig iron, and Southern iron is now definitely established on a \$16.50, Birmingham, base, with reports current that even this could be shaded on large tonnages. Some resale Southern iron is reported to have been sold in carload lots at \$16.25, but \$16.50 more truly represents the market to-day. In the North, \$19 to \$20 continues as the range, though it is reported that on an inquiry for 300 tons of malleable, one Lake furnace intimated that it would shade \$19 to get the order. Chicago furnaces are understood to have adopted \$20 as the base, and will not sell for other than January delivery. Nineteen fifty to twenty is still the asking price on southern Ohio irons, depending on location of the furnace competition. Portsmouth and Sarah furnaces were blown in while Jisco silvery stack went out during the week. Union foundries in Cincinnati are closed following the posting of a notice by the employers that, effective Jan. 3, molders' wages would be reduced to \$5. Negotiations regarding a wage scale have been going on for some time, and it is likely they will be continued. Union workmen have refused to consent to the reduction and are remaining away from the shops.

Based on freight rates of \$4.50 from Birmingham and \$2.52 from Ironton, we quote f.o.b. Cincinnati:

Southern coke, sil. 1.75 to 2.25 (base)	\$21.00
Southern coke, sil. 2.25 to 2.75 (No. 2 soft)	21.50
Ohio silvery, 8 per cent sil.	32.02
Southern Ohio coke, sil. 1.75 to 2.25 (No. 2)	\$22.02 to 22.52
Basic, Northern	22.02
Malleable	22.52

Finished Material.—The customary holiday quiet prevailed during the past two weeks in the market for finished material, but strange as it may seem, the orders booked during the month of December by local offices of some steel companies were heavier than for the same month of the past three years. These orders were made up mostly of small lots and included bars, shapes, plates and wire products. During the week, several orders for 200 tons of plates were booked by an independent mill and two lots of structural shapes were also taken by another interest. Prices are inclined to be firmer and 1.50c. is being rigidly held to on current orders for bars, shapes and plates. On wire products \$2.50, Pittsburgh, is now the general quotation on nails, and \$2.25 per 100 lb. on plain wire. There are few inquiries of size before the trade. The Big Four Railroad will close bids this week on its first quarter requirements for steel, wire, bolts, axles, etc. No tonnage is specified. In the structural field the only new project to come up is the Capitol Theater at Frankfort, Ky., in which 250 tons of steel is involved. Bids will close on Jan. 4. The General Iron Works Co., Cincinnati, will fabricate 250 tons for the Elks Temple in that city. The Sneed Architectural Iron Works will fabricate 190 tons for an addition to the plant of the Standard Sanitary Mfg. Co. at Louisville, Ky., and the Moss Iron Works, Wheeling, has been awarded 125 tons for the Ravenna, Ohio, high school. A small building for the Procter & Gamble Co. at Staten Island, N. Y.,

involving 60 tons has been let to an Eastern fabricator. Bids will close Jan. 8 for an auditorium and market building at Memphis, Tenn., 3500 tons of steel being required. The architects on the 12-story warehouse building for the Belknap Hardware Co., Louisville, Ky., have postponed the opening of bids until Jan. 9. Bids are being taken on both a steel and reinforced concrete building.

Old Material.—There is no activity in the scrap market. Two steel plants operating in this district today notified dealers to suspend shipments till further advised. Locally the scrap market is extremely dull. Some blast furnace scrap was sold during the week for delivery to a southern Ohio furnace which is resuming operations. Prices are unchanged.

We quote dealers' buying prices, f.o.b.

Per Gross Ton	
Bundled sheets	\$3.50 to \$4.00
Iron rails	12.00 to 12.50
Relaying rails, 50 lb. and up	25.00 to 26.00
Revolving steel rails	10.50 to 11.00
Heavy melting steel	9.00 to 9.50
Steel rails for melting	9.00 to 9.50
Car wheels	12.00 to 13.00

Per Net Ton	
No. 1 railroad wrought	8.50 to 9.50
Cast borings	3.00 to 3.50
Steel turnings	2.00 to 2.50
Railroad cast	12.00 to 12.50
No. 1 machinery	13.50 to 14.50
Burnt scrap	7.50 to 8.00
Iron axles	15.50 to 16.50
Locomotive tires (smooth inside)	9.50 to 10.00
Pipes and flues	4.00 to 4.50

Boston

BOSTON, Jan. 3.

Pig Iron.—Eastern Pennsylvania furnaces are talking higher prices and are more insistent on silicon differentials, and yet three inquiries for 500 tons each brought out lower prices this week, by at least those furnaces that took the business. In addition, one of these lots sold for second quarter delivery, business furnaces insist they do not want just now. The weakness of these eastern Pennsylvania furnace prices naturally has influenced Buffalo furnace quotations and the market for these two kinds of irons, in the closing days of 1921, were about as weak as at any previous period of the year. Eastern Pennsylvania No. 2 X iron sold this week at \$19.50, furnace, or \$23.68 delivered, tax paid, and Buffalo No. 2 X on the same delivered basis, tax paid, which brings the price at the furnace down to approximately \$18. No sales of Virginia iron are reported and prices are nominal. Business in Alabama iron is confined to an occasional car for mixture purposes, and the market is \$1 lower in sympathy with sales made in the South. The most important sales reported this week in the New England territory are 250 tons No. 2 X and 250 tons No. 2 plain, eastern Pennsylvania, first quarter delivery, to a maker of textile machinery; 500 tons No. 2 X eastern Pennsylvania, second quarter delivery, to a Vermont melter; 350 tons eastern Pennsylvania and 300 tons Buffalo No. 1 X, and 150 tons eastern Pennsylvania and 100 tons Buffalo No. 2 X, first quarter delivery, to the Framingham Foundries, Framingham, Mass.; and 150 tons Northern No. 2 X, first quarter delivery, to a Portland, Me., stove maker. One furnace representative reports an inquiry for several thousand tons of iron for first and second quarter delivery, but full details are lacking.

We quote delivered at common New England points as follows, having added to furnace prices \$4.06 freight from eastern Pennsylvania, \$5.46 from Buffalo, \$6.58 from Virginia and \$10.66 from Alabama:

East Penn., silicon 2.25 to 2.75	\$24.06 to \$25.06
East Penn., silicon 1.75 to 2.25	23.56 to 24.56
Buffalo, silicon 2.25 to 2.75	24.46 to 25.96
Buffalo, silicon 1.75 to 2.25	24.46 to 25.46
Virginia, silicon 2.25 to 2.75	29.08 to 30.08
Virginia, silicon 1.75 to 2.25	28.58 to 29.58
Alabama, silicon 2.25 to 2.75	28.16
Alabama, silicon 1.75 to 2.25	27.66

Cast Iron Pipe.—The City of New Bedford, Mass., this week opened bids on 705 tons 2 to 12-in. pipe and 14 tons of specials, and the City of Providence, R. I., on 500 tons b and s pipe, made in accordance with Providence specifications. R. D. Wood & Co. were low bidders on the New Bedford lot, there being three other bidders. The actual award will be made within ten days. The Warren Foundry & Machine Co., Phillips-

burg, N. H., was lowest of three bidders on the Providence lot. Salem, Mass., has awarded 1085 ft. of pipe and a small list of specials to the Donaldson Iron Co., Emaus, Pa., against three other bidders. The same company is awarded 900 tons of 4 to 12-in. gas pipe, first half delivery, by the Boston Consolidated Gas Co., Boston. Pipe makers are quoting as heretofore, namely, per net ton f.o.b. Boston and district, in carload lots, 3-in., \$66.70; 4-in., \$56.70; 6-in., \$50.70; 10-in. and larger, \$49.70, with \$4 differentials on class A and gas pipe.

Finished Iron and Steel.—The Boston Structural Steel Co., Inc., Cambridge, Mass., is awarded 440 tons of structural steel for a local hospital addition, 214 tons for a Brookline, Mass., high school, 150 tons for a Lowell, Mass., school, and approximately 100 tons for a Newton, Mass., high school, a total of about 900 tons. Figures will shortly be out for a Kresge store, Boston, and a two-story addition to a large dry goods store, Boston. Plans are being made for a large hotel, Boston, but the steel probably will be placed through New York. Practically no bars were purchased from the mills this week, and plate tonnages booked were unimportant. The market on plates, shapes and bars is generally 1.50c., Pittsburgh. Wire products, especially poultry netting, are in demand, and New England mills are operating at close to capacity.

Jobbers now quote: Soft steel bars, \$2.71½ per 100 lb. base, flats, \$3.21½; concrete bars, \$2.20 to \$2.71½; tire steel, \$4 to \$4.40; spring steel, open hearth, \$4.50; crucible, \$11.50; steel bands, \$3.31½ to \$3.78; steel hoops, \$3.31½; toe rail steel, \$5; cold rolled steel, \$3.55 to \$4.05; structural steel, \$2.71½; plates, \$2.81½ to \$2.99; No. 10 blue annealed sheets, \$3.73; No. 28 black sheets, \$4.50; No. 28 galvanized sheets, \$5.50; refined iron, \$2.71½; best refined, \$4.25; Wayne iron \$5.50; Norway iron, \$5.50 base.

Old Material.—Local old material firms report almost nothing being done in the way of new sales. The little activity noted concerns the filling of contracts placed by Pennsylvania mills some time back. These consumers at the moment show little inclination to cover future requirements, while the daily melt of the average New England foundry is such that requirements can be obtained from local scrap dealers. Market prices, due to the lack of business, naturally have little opportunity to change. They are generally described here as firm, and dealers anticipate securing ruling or higher prices when trading resumes.

The following prices are for gross ton lots delivered consumers' points:

No. 1 machinery cast	\$18.00 to \$19.00
No. 2 machinery cast	16.00 to 17.00
Stove plate	14.50 to 15.00
Railroad malleable	13.50 to 14.00

The following prices are offered per gross ton lots f.o.b. Boston rate shipping points:

No. 1 heavy melting steel	\$7.50 to \$8.00
No. 1 railroad wrought	11.00 to 11.50
No. 1 yard wrought	9.00 to 9.50
Wrought pipe (1 in. in diameter, over 2 ft. long)	7.00 to 7.50
Machine shop turnings	3.50 to 3.75
Cast iron borings, rolling mill	5.75 to 6.50
Cast iron borings, chemical	7.00 to 7.25
Blast furnace borings and turnings	3.50 to 3.75
Forged scrap and bundled skeleton	4.50 to 5.00
Steel car axles and shafting	11.50 to 12.00
Car wheels	11.00 to 11.50
Revolving rails	10.00 to 10.50

St. Louis

ST. LOUIS, Jan. 3.

Pig Iron.—The sale for pig iron the last week has been confined largely to carload orders, one order of 200 tons of foundry iron being placed. Inquiries are for carloads mostly, and these were of fair volume. Most of the trade still was waiting for the New Year before placing orders for more than actual requirements. The market on Northern iron may be said to be \$19, Chicago, while Southern iron is at \$16.50, Birmingham.

We quote delivered consumers' yards, St. Louis, as follows, having added to furnace prices \$2.88 freight and war tax from Chicago and \$5.91 from Birmingham:

Northern foundry, sil. 1.75 to 2.25	\$21.88
Northern malleable, sil. 1.75 to 2.25	21.88
Basic	21.88
Southern foundry, sil. 1.75 to 2.25	22.41

Finished Iron and Steel.—The business from rail-

(Continued on page 132)

Prices Finished Iron and Steel, f.o.b. Pittsburgh

Freight Rates

Freight rates from Pittsburgh on finished iron and steel products, in carload lots, to points named, per 100 lb., are as follows:

Philadelphia, domestic...	\$0.35	Kansas City	\$0.815
Philadelphia, export...	0.285	Kansas City (pipe)...	0.77
Baltimore, domestic...	0.335	St. Paul	0.685
Baltimore, export	0.255	Omaha	0.815
New York, domestic...	0.38	Omaha (pipe)	0.77
New York, export	0.285	Denver	1.35
Boston, domestic	0.415	Denver (wire products) ..	1.415
Boston, export	0.285	Pacific Coast	1.665
Buffalo	0.295	Pacific Coast, ship plates ..	1.335
Cleveland	0.24	Birmingham	0.765
Detroit	0.325	Jacksonville, all rail	0.565
Cincinnati	0.325	Jacksonville, rail and	
Indianapolis	0.345	water	0.46
Chicago	0.38	New Orleans	0.515
St. Louis	0.475		

The minimum carload to most of the foregoing points is 36,000 lb. To Denver the minimum loading is 40,000 lb., while to the Pacific Coast on all iron and steel products, except structural material, the minimum is 80,000 lb. On the latter item the rate applies to a minimum of 50,000 lb., and there is an extra charge of 9c. per 100 lb. on carloads of a minimum of 40,000 lb. On shipments of wrought iron and steel pipe to Kansas City, St. Paul, Omaha and Denver the minimum carload is 46,000 lb. On iron and steel items not noted above the rates vary somewhat and are given in detail in the regular railroad tariffs.

Rates from Atlantic Coast ports (i.e., New York, Philadelphia and Baltimore) to Pacific Coast ports of call on most steamship lines, via the Panama Canal, are as follows: Pig iron, 55c.; ship plates, 75c.; ingot and muck bars, structural steel, common wire products, including cut or wire nails, spikes and wire hoops, 75c.; sheets and tin plates, 60c. to 75c.; rods, wire rope, cable and strands, \$1; wire fencing, netting and stretcher, 75c.; pipe, not over 8 in. in diameter, 75c.; over 8 in. in diameter, 2 1/4c. per in. or fraction thereof additional. All prices per 100 lb. in carload lots, minimum 40,000 lb.

Structural Material

I-beams, 3 to 15 in.; channels, 3 to 15 in.; angles, 3 to 6 in., on one or both legs, 1/4 in. thick and over, and zebs, structural sizes, 1.50c.

Sheared plates, 1/4 in. and heavier, tank quality, 1.50c.

Wire Products

Wire nails, \$2.50 base per keg; galvanized, 1 in. and longer, including large-head barbed roofing nails, taking an advance over this price of \$1.25 and shorter than 1 in., \$1.75; bright Bessemer and basic wire, \$2.25 per 100 lb.; annealed fence wire, Nos. 6 to 9, \$2.25; galvanized wire, \$2.75; galvanized barbed wire, \$3.15; galvanized fence staples, \$3.15; painted barbed wire, \$2.65; polished fence staples, \$2.65; cement-coated nails, per count keg, \$2.00; these prices being subject to the usual advances for the smaller trade, all f.o.b. Pittsburgh, freight added to point of delivery, terms 10 days, net, less 2 per cent off for cash in 10 days. Discounts on woven-wire fencing are 68 to 70 1/2 per cent off list for carload lots; 67 to 69 1/2 per cent for 1000-rod lots, and 66 to 68 1/2 per cent for small lots, f.o.b. Pittsburgh.

Bolts and Nuts

Machine bolts, small, rolled threads, 70, 10 and 5 to 70, 10 and 7 1/2 per cent off list
Machine bolts, small, cut threads, 70 and 5 to 70 and 10 per cent off list
Machine bolts, larger and longer, 65, 10 and 5 to 70 and 10 per cent off list
Carriage bolts, 3/4 in. x 6 in.:
Smaller and shorter rolled threads, 65, 10 and 10 per cent off list
Cut threads, 65 and 10 to 70 per cent off list
Larger and larger sizes, 65 and 10 to 70 per cent off list
Lag bolts, 70 and 10 to 70, 10 and 5 per cent off list
Pilot bolts, Nos. 1, 2 and 3 heads, 60 and 10 per cent off list
Other style heads, 20 per cent extra
Machine bolts, c.p.c. and t. nuts, 1/4 in. x 4 in.:
Smaller and shorter, 65 and 5 per cent off list
Larger and longer sizes, 65 per cent off list
Hot pressed sq. or hex. blank nuts, \$5.50 off list
Hot pressed nuts, tapped, \$5.00 to \$5.25 off list
C.p.c. and t. sq. or hex. blank nuts, \$5.25 off list
C.p.c. and t. sq. or hex. blank nuts, tapped, \$5.00 off list
Semi-finished hex. nuts:
1/4 in. to 9/16 in. inclusive, 80, 10 and 10 per cent off list
Small sizes S. A. E., 80, 10, 10 and 10 per cent off list
1/4 in. to 1 in. inclusive, U. S. S. and S. A. E., 70, 10, 10 and 10 per cent off list
Stove bolts in packages, 80, 10 and 5 per cent off list
Stove bolts in bulk, 80, 10 and 7 1/2 per cent off list
Tire bolts, 65, 10 and 10 per cent off list
Track bolts, carloads, 3c. to 3.25c. base
Track bolts, less than carloads, 4c. to 4.25c.

Upset Square and Hex. Head Cap Screws

1/4 in. and under, 80 and 10 per cent off list
9/16 in. to 1 in., 80 and 10 per cent off list

Upset Set Screws

1/4 in. and under, 80, 10 and 5 to 85 per cent off list
9/16 in. to 1 in., 80, 10 and 5 to 85 per cent off list

Milled Square and Hex. Cap Screws

All sizes, 75 and 10 per cent off list

Milled Set Screws

All sizes, 70, 10 and 10 per cent off list

Rivets

Large structural and ship rivets, \$2.25
Large boiler rivets, 2.35
Small rivets, 70, 10 and 10 per cent off list

Wire Rods

No. 5 common basic or Bessemer rods to domestic consumers, \$36 to \$38; chain rods, \$36 to \$38; screw stock rods, \$41 to \$43; rivet and bolt rods and other rods of that character, \$36 to \$38; high carbon rods, \$43 to \$50, depending on carbons.

Railroad Spikes and Track Bolts

Railroad spikes, 9/16-in. and larger, \$2.25 base per 100 lb. in lots of 200 kegs of 200 lb. each or more; spikes, 1/2-in., 3/4-in. and 7/16-in., \$2.35 to \$2.40 base; 5/16-in., \$2.35 to \$2.40 base. Boat and barge spikes, \$2.35 to \$2.40 base per 100 lb. in carload lots of 200 kegs or more, f.o.b. Pittsburgh. Track bolts, 3c. to 3.25c. base per 100 lb. Tie plates, \$2 per 100 lb. Angle bars, \$2.40 per 100 lb.

Terne Plates

Prices of terne plates are as follows: 8-lb. coating, 200 lb., \$9.30 per package; 8-lb. coating, 1 C., \$9.60; 15-lb. coating, 1 C., \$11.80; 20-lb. coating, 1 C., \$13; 25-lb. coating, 1 C., \$14.25; 30-lb. coating, 1 C., \$15.25; 35-lb. coating, 1 C., \$16.25; 40-lb. coating, 1 C., \$17.25 per package, all f.o.b. Pittsburgh, freight added to point of delivery.

Iron and Steel Bars

Steel bars, 1.50c. from mill. Refined bar iron, 2c. to 2.10c.

Welded Pipe

The following discounts are to jobbers for carload lots on the Pittsburgh basing card:

Butt Weld			Iron		
Inches	Steel		Inches	Black	Galv.
1/2	Black	54 1/2	1/2 to 3/4	+ 3 1/2	+ 22 1/2
3/4 to 1	60	33 1/2	3/4 to 1	36 1/2	18 1/2
1 to 1 1/2	65	50 1/2	1 to 1 1/2	42 1/2	27 1/2
1 1/2 to 2	69	56 1/2			
2 to 3	71	58 1/2			

Lap Weld

2 1/2 to 6	64	2	25 1/2
7 to 8	68	2 1/2 to 6	29 1/2
9 to 12	65	7 to 12	27 1/2
	64		

Butt Weld, extra strong, plain ends

1/2	50 1/2	33	1/2 to 3/4	+ 4 1/2	+ 37 1/2
3/4 to 1	56	38 1/2	3/4 to 1	35 1/2	28 1/2
1 to 1 1/2	62	50 1/2	1 to 1 1/2	42 1/2	28 1/2
1 1/2 to 2	67	55 1/2			
2 to 3	69	57 1/2			
	70	58 1/2			

Lap Weld, extra strong, plain ends

2	62	50 1/2	2	40 1/2	27 1/2
2 1/2 to 4	66	54 1/2	2 1/2 to 4	43 1/2	31 1/2
4 1/2 to 6	65	53 1/2	4 1/2 to 6	42 1/2	30 1/2
7 to 8	61	47 1/2	7 to 8	35 1/2	23 1/2
9 to 12	56	41 1/2	9 to 12	30 1/2	18 1/2

To the large jobbing trade the above discounts are increased by one point, with supplementary discounts of 5 and 2 1/2 per cent.

Boiler Tubes

The following are the discounts for carload lots f.o.b. Pittsburgh:

Lap Welded Steel		Charcoal Iron	
1 1/4 in.	26 1/2	1 1/4 in.	5
2 to 2 1/4 in.	41	1 1/2 to 1 3/4 in.	15
2 1/4 to 3 in.	52	2 to 2 1/4 in.	25
3 1/4 to 13 in.	57	2 1/2 to 3 in.	30
		3 1/4 to 4 1/2 in.	32

Standard Commercial Seamless Boiler Tubes

New discounts have been adopted on standard commercial seamless boiler tubes, but manufacturers are not yet ready to announce them for publication, and for that reason we publish no discounts this week.

Sheets

Prices for mill shipments on sheets of standard gage in carloads, f.o.b. Pittsburgh, follow:

Blue Annealed

Cents per Lb.		Cents per Lb.	
No. 8 and heavier	2.20	Nos. 11 and 12	2.30
Nos. 9 and 10 (base)	2.25	Nos. 13 and 14	2.35
		Nos. 15 and 16	2.45

Box Annealed, One Pass Cold Rolled

Cents per Lb.		Cents per Lb.	
Nos. 17 to 21	2.80	No. 28 (base)	3.00
Nos. 22 to 24	2.85	No. 29	3.10
Nos. 25 and 26	2.90	No. 30	3.20
No. 27	2.95		

Galvanized

Cents per Lb.		Cents per Lb.	
Nos. 10 and 11	3.00	Nos. 25 and 26	3.70
Nos. 12 to 14	3.10	No. 27	3.85
Nos. 15 and 16	3.25	No. 28 (base)	4.00
Nos. 17 to 21	3.40	No. 29	4.25
Nos. 22 to 24	3.55	No. 30	4.50

Tin-Mil Black Plate

Cents per Lb.		Cents per Lb.	
Nos. 15 and 16	2.80	No. 28 (base)	3.00
Nos. 17 to 21	2.85	No. 29	3.05
Nos. 22 to 24	2.90	No. 30	3.05
Nos. 25 to 27	2.95	Nos. 30 1/2 and 31	3.10

NON-FERROUS METALS

The Week's Prices

		Cents Per Pound for Early Delivery					
		Copper, New York Straits		Lead		Zinc	
		Lake	Electro-lytic*	New York	St. Louis	New York	St. Louis
Dec							
28.....	13.87½	13.62½	33.00	4.70	4.40	5.17½	4.82½
29.....	13.87½	13.62½	32.87½	4.70	4.40	5.20	4.85
30.....	13.87½	13.62½	33.12½	4.70	4.40	5.20	4.85
31.....	13.87½	13.62½	.....	4.70	4.40	5.20	4.85
Jan.							
3.....	13.87½	13.62½	32.75	4.70	4.40	5.17½	4.82½

*Refinery quotation.

New York

NEW YORK, Jan. 3.

At the beginning of the new year the tone of all the markets is optimistic and the price tendency is strong. The light demand for copper is regarded as temporary and prices are unchanged and firm. The tin market is only moderately active at higher prices than a week ago. Demand for lead is seasonal at unchanged prices, while the demand for zinc is light with quotations unchanged from a week ago.

Copper.—Demand for copper has been exceedingly light, as measured by both inquiry and sales, but prospects for the immediate future are bright. There has been no change in electrolytic prices and the metal is quoted at 13.62½c., refinery, or 13.87½c., delivered, for January and first quarter, although some producers are asking slightly more for delivery beyond January. Inquiry has not broadened beyond the first quarter, unless included in business for the first half, which so far is light. The January quotation of the larger producers for the first quarter is 14c., delivered, or 13.75c., refinery.

Copper Averages.—The average price of Lake copper for the month of December, based on daily quotations in THE IRON AGE, is 13.78c. The average price for electrolytic copper is 13.55c.

Tin.—The closing week of the year has been featured by fairly good sales of early arrivals and actual spot metal, but the total has been small. In futures very little business has been done, although on Friday a few sales were made at 33c. to 33.12½c. Optimism prevails and better buying is expected early in January. Spot Straits tin was quoted to-day at 32.75c., New York, and quotations in London were about £3 per ton lower than a week ago at £168 12s. 6d. for spot standard, £170 10s. for future standard and £170 for spot Straits, with the Singapore price at £173 5s. on Monday. Deliveries into consumption for December were 3710 tons and the stock on Dec. 31 and the quantity in landing were 516 tons and 1180 tons, respectively.

Lead.—Sales of fairly liberal proportions were made last Friday on a basis of 4.40c., St. Louis; otherwise the market has been quiet. The leading interest continues to quote 4.40c., both New York and St. Louis, while in the outside market the St. Louis quotation has stiffened at the firm price of 4.40c., with the New York quotation at 4.75c.

Zinc.—Sales of carload lots constitute the present demand which is light. Prime Western for early delivery is quoted by some sellers at 4.82½c. and by others at 4.85c., St. Louis, sales having been made at both of these levels. We quote the market for January or 30-day delivery at 4.82½c., St. Louis, or 5.17½c., New York, with February and March five points higher, respectively. While inquiry is light for these positions it is believed that demand will be better as the months advance.

Antimony.—The market is quiet and unchanged at 4.50c., New York, duty paid, for wholesale lots for early delivery.

Aluminum.—Virgin metal, 98 to 99 per cent pure, in wholesale lots for early delivery is quoted at 19c.,

f.o.b. plant, but the same grade is quoted by importers at 17c. to 18c., New York, duty paid. Demand is light.

Old Metals.—Prices are firm though very few transactions are reported. Dealers' selling prices are as follows:

	Cents Per Lb.
Copper, heavy and crucible.....	13.25
Copper, heavy and wire.....	12.50
Copper, light and bottoms.....	10.00
Heavy machine composition.....	10.25
Brass, heavy.....	8.00
Brass, light.....	6.00
No. 1 red brass or composition turnings.....	8.25
No. 1 yellow rod brass turnings.....	6.25
Lead, heavy.....	4.25
Lead, tea.....	3.25
Zinc.....	3.00

Chicago

JAN. 3.—The metals were very quiet between the holidays, but copper, lead and zinc made slight advances. The old metal prices remain unchanged. We quote in carload lots: Lake copper, 14c.; tin, 33.75c.; lead, 4.50c.; spelter, 4.90c.; antimony, 6.50c., in less than carload lots. On old metals we quote: Copper wire, crucible shapes and copper clips, 10.75c.; copper bottoms, 8c.; red brass, 8.25c.; yellow brass, 5.75c.; lead pipe, 3.25c.; zinc, 2.37½c.; pewter, No. 1, 23c.; tin foil, 24c.; block tin, 26c.; all buying prices for less than carload lots.

St. Louis

JAN. 3.—Lead and zinc are slightly easier. Lead is quoted at 4.37½c., car lots, and slab zinc, 4.82½c. On old metals we quote: Light brass, 3.50c.; heavy red brass and light copper, 7c.; heavy yellow brass, 4c.; heavy copper and copper wire, 7.50c.; zinc, 2c.; pewter, 15c.; tin foil, 16c.; tea lead, 2c.; aluminum, 9c.

Copper in the United States in 1921

Smelter production of copper from ore mined in the United States was about 205,800 gross tons in 1921; refinery production was about 411,000 tons, of which 268,300 tons was from domestic material and the balance from foreign material. These figures, from the United States Geological Survey, show definite figures for eleven months and the producing companies' estimates for December.

Imports for eleven months amounted to about 142,000 gross tons, of which 30,400 tons was refined and 70,100 tons blister copper, the balance being ore, concentrates and matte. Exports for eleven months totaled about 253,000 gross tons, of which 240,000 tons was new refined copper, and 13,000 tons manufactured—wire, rods, pipes, tubes, sheets, etc.

Domestic consumption of refined copper is estimated at 255,400 gross tons, compared with 470,500 tons in 1920, as shown in the following table:

	Gross Tons	1920	1921
Refinery production:			
from domestic sources.....	527,700	268,300	
from foreign sources.....	153,600	142,900	
Imports of refined copper.....	48,700	33,500	
Stocks, Jan. 1, 1921.....	281,700	294,200	
Total available.....	1,011,700	738,900	
Exports, exclusive of manufactured	247,000	262,000	
Stocks, Dec. 31, 1921.....	294,200	221,500	
	541,200	483,500	
Domestic withdrawal's.....	470,500	255,400	

The Worcester, Mass., section A. S. M. E., held a smoker in the Boys' Trade School Tuesday evening, Jan. 3, at which C. L. Ipsen, General Electric Co., delivered an address on Mechanical Heating Problems Solved Electrically. A. M. Brewster, Atlas Die Casting Co., Worcester, will talk on Manufacturing and use of Die Castings, at a meeting of the Worcester section, on Jan. 24, at the North Works, American Steel & Wire Co. F. Harold Daniels, R. Sanford Riley Stoker Co., Worcester, also will talk, on a Closeup of Stoker Combustion, using moving pictures.

PERSONAL

Edward Worcester, vice-president in charge of sales, National Tube Co., Pittsburgh, has resigned, effective Jan. 1. Mr. Worcester has been identified actively with the tubular steel trade for more than 30 years, and has a legion of friends from the Atlantic to the Pacific who hold him in the highest esteem. He retires from active business to take a well earned rest, but will still hold an inactive connection with the National Tube Co. He will devote his time to private interests and further study of subjects in which he is vitally interested. Mr. Worcester was born in East Bridgewater, Mass., Jan. 29, 1855, and his first business connection was with the Chapman Valve Co., Boston.



EDWARD WORCESTER

He entered the employ of that company in 1870, just 52 years ago, and in 1875 had reached the position of salesman. He left that position in 1875, to become head salesman in the Chicago agency of the National Tube Works Co. From 1877 to 1882 he was salesman for Walworth Mfg. Co., Boston, and from 1882 until 1886 he was assistant secretary, and later secretary of Crane Bros. Mfg. Co., Chicago. In 1888, he was appointed local manager of the St. Louis office of the National Tube Works Co., combined with this being the position of secretary of the Western Tube Co., Keewauke, Ill., in which the National Tube Works Co., in 1890, acquired an interest. In 1897, Mr. Worcester was appointed assistant sales manager of the National Tube Works Co., McKeesport, Pa. This company was later taken over by the United States Steel Corporation, which also took over nearly every important tube plant in the country, and its name was changed to the National Tube Co. In 1903, he was appointed vice-president of the National Tube Co., in charge of sales, which position he held until his retirement. John H. Nicholson, who has been with the company for 22 years, for several years as vice-president in charge of operations of the seamless tube plants of the company, relinquishes those duties to take up those of Mr. Worcester. Mr. Nicholson was one of the owners of the Standard Seamless Tube Works, Ellwood City, Pa., which was acquired by the National Tube Co., in 1900, at which time he became affiliated with the latter. Taylor A. Allderdice, vice-president in charge of operations at all except the seamless tube works, now takes charge of operations at all plants of the company.

Peter S. Steenstrup, vice-president and general manager General Motors Export Co. New York, has been appointed assistant to Alfred P. Sloan, Jr., vice-president in charge of operations of the General Motors Corporation.

H. E. Forbes, Buffalo, has been elected president of the Pierce Arrow Motor Car Co., succeeding Col. George W. Mixter, resigned. Col. Charles Clifton will continue as chairman of the board.

Edwin C. Foster has been appointed manager of the Pittsburgh sales office of E. J. Lavino & Co., Bullitt Building, Philadelphia, manufacturers of ferromanganese and other ferroalloys. The company's new Pittsburgh office is in the Oliver Building. Mr. Foster has for some time been associated with the company at its main office in Philadelphia.

Bruce Haines, assistant manager Crawfordsville Wire & Nail Co., Crawfordsville, Ind., has resigned and will become general manager of the Davenport, Iowa, branch of the Nichols Wire & Sheet Co. Kansas City, Mo.

Ferdinand W. Roebling, John A. Roeblings' Sons

Co., Trenton, N. J., has been elected a director of the Otis Elevator Co. New York.

Col. William C. Skinner, formerly president Colt's Patent Fire Arms Mfg. Co., Hartford, Conn., has sailed for South America to be away about a month. He is recovering from a nervous illness.

S. F. Bowser, founder and president of S. F. Bowser & Co., Fort Wayne, Ind., manufacturers of pumping equipment, has retired from the presidency of the company and will be succeeded by S. B. Bechtel, general manager of the company for the past seven years.

Edward M. Adams will be first vice-president and general manager of sales of the Inland Steel Co., succeeding G. H. Jones. Walter C. Carroll will be vice-president in charge of sales for the sheet division, and Charles R. Robinson vice-president in charge of sales for the rail and track accessories division. Photographs and biographical sketches of Messrs. Jones and Carroll were published in these columns on Nov. 10 and 3, 1921, respectively. Edward Martin Adams has spent 16 years of his business career with the Inland company. He was born at Cherry Valley, Ill., on Dec. 1, 1876, and there learned telegraphy. For a number of years he served as telegraph operator and agent at various points on the western lines of the Illinois Central Railroad, and in 1900 became identified with the Buda Co., Harvey, Ill., as traffic manager. Five years later he joined the staff of the Inland Steel Co. as secretary, a position which he held continuously until August, 1919, when he was made vice-president and secretary. By virtue of his long and uninterrupted service with the Inland organization at Chicago, Mr. Adams has won a wide acquaintanceship in the territory his company serves and has acquired a thorough knowledge of the individual requirements of consumers in a large section of the country. An understudy of his predecessor ever since he became identified with the iron and steel industry, he is expected to carry forward the sales policies which were in no small measure responsible for the meteoric growth of the Inland company.

W. C. Starkey, for several years chief engineer of the Ohio Brass Co., Mansfield, Ohio, on Jan. 1 became vice-president and directing engineer of the Stevenson Gear Co., Indianapolis, manufacturer of gear cutting machinery.

G. H. Jones, who resigned as first vice-president and general manager of sales of the Inland Steel Co., Chicago, effective Jan. 1, has leased quarters at 1212 First National Bank Building, Chicago, where he will direct the affairs of the Hillside Fluor Spar Mines, Rosiclare, Ill., of which company he is president and treasurer. The Rosiclare property, which is being developed at a cost of several hundred thousand dollars, will go into production early this year. Associated with Mr. Jones in this undertaking as vice-president and general manager is Capt. A. B. Thomas, who has been identified with the fluorspar mining industry since its inception. Mr. Jones retains his heavy interests in the Inland Steel Co. and will continue to serve on its board of directors.

E. W. Goodwin, former engineer for the Packard Motor Car Co., Detroit, has taken a similar position with the Maxwell-Chalmers Co., Detroit.

George M. Humphrey, for several years with the legal department of M. A. Hanna & Co., Cleveland, became a partner in that firm on Jan. 1.

George W. McCandless, secretary and treasurer McConway & Torley Co., Pittsburgh, has been named by Mayor Magee of that city as director of the department of public safety, which embraces the police and fire departments.

Charles E. Drum has been made general manager of the Hayes Manufacturing Co., Detroit, and Joseph Richard chief engineer.

George H. Kuhn, who has been at the Detroit office of the Charles Dreifus Co., Pittsburgh, scrap iron and steel, for the past year, has been transferred to the Cleveland office of the company, in the Guardian Trust Building.

C. F. Rogers, formerly with C. E. Johansson, Inc., Poughkeepsie, N. Y., has joined Purinton &

Smith, machinery and tools, Hartford, Conn., in a selling capacity.

Elton Hoyt, II, who has been associated with Pickands, Mather & Co., Cleveland, for a number of years, and has for some time had charge of that firm's ore sales, was made a member of the firm Jan. 1.

Howard R. Williams has been appointed Philadelphia district sales manager of the Electric Alloy Steel Co., Youngstown, Ohio. The company's Philadelphia office is at 511 Pennsylvania Building. Mr. Williams has been assistant to the general manager of sales at Youngstown and formerly was with the Youngstown Sheet & Tube Co.

John J. Brant, general auditor Youngstown Sheet & Tube Co., Youngstown, Ohio, retired Dec. 31. He will continue to make his home in Youngstown, where he has resided since 1885. He was appointed auditor of the company in 1911, having previously been in the auditing and accounting departments. He has served with the company for 20 years.

George Martin has resigned as auditor of the Youngstown Steel Car Co., Niles, Ohio. He had been previously identified with Price, Waterhouse & Co.

OBITUARY

MASON EVANS, aged 72, for many years actively identified with financial and industrial enterprises of the Mahoning Valley, died Dec. 26 at his home in Youngstown, Ohio, from paralysis, following several years of declining health. His most active connection in the steel industry was as treasurer of the old Youngstown Iron & Steel Co., now the property of the Sharon Steel Hoop Co., Sharon, Pa.

F. ALEXANDER WITTE, president Witte Hardware Co., St. Louis, died Dec. 27 at his residence in that city, at the age of 54 years. He was born in St. Louis Oct. 2, 1868.

EMIL L. MAYER, aged 57, Pittsburgh district manager International Harvester Co. of America, died in his home in Bellevue, Pa., Dec. 28. He had been associated with that company for 41 years, entering its employ as an office boy. He had been general manager in Pittsburgh for 11 years.

THOMAS E. DWYER, president Wakefield Lead & Pipe Co., Lowell, Mass., died Dec. 26 at the St. John's hospital, that city, after an illness of about a month.

WINFIELD EVERETT HOLMES, treasurer Samuel M. Green Co., Springfield, Mass., and an authority on industrial processes, methods and equipments, steam and hydraulic power plants, the elimination of waste in industrial processes, and in the generation of power, died Dec. 25, at his home in Springfield, following a five months' illness. Mr. Holmes was born May 10, 1881.

DAVID J. BRAUN, one of the pioneers in the lighting fixture business, died in Chicago, Dec. 26 at the age of 79. He learned the metal spinning trade in Württemberg and came to America in 1866 and to Chicago in 1874. In 1889 the David J. Braun Mfg. Co. was incorporated and later consolidated with the Beardslee Chandelier Mfg. Co., and was the first factory in Chicago for manufacturing lighting fixtures.

The David J. Joseph Co., Cincinnati, dealer in waste material, has increased its capitalization by the issue of \$500,000 preferred stock, which has been fully subscribed. This makes the capitalization of the company \$1,250,000, of which \$750,000 is common stock. This company, which was organized one year ago, during the year opened yards at Chicago and St. Louis and has also opened an office in Pittsburgh. The increased capitalization will be used in further extending its operations.

Navy Sells 13 Vessels

Bids to be submitted for the several battleships and monitors this month may be influenced by prices at which the Navy Department last week sold 13 vessels of different types, the largest being the triple-screw cruiser Brooklyn, at Mare Island, Cal., appraised at \$200,000 and sold to the American Iron & Metal Co. of California, for \$46,667. These vessels, however, are smaller than the battleships and monitors to be sold and will not prove to be so great a task in dismantling as the heavier armored battleships will. Among other ships sold, the prices they brought and their appraised values, follow:

Vessel	Price	Appraisal	Buyer
Transport Astoria, at Boston	\$30,500	\$130,000	Richard T. Green Co., Chelsea, Mass.
Yacht Vega, at Philadelphia	10,000	102,000	C. H. Crocker, San Francisco
Lighter 160, at Mare Island	5,725	12,000	Hunt, Hach & Co., Oakland, Cal.
Training ship Intrepid, at Mare Island....	4,015	20,000	M. Parker, San Francisco
Yacht Galatea, at Portsmouth, N. H.	4,400	116,000	A. A. Tanos, New York
Destroyer Smith, at Philadelphia	6,176	7,000	Jos. G. Hitner Sons Co., Philadelphia
Eagle No. 25, at Philadelphia	1,026	5,000	Jos. G. Hitner Sons Co., Philadelphia

The list on which bids are to be received Jan. 16 includes the battleships Maine, Missouri and Wisconsin at Philadelphia, each appraised at \$120,000; the monitors Puritan and Miantonomah, at Norfolk, Va., and the Ozark and Tonopah, at Philadelphia; the wrecked cruiser Memphis, at Santo Domingo and the triple-screw cruiser Columbia, at Philadelphia, appraised at \$300,000. The monitors are appraised at from \$4,000 to \$40,000.

Bourne-Fuller Plant Resumes

Describing its action as an experiment towards improving industrial conditions the Bourne-Fuller Co., Cleveland, resumed operations on its Upson Nut steel plant and blast furnace Jan. 3. The blooming mill and three of the five open-hearth furnaces will be operated. The finishing mills will be run to fill orders as received. Surplus steel beyond requirements of the finishing mills will be stored in semi-finished form. The company's stack has been out of blast since last January and its open-hearth department was operated only four months last year.

The employees expressed a willingness to take a cut in wages rather than to remain longer out of work and a flat reduction of 15 per cent was made. This places common labor on the basis of 25½c. per hour. The company promised its employees that it would keep the plant in operation three months and hopes by the expiration of that time business will have improved sufficiently to permit it to continue operations.

Inquiries for Coke

UNIONTOWN, PA., Jan. 3.—The new year is being ushered in in the Connellsville bituminous region with first inquiries for coke tonnage for the first half of the year. Only one contract is reported so far and that semi-officially. It is to the effect that an Eastern steel company has contracted for 7,500 tons of furnace coke monthly for three months at \$3 a ton.

Output in the region has fallen off slightly during the past two weeks.

Investigations on the carbonization of lignite have been under way for some time under the direction of Dr. E. J. Babcock, dean of the mining engineering department of the University of North Dakota. In a bulletin of the Bureau of Mines, W. W. Odell, fuel engineer of the bureau, gives preliminary information, including a sketch of the carbonizer employed. Twenty tons of raw lignite were carbonized per day and by-products are recovered. The briquetting equipment rolls pillow-shaped briquets weighing approximately 2¼ oz. each.

Iron and Steel Markets

(Continued from page 127)

roads features the iron and steel market. The Alabama, Tennessee & Northern Railroad has placed an order with the Mount Vernon (Ill.) Car Co. for 250 gondola cars and 50 sets of steel underframes for cars. The Missouri Pacific has an inquiry out for 100 wheels, and the Wabash wants a quantity of boiler tubes—about 100 tons being involved. The Missouri, Kansas & Texas Railroad will shortly start work on new freight terminals at Denison, Tex., the biggest part of the work being the laying of approximately 30 miles of track, for which 85 lb. relaying rails already on hand will be used. Distributors are buying heavily of pipe for use in the oil fields at Mexia, Texas.

For stock out of warehouse we quote: Soft steel bars, per lb. iron bars, 2.77 $\frac{1}{2}$ ¢; structural shapes, 2.87 $\frac{1}{2}$ ¢; tank plates, 2.87 $\frac{1}{2}$ ¢; No. 10 blue annealed sheets, 3.17 $\frac{1}{2}$ ¢; No. 28 black sheets, cold rolled, one pass, 4.15¢; cold drawn rounds, shafting and screw stock, 5.65¢; structural rivets, \$3.62 $\frac{1}{2}$ per 100 lb.; boiler rivets, \$3.62 $\frac{1}{2}$; tank rivets, 7.16 in. and smaller, 65 and 5 per cent off list; machine bolts, large, 60-10 per cent; small, 60, 16 and 10 per cent; carriage bolts, large, 55-5 per cent; small, 60 and 10 per cent; lag screws, 65-5 per cent; hot pressed nuts, square or hexagon blank, \$4, and tapped, \$3.75 off list.

Old Material.—The market for old material remains very weak, and continues to drag, although prices have changed very little. There has been a consumptive buying. A few transactions between dealers are reported, where contracts expiring and deliveries must be made before the end of the year. Inquiries for relaying rails are picking up, and it is reported that some good-sized contracts will be closed early in January. Current railroad offerings include: Missouri, Kansas & Texas, 1250 tons; Pennsylvania System (Southwestern Region) 4100 tons; Louisville, Henderson and St. Louis, 500 tons; Baltimore & Ohio, 11,000 tons and an open list issued by the New York Central.

We quote dealers' prices f.o.b. consumers' works, St. Louis industrial district and dealers' yards, as follows:

Per Gross Ton		
Iron rails	.....	\$15.50 to \$16.00
Steel rails, rerolling	.....	12.00 to 12.50
Steel rails, less than 3 ft.	.....	12.00 to 12.50
Relaying rails, standard section	.....	23.00 to 28.00
Cast iron car wheels	.....	15.00 to 16.50
No. 1 heavy railroad melting steel	.....	11.00 to 11.50
No. 1 heavy shoveling steel	.....	10.50 to 11.00
Ordinary shoveling steel	.....	10.00 to 10.50
Frogs, switches and guards cut apart	.....	11.00 to 11.50
Ordinary bundle sheet	.....	4.50 to 5.00
Per Net Ton		
Heavy axles and tire turnings	.....	\$5.50 to \$6.00
Iron angle bars	.....	13.50 to 14.00
Steel angle bars	.....	10.00 to 10.50
Iron car axles	.....	18.00 to 18.50
Steel car axles	.....	13.50 to 14.00
Wrought iron arch bars and transoms	.....	13.50 to 14.00
No. 1 railroad wrought	.....	9.50 to 10.00
No. 2 railroad wrought	.....	8.50 to 9.00
Railroad springs	.....	11.50 to 12.00
Steel couplers and knuckles	.....	11.50 to 12.00
Locomotive tire, 42 in. and over, smooth inside	.....	8.50 to 9.00
No. 1 dealers' forge	.....	7.50 to 8.00
Cast iron borings	.....	6.00 to 6.50
No. 1 busheling	.....	9.00 to 9.50
No. 1 boilers cut in sheets and rings	.....	7.50 to 8.00
No. 1 railroad cast	.....	13.50 to 14.00
Stove plate and light cast	.....	12.00 to 12.50
Railroad malleable	.....	9.50 to 10.00
Agricultural malleable	.....	9.00 to 9.50
Pipes and flues	.....	7.50 to 8.00
Heavy railroad sheet and tank	.....	6.50 to 7.00
Light railroad sheet	.....	4.50 to 5.00
Railroad grate bars	.....	9.50 to 10.00
Machine shop turnings	.....	5.00 to 5.50
Country mixed iron	.....	7.00 to 7.50
Uncut railroad mixed	.....	7.50 to 8.00
Horseshoes	.....	10.00 to 10.50
Railroad brake shoes	.....	9.50 to 10.00

Leonard Kennedy & Co., 67 Wall Street, New York, have not purchased machinery against their contract for removing a hill in Rio de Janeiro, Brazil. They are now negotiating for hydraulic equipment, including motors, pumps, flumes, etc., and will probably begin work about May. At present, the hill is being removed by hand, the method of the former Brazilian contractor.

British Iron and Steel Markets

Falling and Selling Prices Getting Nearer Continental Prices—Naval Contracts Abandoned

(By Cable)

LONDON, ENGLAND, Jan. 3.

There is more inquiry for pig iron; but the reductions in English and Welsh railroad rates was disappointing, amounting to only 1s. (21c.) on pig iron. Scottish railroads refuse any concession. Cheaper pig iron is expected shortly, as makers desire to get more furnaces to blowing.

Improved demand for hematite is in evidence, but the output is adequate to take care of it. Foreign ore is duller; freight charges from Bilbao to Middlesbrough are easier. The best Rubio ore is quoted at 26s. (\$5.46) c.i.f. Tees.

Some Northeastern steel works are resuming operations this week; but the Scotch steel plants remain closed, probably for fourteen days. The position is brighter, for costs are falling and selling prices are more nearly approaching those for Continental materials. Steel beams are now sold at from £8 to £8 5s. (1.50 to 1.55c. per lb.) f.o.b.; boiler plates, to Lloyds' test, have been done at £12 10s. (2.34c. per lb.) f.o.b.

Guest, Keen & Nettlefolds, Ltd., proposes to electrify the entire Dowlais works. Vickers and Armstrong interests are negotiating for the purchase of the Woelkersdorf arsenal. The Forth Shipbuilding & Engineering Co. has registered its nominal capital at £315,000 [previously £300,000].

Continental business is quiet. Belgian beams are being sold at £7 10s. (1.41c. per lb.) f.o.b.; Belgian merchant bars at £7 12 $\frac{1}{2}$ s. to £7 15s. (1.43 to 1.45c. per lb.) f.o.b., for January and February shipment. French merchant bars are held at £8 (1.50c. per lb.) f.o.b., for January and February. Belgian plates are quoted up to £10 (1.87 $\frac{1}{2}$ c. per lb.) f.o.b. for quick shipment. German rods are being sold at £8 10s. (1.59c. per lb.) f.o.b. for shipment in first quarter. No. 3 Belgian bar iron is quoted at £9 15s. (1.83c. per lb.) delivered to the Midlands.

Tin plate outlook is disappointing. Prices are easier, January shipment being sold at 19 $\frac{1}{2}$ s. (\$4.15) basis f.o.b. Prompt 28 x 20 in. sizes are offered at 40s. (\$8.40) f.o.b. The export demand is quiet. Wasters are weaker; quarters are offered at 20s. (\$4.20) f.o.b., ex-stock. Twenty x 14's are quoted at 19s. (\$3.99) f.o.b.

Galvanized sheets are weak and some makers are considering closing down. Black sheets are easier, Japanese specifications being offered at £17 10s. (3.28c. per lb.) f.o.b., without response.

We quote gross ton, except where otherwise stated, f.o.b. maker's works, with American equivalent figured at \$4.20 per £1 as follows:

Durham coke, delivered	£1 8 $\frac{1}{2}$	to £1 10	\$5.98 to \$6.30
Cleveland No. 1 foundry	5 5	& 5 10*	22.05 & 23.10*
Cleveland No. 3 foundry	5 0	& 5 5*	21.00 & 22.05*
Cleveland No. 4 foundry	4 15		19.95
Cleveland No. 4 forge	4 10		18.90
Hematite	7 0*		29.40*
East Coast mixed	5 0	& 5 2 $\frac{1}{2}$ *	21.00 & 21.52*
Ferromanganese	15 0	& 14 10*	63.00 & 60.90*
Rolls, 60 lb. and up	8 10	to 9 10	35.70 to 39.90
Billets	8 0	to 8 5	33.60 to 34.65
Sheet and tin plate bars, Welsh	7 15		32.55
Tin plate, base box	0 19 $\frac{1}{4}$	to 1 0 $\frac{1}{4}$	4.04 to 4.25
C. per lb.			
Ship plates	9 10	to 10 10	1.78 to 1.97
Boiler plates	14 0	to 14 10	2.62 to 2.72
Tees	10 0	to 11 0	1.87 to 2.06
Channels	9 5	to 10 15	1.73 to 2.02
Beams	8 0	to 10 0	1.50 to 1.87
Round bars, $\frac{1}{2}$ to 3 in.	10 10		1.97
Galvanized sheets, 24 g.	16 10		3.09
Black sheets	13 10		2.53
Steel hoops	12 0	& 12 5*	2.25 & 2.30*
Cold rolled steel strip, 20 g.	24 10		4.59

*Export price.

Machine Tool Industry Had a Poor Year

Industry Has Not Suffered So Greatly Because of Lack of Orders
in Any Previous Business Depression

AT least it can be said that the machine-tool industry enters upon the New Year with much better prospects than it faced a year ago. Then the business depression had barely set in. Now a whole year of readjustment of selling prices, production costs and other factors entering into the situation has gone by and the mood of buyers is of a much more encouraging character. Aside from the fact that the need of machine tools by metalworking industries was at low ebb the past year because of lack of work, the great number of new and used machines offered for sale at "bargain" prices, most of them leftovers from the war, cut a deep hole in the business which the machine-tool builders might otherwise have got. Many of the machine-tool plants received so little business during a part of the year that their plants were wholly or partially shut down for weeks or months at a time. Many of the tools owned by the War Department, which inventoried at millions of dollars, have been turned over to vocational training schools and thus are eliminated as a factor in the market. Stocks still held by Government departments are relatively unimportant.

Railroad Buying the Hope of Eastern Machine-Tool Trade

OWING to the lack of work among metalworking industries and to the retrenchment policies of most of the large manufacturing companies in the East, the year 1921 was a very poor one with machine-tool sellers in the New York market. Most of the large plants in the East, in common with those elsewhere in the country, were left with large stocks of machine-tool on their hands when the slump in business set in, and many of them became sellers, rather than buyers, of tools. Those which really needed new shop equipment were hesitant about buying in the early part of the year because of the possibility of price reductions, and when these reductions finally came, affecting almost every make of machine tool, they still hesitated on the theory that the liquidation of prices had barely begun. Much of the buying was confined to single machines urgently needed, and there was a great deal of "bargain hunting."

Many used machines in good condition were offered for sale, and in addition there was a considerable number of new machines, which were sold at "second-hand" prices, to attract business away from the regular manufacturing companies.

Price readjustments during the year were many and sweeping, and while prices have not gone back fully to the 1914 level, they are not far out of line when present higher labor costs and higher costs of material, transportation, etc., are taken into consideration.

The first half of the year was uneventful so far as

important business is concerned. Nor was the last half of the year active, though an improvement was noted beginning in August or September. Sales in October reached a fair volume in comparison with the low sales records of earlier months of the year.

The trade was buoyed up by hopes of railroad buying when inquiries began to make their appearance in the fall. The Delaware, Lackawanna & Western issued an inquiry for about 40 machines early in October. The Erie inquired for 64 machines in November, and eventually purchased a part of this list, filling its requirements, however, largely with used tools. The American Locomotive Co. inquired for 35 machines in late November and purchased the entire lot, this constituting probably the largest single piece of machine-tool business completed in the New York district within the year.

Other railroad inquiries have been issued, but action was deferred. The Chesapeake & Ohio took bids on about \$100,000 worth of shop equipment, but has not yet bought. The Delaware & Hudson recently issued a small list.

While the trade looks for no marked revival of machine-tool buying early in 1922, the prospects are better than were faced a year ago. Usually among the first to feel the effects of a depression, the machine-tool industry is also usually the last to recover. It is now awaiting a more general recovery of business activity as a prelude to better buying of its products.

Chicago Machine Tool Market Dull in 1921

MACHINE-TOOL buying was exceptionally light in the Chicago district in 1921. In fact, representative dealers estimate that their total sales for the year will not exceed 20 or 25 per cent of those of 1920. Agricultural implement manufacturers bought practically nothing; the automotive industry purchased little, and industrial plants as a whole made few additions to their equipment during the year. While railroad purchases stood out in bold relief because of their size, they were few in number and in the aggregate represented a much smaller outlay than their expenditures for tools in the preceding year. Although it cannot be said that there was active buying by any class of users, purchases by schools, motor service stations and small manufacturers of dwelling house appurtenances were notable in a dull market.

Prices of machine tools declined during the course of the year. In January two makes of engine lathes were reduced 7½ and 10 per cent, respectively. In January and February, several manufacturers of shapers announced cuts of 15 per cent. In February and March, milling machines went down an average

of 15 per cent. On April 1, the leading lines of planers, engine lathes and radial drills were reduced 10 per cent. In August milling machines were again reduced 10 to 15 per cent and in October engine lathes, radial drills and shapers were again cut 10 to 15 per cent. Similar reductions in other types of tools were made throughout the year.

Notwithstanding price reductions, the sale of new equipment was impeded by offerings of second-hand tools. Numerous auctions of the stocks of bankrupt manufacturers threw considerable used equipment on the market at low prices. The absorption of these tools, in part, accounts for the small sales of new equipment throughout the year. In some cases, buyers showed no interest in new machines and covered their entire requirements by purchasing second hand tools. Thus \$250,000 worth of used equipment was bought for a new Minneapolis plant which went into the manufacture of automotive replacement parts.

The outstanding purchase of new equipment in the first half of the year was that of the Atchison, Topeka & Santa Fe R. R., which bought \$125,000 worth

of tools for its Albuquerque, N. M., shops. This list brought out concessions of 10 per cent or more under the then prevailing prices. During April and May small sales to automobile manufacturers were recorded, evidently reflecting the seasonal revival in that industry. In June the Great Northern R. R. closed for \$25,000 worth of equipment, and toward the end of July the Illinois Central bought \$150,000 worth of tools at sharp concessions. No further buying of consequence occurred until October and November, when additional railroad business was closed. The Virginian placed orders for \$20,000 worth, while the Missouri, Kansas & Texas closed for a list of 86 tools. The Santa Fe also bought a few additional items, including

an axle lathe, a 1500-lb. steam hammer and a number of sheet metal working machines. The Hurley Machine Co., manufacturer of washing machines, Chicago, bought 15 power presses representing a total outlay of \$20,000. Another order taken in the Chicago district toward the close of the year covered complete equipment for a plant of the Richmond Car Co., Inc., Richmond, Va.

Throughout the year, inquiries were repeatedly issued and withdrawn. This was particularly true of railroad lists. The Santa Fe and the Illinois Central bought only after much delay, whereas the Rock Island, which has had a list before the trade most of the past year, has not yet bought.

New England Machine Tool Market for 1921

CONSERVATIVE estimates place sales of new machine tools in New England during 1921 at approximately 12½ per cent of those for 1920. In other words, sales probably have not amounted to much more than \$500,000, whereas, in 1921 they easily amounted to \$4,000,000. This percentage is based on dollars and cents alone. When the number of individual tools sold is taken into consideration, the showing is not so poor. The unfavorable showing is due more to the price situation than to actual consumption.

Of the new machines sold this year, the textile machinery makers and allied interests have been by far the heaviest buyers both from the number of individual tools and price standpoints. Educational institutions have been market factors, but the purchase of approximately \$30,000 new metal working equipment by a Connecticut maker of ship engines probably constitutes the most notable exception to textile machinery buying. Included in the estimated sales of \$500,000 are cranes. In fact, the crane market has been a considerable factor in pulling up sales to that basis. Power house cranes have dominated the market.

A miscellaneous assortment of machine tools has been purchased. February generally is conceded to be

the low sales point of the year. The next low point was August, but sales in that month did not fall as low as in February. Since August the trend of business has been upward; consequently, that month is generally spoken of as the low point of the year. The upswing since August has been very slow, but sufficient to lend considerable encouragement to manufacturer and seller of machine tools.

The outlook for 1922 is for further improvement. Machine tool interests look for other than textile machinery makers to come into the market, and indications are the New England railroads will buy some badly needed equipment.

The number of used machine tools sold here during 1921 is much larger than the new, but here again the price situation has made for an unprofitable year. In 1920 the used machinery market had Government supplies to draw upon. Such supplies were practically eliminated during the early part of 1921, but a new supply—bankrupt manufacturers'—soon developed. The new supply dwindled to small proportions during the last quarter of 1921, and, as a result, the used tool market has been thoroughly cleaned up on several lines of machines.

Cleveland Machine Tool Market

WITH the buying of machinery at low ebb, the machine tool industry in Cleveland experienced its worst year during 1921. For a number of years, leaving out of consideration the unusual demand during the war-time period, the automobile industry had been the main source of the machine tool business in the Central West and during some otherwise dull periods the demand from this field held up well and furnished the backbone of activity. With the reaction following the tremendous plant extension of automobile companies in 1920, sales of machinery to motor car builders came almost to a stop. Some orders were placed by automobile plants during the year, but these were almost wholly for improved tools for replacements to cut down production costs. These orders were for single machines, or at the most small lots. In no case was there any buying in round lots to increase production. Late in the year, there was a little more activity in the automobile field owing to purchases by one or two new companies that were preparing to equip motor car plants.

Makers of automobile parts and accessories bought some machinery during the early part of the year, the demand from this source being better than from the motor car companies. Another allied industry, the tire making industry, had been for several years a good source for machinery orders, particularly for equipment for making tire molds, but the capacity of the tire making plants had been extended to beyond the country's consuming capacity for the output, so that virtually no machinery was purchased during 1921 by either the Akron tire makers or the foundries and machine shops that specialize on tire molds. Other industries did little buying during the year as in most metal working lines, plant capacities had been greatly increased and with plant operations sharply reduced,

there were few shops that did not have a great deal of idle machinery.

The machine tool business showed some revival during the last two or three months of the year, but orders, as earlier in the year, were mostly for single machines. Throughout the year large industrial companies as a rule kept out of the market, the bulk of the business coming from small shops. Railroads in the Cleveland territory bought scarcely any machinery during the year, but the improved demand from railroads in other sections brought a few orders late in the year to Cleveland machine tool builders. There was very little building of industrial plants in the Central West during the year and consequently, the demand for equipment for new shops was negligible. A bright spot in the market was the development of some demand for machinery for equipping manual training schools, several of which were built recently in industrial centers.

Foundry operations in Ohio were down to 25 per cent or less of capacity during the year and very few orders were placed by foundries for either machine tools, molding machines or other equipment. Machinery orders come in goodly numbers from steel plants when conditions are normal, but there was virtually no demand from this source during the year.

The price situation was an important factor in the market during the early part of the year. Some buyers withheld orders, waiting for lower prices, but the prediction that lower prices would not stimulate sales apparently proved true.

Probably the predominating feature in the machinery market during the year was the large amount of used machinery offered. This began to come out early in the year when considerable machinery purchased during the previous year was placed on the market. By the time this machinery was delivered, it

was not needed, as the business slump had come and considerable of this machinery had not been uncanceled. Later, other surplus machinery was dumped on the market by automobile companies that were curtailing capacities and by plants in other fields. Equipment of small plants that had gone out of business with the depression added to the total. Late in the year, the General Motors Corporation gathered up in Detroit 1500 used machines from its various plants and placed them on the market. The demand for used machinery appeared better during the year than for new tools,

this being due to the general policy of buyers to keep their investments for equipment down as low as possible. However, the used machinery moved slowly, as it was offered faster than it could be absorbed.

Early in the year, Cleveland machine tool builders kept their plants in fair operation, building machines for stock, but when they had accumulated good sized stocks and the expected revival of business had not appeared, they either cut production way down or in some cases shut their plants down entirely. Some of these have fairly large stocks on hand at present.

The Machine Tool Industry of Cincinnati

THE machine tool industry in Cincinnati during 1921 experienced probably the duller year in a decade. Practically all of the manufacturing plants were closed for the greater part of the year, although a few managed to keep running with a skeleton of their normal force. While this condition was common throughout the country, Cincinnati, which is the center of the industry, was probably harder hit than any other section. Some of the smaller shops were able to run for several months in the early part of the year, but taking the 12 month period, it is doubtful whether the average operation in the industry was 15 per cent as compared with what might be considered a normal period.

The year opened with virtually all of the shops closed, but during the early months of the year some of these were re-opened with a greatly reduced force and a shorter schedule of working hours. In January a small volume of export inquiries appeared, but with the exception of some South American business, very few orders were placed. Reduction in wages in the industry made it possible for some of the shops to keep running, making up stock. During the month of February, however, business was very quiet and plants which had been running on reduced schedules were shut down entirely. In the early part of March, machine tool prices were cut approximately 10 to 15 per cent. In this month, some buying developed, principally by the Santa Fe Railroad and the Japanese Government. In the latter part of the month, conditions were somewhat improved and some export orders were placed. Lathe manufacturers made a cut in prices and this was followed by some reinstatement of old orders. Early in April, German manufacturers were offering machine tools and machine tool supplies

in this country at very low prices, but such was the state of industry in general that no records of orders being placed were available. From April to June the machine tool business was very quiet, although during the month of May the Big Four Railroad issued an inquiry for \$80,000 worth of tools. The month of June was the best so far this year but in July orders were very scarce and practically all of the shops were again closed down.

Along toward the middle of August a slight improvement was noticed, the automobile industry showing some activity. In September a number of shops which had been closed for several months opened up with small forces. From then until the close of the year a gradual improvement was noticed and although the orders were small, nevertheless they were such as to give encouragement to the manufacturers. During this period, some fair sized orders were placed, chief among them being approximately \$75,000 worth of tools for the Big Four Railroad, 10 machines for the Virginian Railway and about 70 tools for the M. K. & T. Railroad. The International Nickel Co. was also a fair buyer, and several fairly large orders were booked for export to Cuba and South America.

During the closing months of the year, the complexion of the inquiries was greatly improved, giving rise to the hope that next year will probably be a much better one for the machine tool manufacturers. Orders booked during the last three months were also greater in number and altogether the indications point to a better business in 1922 than was had during 1921. Stocks in manufacturers' hands are being steadily, though slowly, disposed of and the great majority of the plants have very few tools available for immediate delivery.

Hopes Not Realized at Pittsburgh

THE story of the machinery and machine tool markets in Pittsburgh in 1921 is one of hope deferred. It was such a lean year in the steel and allied industries, to which the machinery trade looks largely for business in this district, as regards business and a losing one so far as profits are concerned, that while a good many inquiries came out for equipment, actual orders were relatively few and a good many projects, against which quotations went in early in the year, still were only prospects at the close of the year. The largest piece of business placed during the year was for the new plant of the International Nickel Co., Huntington, W. Va. For this plant 10 cranes of capacities varying from 5 to 10 tons were placed, the order going to Manning Maxwell & Moore, distributors of the Shaw crane. The merchant mills, 7 in number, for this plant were awarded to the United Engineering & Foundry Co., Pittsburgh, and a 30-in. sheet mill and a 26-in. cold mill went to the Standard Engineering Works, Ellwood City, Pa.; Chambersburg Engineering Works and the Massillon Foundry & Machine Co. divided an order for 4 hammers; Allis-Chalmers Mfg. Co. was awarded motors and controllers for 30-in. sheet mill, 26-in. cold mill, 24-in., 20-in., 14-in. and 9-in. merchant mills, the Westinghouse Electric & Mfg. Co. a variable speed set to drive the 9-in. and 10-in. merchant mills and the General Electric Co. the transformers, the motor-generator set and the main switch

board. The Mesta Machine Co. was the successful bidder for the mill drives, one of 1200 hp. for the 30-in. sheet mill, one of 300 hp. for the 26-in. cold mill, one of 1200 hp. for the 24-in. billet mill, one of 1100 hp. for the 20-in. bar mill, one of 800 hp. for the 14-in. merchant mill and three of 500 hp. for the 10-in. merchant mill, the 9-in. rod mill and the 9-in. wire mill. Two tilting tables and three roll lathes were placed with the United Engineering & Foundry Co.

Otherwise the business of the year was of such equipment as was absolutely needed and then largely for replacement. There was so much uncertainty to prices that those projecting new plants or extensions requiring tools or machinery were encouraged to delay. Price reductions were frequent by machine tool manufacturers during the first half of the year and though public announcements were lacking during the last half, the market remained in buyers' favor, due to the fact that there was not enough business to go around and competition was keen for passing business. Builders of cranes, mills and heavy equipment generally, have had to pare prices pretty sharply to secure business lately. Crane prices which prior to the war averaged a little less than 10c. per lb. and during the war and the post-war boom of 1920 went above 20c. per lb. now are back at about 10c. per lb. on the basis of prices which have leaked out on some recent awards. Incidentally, as bearing on the future demand for

cranes and parts from steel manufacturers, some now are building their own. On all recent purchases made by the Carnegie Steel Co. the manufacturer has been obliged to furnish blueprints of the crane and parts

and there is now more than one crane in use by this company which it has built itself. Railroad buying has been practically nil in the Pittsburgh district the past year.

The Week's Market

New York

NEW YORK, Jan. 3.

Late last week the purchasing department of the Delaware, Lackawanna & Western Railroad began calling to its offices the representatives of machine-tool builders preparatory to placing orders against its recent list of about 40 machines. It is expected that all of its business will be placed this week. The Seaboard Air Line last week bought about \$30,000 worth of machine tools, most of the business going to one New York company which specializes in railroad tools. Two turret lathes were ordered from a Cleveland builder.

The last week of 1921 was otherwise dull, but prospects were somewhat improved. A better demand for turret lathes is in evidence, one company's December business in this district having shown quite a marked improvement.

The crane market in this section was featureless the past week. The 34 gantry cranes for the New York City piers at Stapleton, S. I., were awarded to the Wellman-Seaver-Morgan Co., low bidders on the second bidding, with a price of \$276,268. On the other three items of the tender the following awards were made, based on the first bids submitted: B. Gurney Elevator Co., 300 Eighth Avenue, New York; C. Watson Flagg Engineering Co., 123 Liberty Street, New York, electric power wiring; D. Shevlin Engineering Co., 110 West Thirty-fourth Street, steam-heating equipment. The H. S. Jones Building Co., 280 Madison Avenue, New York, holding a contract for construction work awarded by the Passaic Valley Sewage Commission, has purchased a 15-ton hand power crane from the New Jersey Foundry & Machine Co., which was the low bidder on a recent inquiry. The Coleman-Shoemaker Co., Philadelphia, recently in the market for a 10-ton, 28-ft. span hand power crane, has purchased. The West Jersey Supply & Sand Corporation, Beach & Marlborough streets, Philadelphia, has purchased a 25-ton Orton & Steinbrenner locomotive crane.

The Warner-Quinlan Co., 79 Wall Street, New York, has awarded contract to the John W. Ferguson Co., Paterson, N. J., for eight fireproof buildings at Linden, N. J., to replace its asphalt manufacturing plant, recently destroyed by fire with loss estimated at close to \$1,500,000. The work will include a power plant, machine repair shop and other works buildings. The Hammond Iron Works, Warren, Pa., has received a contract for steel tanks at the new plant, which is estimated to cost about \$1,000,000, including machinery. The Clifford, Huntz, Baker Engineering Corporation, 40 Rector Street, New York, is engineer.

The New York Central Railroad Co., Grand Central Terminal, New York, has plans nearing completion for enlargement of its car repair shops at West Albany, N. Y. The work will be carried out in connection with a \$20,000,000 expansion and improvement program in this section.

The Muggers Iron Works, Inc., 796 East 133rd Street, New York, will build a one-story addition, 50 x 105 ft. Plans have been filed.

A vocational department will be installed in the two-story high school to be erected by the Board of Education, Maybrook School District, Maybrook, N. Y., estimated to cost about \$110,000. Frederick Elcholtz is president of the board. H. T. Blanchard, 137 East Forty-sixth Street, New York, is architect.

The Gresser Knitting Machine Co., 260 West Broadway, New York, manufacturer of knitting machinery and parts, has leased the eight-story factory at 248-50 West Broadway, totaling about 38,000 sq. ft., for a new plant. The present works will be removed to this location.

The New York Edison Co., Irving Place and Fifteenth Street, New York, will commence the immediate erection of a two-story power house, 38 x 126 ft., at Park Avenue and 188th Street, estimated to cost about \$75,000.

The Board of Aldermen, New York, has approved an appropriation of \$900,000 for a new pier on the North River, replacing Pier No. 32. The Department of Docks, Municipal Building, will be in charge.

A one-story power house will be erected by the St. Joseph's Infant Home, Green Street, Utica, N. Y., in connection with a new mechanical laundry building, estimated to cost about \$45,000.

The Manhattan Roofing Co., 133 East 118th Street, New

York, has acquired the building now occupied and plans the erection of a new six-story structure for general expansion.

The A. A. Garage, Inc., has leased a two-story building on Avenue A, between Sixtieth and Sixty-first Street, New York, for an automobile service and repair works. C. R. Warren and H. Williams head the company.

The American Insulation Co., 9 New Jersey Railroad Avenue, Newark, N. J., manufacturer of roofing, etc., with headquarters at Roberts and Stokely streets, Philadelphia, has leased the one-story building at 128-34 Jackson Street, and will remove its local works to this location. The property is owned by the Bassick Co., Bridgeport, Conn., manufacturer of casters, etc.

The Wittemann Aircraft Corporation, Hasbrouck Heights, N. J., and other airplane manufacturing interests, are negotiating with the Department of Streets and Public Improvements, Newark, for a site at Port Newark, for the establishment of a plant to manufacture aeroplanes and other aircraft and parts. As projected the plant will cost in excess of \$1,000,000. Paul Wittemann is head of the company.

The Central Ice & Cold Storage Co., Vineland, N. J., has completed plans and will soon break ground for a new one-story ice-manufacturing plant at Sixth and Pear streets, estimated to cost about \$250,000, including machinery. A. L. Williams is president.

The Borough Council, Butler, N. J., has disposed of a bond issue of \$76,700, for the construction of an addition to the municipal electric power plant.

The Somerset Electric Co., Morristown, N. J., will acquire and merge the plants and properties of the United Electric Co., and the Roonton Electric Co., Boonton, N. J., and has issued a bond issue of \$450,000 for this purpose. It is proposed to make improvements and extensions in the present plants and system.

New England

BOSTON, Jan. 2.

The final week of 1921 was quiet in the local machine-tool market. Anticipated closing on crane business did not materialize, being put off for another week or ten days. Three or four houses monopolized the business which appeared and about 80 per cent of the equipment purchased was used machinery. Sales for the week include a 20-in. lathe and a 20-in. planer, both used tools, to a Weirs, N. H., consumer; a new Garvin screw slotter, to a Bangor manufacturer; a 28-in. used Prentice drill, and a used 7500-lb. hammer to a local street railroad company; a used Brown & Sharpe vertical milling machine and other equipment to a Lowell textile machinery maker. A small amount of export business was put through for Cuba, including a used 24 x 24-in. x 6 ft. planer, a 9-in. x 4 ft. Seneca Falls lathe and miscellaneous used equipment. The L. B. Smith Co., 11 and Fourth streets, South Boston, silversmiths, is in the market for fairly heavy press equipment, either new or used. About the only other new business to develop is an inquiry for two large back geared lathes and several less expensive turning tools.

A number of old prospects, considered more or less uncertain have become active once more, one involving approximately \$20,000 worth of presses and another a moderately large list of shop equipment for a New England street railroad company. With the revival of such prospects, added to those considered alive, local machine tool houses are confident good bookings will be made in January and February. Dealers in most other sections of New England are less hopeful, although in Providence the outlook for used tools, at least, is looked upon as encouraging. No changes in prices are reported this week. The local trade, however, anticipates some adjustments within the next fortnight.

The Gilbert & Barker Mfg. Co., Springfield, Mass., tanks, etc., contemplates additions, but details have not been worked out.

The Gilbert & Barker Mfg. Co., Springfield, Mass., tanks, Haven, Conn., plans the erection of a one-story factory, 140 x 160 ft., to cost approximately \$100,000.

In the interest of economy, the Hill plant, Springfield Army, Springfield, Mass., is to be abandoned by the

Government as a manufacturing unit and will be leased to outside interests.

The Textile Finishing Machinery Co., 171 Westminster Street, Providence, R. I., will commence the immediate erection of its proposed plant on Harris Avenue, consisting of two buildings, one of which will be equipped as a machine shop.

The Segal Metal Products Co., Springdale, Stamford, Conn., is planning to rebuild the portion of its plant, destroyed by fire, Dec. 21, with loss reported at about \$15,000. The structure had been occupied only about a week by the Segal company for the manufacture of locks and kindred specialties.

The Conaery Machine & Tool Co., Springfield, Mass., has preliminary plans under way for a new one-story plant, 50 x 150 ft., on property recently acquired on Flisk Avenue.

The Builders' Iron & Steel Co., 262 Bridge Street, Everett, Mass., has work under way on the superstructure for its new one-story plant, 25 x 70 ft., estimated to cost about \$65,000.

The Robert M. Keating Co., Springfield, Mass., is arranging for the manufacture of an improved type of flush valve on a quantity basis at its plant at an early date. Tools and equipment for the production are now being developed.

John McGann and Raymond Handrahan, Waltham, Mass., have acquired a building at Charles and Harvard streets, for the establishment of a machine repair works, primarily for automotive service.

Chicago

CHICAGO, Jan. 3.

A little business was closed between the holidays but if all users who have promised to take action on their needs after the first of the year actually make purchases, the coming month should be an active one. Not only the railroads, but miscellaneous users, have indicated that they expect to buy equipment. Among the railroads the Santa Fe and the Rock Island are regarded as most likely to place their requirements in the near future. The Union Pacific which was reported to have prepared an extensive list has thus far merely asked for quotations for the purpose of preparing a 1922 budget. The Burlington is preparing to enter the market for extensive needs, the most important of which will be the requirements of a new shop to be built near Denver for the Colorado & Southern, its subsidiary.

The Growolz Artificial Ice Co., 1018 South Hamilton Avenue, Chicago, has secured a permit for the construction of a one-story plant, 124 x 165 ft., at 3916-28 W. Harrison Street, to cost \$34,000.

The Great Northern Railway Co., St. Paul, F. A. Bushnell, purchasing agent, is inquiring for a Niagara 12-ft. squaring shear and a Chicago 12-ft. brake, but bids on competitive machines are invited.

The construction of a plant of the American Locomotive Co. at Granite City, Ill., is believed to be imminent, as temporary structures for engineers in charge of design and construction are now being erected on the company's property in that city.

The Nelson Knitting Co., 660 South Wyman Street, Rockford, Ill., plans to construct a three-story knitting factory on Kent Street near Church Street, at a cost of \$75,000.

The Globe Portland Cement Co. has let a contract for a large cement plant at Dubuque, Iowa, at a reported cost of \$2,000,000.

The Monticello Tire & Rubber Co., Monticello, Iowa, is constructing a 60 x 190-ft. tire plant to cost \$20,000.

The Henry Artificial Ice Co., Henry, Ill., is having plans prepared for a one-story artificial ice plant to cost \$30,000.

Temporary repairs have been made to the plant of the West Michigan Steel Foundry Co., Muskegon, Mich., which was damaged by fire Dec. 14. Permanent repairs will not be made until next spring. The fire loss totaled \$25,000, of which \$11,000 was in the structure, and \$17,000 in equipment and supplies.

The Haskell & Barker Car Co., Michigan City, Ind., has taken bids on a foundry addition.

The J. A. Huetter Machine Co., 545 Kentucky Avenue, Indianapolis, is preparing plans for a one-story machine shop, 55 x 85 ft., to cost \$25,000.

C. A. Starr, 137 Park Place, Decatur, Ill., plans to construct a one-story automobile repair shop, 75 x 162 ft., to cost \$40,000.

G. C. Brown and W. C. Gridley, 1826 Hoffman Boulevard, Rockford, Ill., are having plans drawn for a one-story garage,

60 x 145 ft., a repair shop, 35 x 90 ft., and a boiler plant, 20 x 30 ft., on Auburn Avenue, to cost \$75,000.

The Oetting Brothers Ice Co., 1726 West Fifteenth Street, Chicago, is taking bids for a new two-story and basement plant, 80 x 180 ft., on Fifteenth Street. Edward G. McClellan, 7441 Cottage Grove Avenue, is architect.

The Pratt Brothers Mining Co., Herrin, Ill., operating the Jeffrey mine, is considering the rebuilding of the tippie at its property, recently destroyed by fire.

Fire, Dec. 24, destroyed the plant of the Teetoe Adding Machine Co., occupying the larger portion of a five-story building, with loss reported in excess of \$500,000, including machinery.

The Great Northern Power Co., Duluth, Minn., is considering the construction of a new hydroelectric generating plant in the vicinity of Fond du Lac, Minn., estimated to cost in excess of \$1,500,000.

The Monticello Tire & Rubber Co., Monticello, Iowa, has filed plans for the erection of a new one-story plant, 60 x 160 ft., to be equipped for the manufacture of automobile tires and other rubber products.

A vocational department will be installed in the new two-story and basement high school to be erected by the Board of Education, Consolidated District, Reinbeck, Iowa, estimated to cost about \$250,000. Bids will be taken at once. Netcott, Donnon & Netcott, Black Building, Waterloo, Iowa, are architects.

Philadelphia

PHILADELPHIA, Jan. 2.

Horace T. Potts & Co., 316-20 North Third Street, Philadelphia, manufacturers of iron and steel products, will defer until early spring the construction of their new foundry and iron-working buildings at Erie Avenue and D Street, contract for which was awarded to the William Steele & Sons Co., 1600 Arch Street. The plant will cost in excess of \$100,000.

The F. Weber Co., 1220 Buttonwood Avenue, Philadelphia, manufacturer of drawing instruments and precision products, has awarded contract to the A. Raymond Raff Co., 1635 Thompson Street, for rebuilding the portion of its plant recently destroyed by fire. The construction will cost about \$30,000.

The Energy Elevator Co., 214 New Street, Philadelphia, manufacturer of freight elevators, etc., has taken title to property adjoining its plant for extensions.

A two-story power plant, 53 x 60 ft., will be erected by the board of directors, St. James Mercy Hospital, Chester, Pa., in connection with a new four-story hospital. Bids will be asked early in January. F. F. Durang, 1220 Locust Street, Philadelphia, is architect.

The Allen Iron & Steel Co., Third and Venango streets, Philadelphia, has filed plans for a new one-story building, for general works service, estimated to cost about \$13,000. The Austin Co., Bulletin Building, is contractor.

A vocational department will be installed in the three-story and basement senior and junior high school to be erected by the Radnor Township School District, 115 North Wayne Avenue, Wayne, Pa., estimated to cost about \$150,000. H. C. Richards, 608 Chestnut Street, Philadelphia, is architect.

The Shippers' Car Line, Milton, Pa., a subsidiary of the American Car & Foundry Co., operating a local tank car repair plant, is planning to rebuild the portion of the works destroyed by fire, Dec. 22, with loss of about \$25,000. The fire was confined for the most part to the shearing department and washer shop.

The Frick Co., Waveshoro, Pa., manufacturer of agricultural implements and parts, will soon take bids for a one-story addition, 50 x 100 ft., to be used as an erecting shop and for engine production. A. O. Frick is vice-president and general manager.

The E. Koeler Co., Williamsport, Pa., manufacturer of stationary steam boilers, etc., is considering the erection of a one and two-story addition.

The Swedesboro Ice & Cold Storage Co., Swedesboro, Philadelphia, has awarded contract for its new ice-manufacturing and cold storage plant to William F. Koelle & Co., Twenty-sixth and Oxford streets, Philadelphia, and work will commence at once. It is estimated to cost about \$100,000.

The Hanover Automobile Co., Hanover, Pa., occupying the former plant of the General Gas & Electric Co., is planning for enlargements to provide for a capacity of 1000 cars a month, designed to sell for about \$300 each. It is expected to give employment to about 1500 operatives.

Baltimore

BALTIMORE, Jan. 2.

The Parker Metal Decorating Co., Howard and Ostend streets, Baltimore, has filed plans for a one-story factory, 60 x 69 ft., to replace a portion of its works recently destroyed by fire.

The Board of Works, Baltimore, is considering tentative plans for a central machine and repair shop for municipal departments. Edward G. Rost, City Hall, is mechanical superintendent.

Officials of the S. B. Sexton Stove & Mfg. Co., 501 West Conway Street, Baltimore, have organized the Isaac A. Sheppard Co., to succeed the former company of that name and whose plant, known as the Excelsior Stove Works at Chester and Eastern avenues, was purchased recently by the Sexton company under a bankruptcy sale. The new company will be capitalized at \$2,100,000 and will operate at the plant for the manufacture of stoves, stove castings, heating and cooking equipment, ventilating apparatus, etc. The incorporators are Charles S. Austin, Jesse N. Bowen and Arthur W. Baker. The registered agent is Clarence K. Sexton, address noted.

The Bostwick-Lyon Bronze Co., Waynesport, Pa., operating the Hagerstown Bearing Metal Works, Hagerstown, Md., as a branch plant, has purchased the plant and business of the Maryland Smelting & Refining Co., Hagerstown. The company will be merged with the Hagerstown Bearing Metal Works and the plant used for expansion.

The State Board of Prison Control, Baltimore, has plans under way for a two-story mechanical and industrial shop at the Maryland House of Correction, Bridewell, Md., 45 x 150 ft., estimated to cost about \$40,000. Theodore W. Pietsch, American Building, Baltimore, is architect.

The Palmetto Concrete Mfg. & Machinery Co., 1422 Henderson Street, Columbia, S. C., has completed plans for two new buildings, 40 x 100 ft. and 30 x 90 ft., and will commence work soon. H. C. Randolph is president.

The Jarvis Storage Battery Co., 229 South Liberty Street, Winston-Salem, N. C., recently organized with a capital of \$50,000, has plans under way for a new one-story factory to manufacture storage batteries. A site has been purchased. G. C. Jarvis is president, and O. F. Brown, vice-president.

The Georgia Railway & Power Co., Atlanta, Ga., is arranging for a bond issue of \$13,000,000, about \$3,000,000 of which will be used for electric plant extensions and improvements. A program has been arranged to include the completion of a hydroelectric generating plant on the Tugalo River, with capacity of about 80,000-hp.; enlarging the generating plant at Morgan Falls, new electrical equipment, etc. Harry M. Atkinson is chairman of the board.

The Norfolk & Western Railway Co., Roanoke, Va., will build a new coaling plant at Williamson, W. Va., to cost about \$75,000, including mechanical equipment.

The Richmond Car Works, Richmond, Va., recently organized, has taken title to the Government plant at South Richmond for \$220,000, originally designed as a marine boiler plant for the United States Shipping Board. The site totals 52 acres, with main building, 180 x 600 ft. It will be equipped at once for the manufacture of steam and electric cars and other products. Lewis C. Williams is president.

Pittsburgh

SEATTLE, Dec. 20.

The closing week of the old year was featured by at least one good-sized order, namely, the mill-drives for a blooming mill and a continuous mill at the Steubenville, Ohio, plant (LaBelle Works), of the Wheeling Steel Corporation. This order, placed through the Dravo-Doyle Co., Pittsburgh, is for two Nordberg four-cylinder uniflow engines. Generally, business in machinery and equipment has been quiet, but this is merely looked upon as a seasonal condition and the common expectation is that some action will be taken on pending business as soon as the inventory period is out of the way. There have been no crane awards the past week, but a number of inquiries are regarded as near the closing stage and buyers are believed to be holding back orders chiefly to put the purchases on 1922 accounts. It is said that the Niles-Rement-Fond Co. submitted the lowest bid against the inquiry of the Elliott Co., Jeannette, Pa., for a 50-ton overhead with 10-ton auxiliary and span of 58 ft. 6 in. The Universal Steel Co., Bridgeville, Pa., has placed an order with Manning, Maxwell & Moore, Inc., for two Chambersburg hammers, one a 1500-lb. steam drop hammer and the other a 1200-lb. board drop, hammer. The Allis-Chalmers Mfg. Co., has taken an order for a Barr chain grizzly for the Jones & Laughlin Steel Co., for its ore mining subsidiary, the Interstate Iron Co.

Cincinnati

CINCINNATI, Jan. 2.

There have been few developments in the machinery market the past week. The Chicago, Burlington & Quincy Railroad issued a list which is now being figured on. With this exception new inquiries are at a low rate. Few orders have been booked, the largest consisting of a number of wood-working machines bought by a Middle Western railroad. No action has been taken on the C. & O. list or the one issued by the Rock Island. The Louisville & Nashville Railroad is expected to close this week on a number of tools recently inquired for.

With the passing of 1921, one of the poorest years in the machine tool industry for the past decade has been closed. Many of the smaller manufacturers of tools have been shut down since last spring and only skeleton forces are employed in many of the larger ones. Some plants have been able to maintain a fair rate of operation, but on an average the machine tool industry during the year did not exceed 25 per cent of capacity. However, while the year was poor, orders booked during December, and the number of live inquiries still outstanding, have somewhat encouraged manufacturers who now feel confident that the turning point has been passed and a steady improvement will be forthcoming.

The Central South

ST. LOUIS, Jan. 2.

The Superior Ice & Storage Co., Lee Building, Kansas City, Mo., will break ground at once for a new ice-manufacturing plant, with a daily capacity of about 100 tons. It is estimated to cost approximately \$100,000. A. L. Williams is head.

The Mobile & Ohio Railroad Co., St. Louis, will install a new coal and cinder handling plant at its yards at Jackson, Tenn., estimated to cost about \$25,000.

The Board of Directors, University of Missouri, Columbia, Mo., is completing plans and will soon call for bids for a one-story and basement power plant, estimated to cost about \$150,000. James P. Jamieson, Security Building, St. Louis, is head of the board.

At a special election, Dec. 21, at Lawton, Okla., bonds were approved for \$600,000 for the construction of a municipal electric power plant and distributing system.

The Harlan Ice & Refrigerator Co., Harlan, Ky., is planning the erection of a new one-story factory. It recently increased its capital to \$100,000 for expansion.

A vocational department will be installed in the new high school to be constructed at Flat River, Mo., estimated to cost about \$100,000. J. H. Felt & Co., Temple Building, Kansas City, Mo., are architects.

The International Harvester Co., 606 South Michigan Avenue, Chicago, will rebuild the portion of its repair shops at Salina, Kan., and will break ground at once. The new structure will cost close to \$20,000, exclusive of equipment.

Seattle

PITTSBURGH, Jan. 2.

The Chehalis Box, Basket & Veneer Co., Chehalis, Wash., has completed plans for the rebuilding of its factory at North Chehalis, and proposes to commence work soon. It will be equipped for a capacity of 20,000 boxes per day, and is estimated to cost close to \$90,000, including machinery. L. J. Sticklin is president.

A. M. Elliott, Vancouver, Wash., formerly connected with the B. F. Goodrich Co., Akron, Ohio, is organizing a company to establish a plant to manufacture automobile tires and tubes. The local Commercial Club is interested in the project, and a site is being selected.

The Elmore Copper Co., Mountain Home, Idaho, has been granted permission to construct a dam and hydroelectric power plant on the South Fork of the Boise River, about 25 miles north of the Arrowhead dam. It is said that the project will cost in excess of \$100,000.

The Common Council, Yamhill, Ore., is considering the construction of a municipal electric lighting plant.

The Airo Metal Products Co., Yakima, Wash., has acquired the plant and business of the Crimp-Hards Mfg. Co., Ellensburg, Wash., manufacturer of automatic pumps and parts. The business will be continued at the present location until spring, when it will be removed to the Yakima works. The latter plant will be enlarged.

The Board of Directors, University of Montana, Bozeman, will take bids until Jan. 14 for the construction of

new engineering building and shops. On Jan. 21, bids will be opened for power house equipment at the college. An appropriation of \$1,400,000 is available for these and other extensions.

The Gulf States

BIRMINGHAM, Jan. 2.

The Humphreys-Pure Oil Refineries Corporation, Mexia, Tex., has been incorporated under Delaware laws with capital of \$50,000,000 to build a local refinery. It is an affiliation of the Humphreys-Mexia Co. and the Pure Oil Co. Plans are under way for the erection of a refinery in the vicinity of Dallas, Tex., and pipe line to the Gulf, estimated to cost close to \$5,000,000, complete. Col. E. A. Humphreys is one of the heads of the company.

The Wilson Hydraulic Casing Machine Co., Clarksburg, W. Va., Daniel Howard, head, is planning the construction of a one-story machine works at Burkburnett, Tex., to manufacture machine equipment for oil well service.

The Leesburg Pulp Mill, Leesburg, Fla., is planning for enlargements to double the present capacity. Considerable new machinery will be installed.

The Wichita Motors Co., Wichita, Tex., is arranging for the manufacture of cotton-picking machinery at its plant, to be marketed as the Price-Campbell cotton picker. Parts production and assembling will be carried out at the works. J. G. Culbertson is president.

Henry and James Coyle, Huntsville, Ala., are organizing a company to establish a plant to manufacture spark plugs of special type and other ignition equipment.

The Maddox Foundry & Machine Co., Archer, Fla., is considering the erection of a new one-story foundry, 40 x 50 ft. H. Maddox is general manager.

The Common Council, St. Augustine, Fla., is planning for a bond issue of \$30,000 for the establishment of a municipal electric light and power plant. Plans will be prepared at an early date.

California

SAN FRANCISCO, Dec. 20.

The Tunison Motor Co., Hayward, Cal., is perfecting plans for the erection of a new plant at Oakland, Cal., to manufacture automobiles. It is proposed to produce all equipment and parts, with the exception of bearings, electrical accessories and minor equipment. A. W. Beam, head of the local Chamber of Commerce, was recently elected president of the company. George H. Reuben is general manager.

The Terminal Iron Works, Stockton, Cal., recently organized, has acquired the plant and business of the Stockton Iron Works, and will operate the property. An adjoining site has been leased for an addition. Harry W. Pawke, formerly superintendent of the Moore Shipbuilding Co., is head.

A vocational department will be installed in the high school to be erected by the Board of Education, Orange, Cal., estimated to cost about \$130,000. Allison & Allison, Hibernian Building, Los Angeles, are architects.

The Great Western Power Co., 14 Sanson Street, San Francisco, has tentative plans for a new hydroelectric generating plant in the vicinity of Oroville, Cal., estimated to cost about \$2,000,000.

The Automatic Electric Machine Co., San Francisco, manufacturer of automatic dating and canceling machines and parts, is planning the erection of a new factory at Oakland, Cal., where a site has been selected. It is proposed to commence work at an early date. H. G. Lundgren is president.

The Board of Education, Lodi, Cal., has instructed William Inch, principal of the Union High School, to have plans prepared for a new mechanical and manual training shop at the present school, in connection with a proposed science building.

Mallory Brothers, Santa Rosa, Cal., operating a general machine works, are planning the erection of a new reinforced-concrete machine and forge shop. The present works will be removed to the structure upon completion and additional equipment installed.

The Sugar Pine Lumber Co., First National Bank Building, San Francisco, has plans under way for a new lumber mill on the San Joaquin River, near Fresno, estimated to cost about \$2,000,000, including power plant, machinery, etc. The company will also build a railroad, estimated to cost approximately a like amount, including locomotives and other rolling stock. Elmer H. Cox is president.

The Board of Supervisors of Santa Clara County, San Jose, Cal., will build a new power house and cold storage plant at the County Hospital.

Cleveland

CLEVELAND, Jan. 2.

While orders are light machine tool manufacturers report considerable improvement in inquiry which is in marked contrast with the holiday period a year ago when everything in machinery lines was flat. Makers of automatic machinery have recently received a number of inquiries ranging from single tools up to lots of 10 machines, mostly from the automobile and allied industries. Makers of screw machinery and turret lathes are getting some orders from the brass and other industries and report an improvement in inquiries. A local manufacturer has taken an order from the Hudson Motor Car Co. for two automatic screw machines and another order for two machines from the Seaboard Airline Railroad.

Local dealers state that the holiday week has had little effect on the market as the volume of business has kept up at about the recent rate. There is a moderate inquiry for from one to four machines. The demand is largely for small machines and the prospective buyers usually favor used tools. Considerable of the inquiry is coming from small machine shops doing repair work.

The General Motors Corporation is still shipping its surplus machinery to Detroit and it is expected that this will be placed on the market early in January. The number of machines, originally estimated at 1600, has been increased to 2500 to 3000. However, as the machines are shipped in, superintendents of the various General Motors plants are picking out tools that have come from other plants that they can use so that the total number to be placed on the market may not be much over 2000. These will be sold through dealers.

The Sandusky Cement Co., Engineers Building, Cleveland, will shortly place contracts for the erection of a new cement plant near Toledo, Ohio. It will probably include three buildings of steel construction. Complete equipment will be purchased. Three overhead traveling cranes with 80-ft. span and approximately 10-ton capacity to handle three yard buckets will be required. An inquiry for the cranes has already been sent out.

Milwaukee

MILWAUKEE, Jan. 3.

Although sales in the last week to 10 days were small, inquiry was unusually active, considering the period, and it appears very likely that orders on these will mature shortly. Makers of milling machines expect renewed interest from the automotive and agricultural implement industries. The former have been buying on a small scale, while the latter were out of the market the greater part of the past year. A hopeful sign for all classes of tool business is that new enterprises are again being established, due to the easier financial situation. At present their requirements are only relieving the used tool situation and then only to a limited extent.

The Sunby Battery Co., Milwaukee, has been organized with an authorized capital stock of \$500,000 to manufacture storage batteries and similar specialties. The principals are represented by Emil J. Gehrz and Walter Schinz, Jr., attorneys, 105 Wells Street, who for the present will not reveal the identity of the promoters or issue details concerning the enterprise.

The Starcast Aluminum Co., Milwaukee, has been incorporated with a capital stock of \$10,000 to manufacture aluminum parts and specialties. The incorporators are Nicholas A. Boehm, president and treasurer Wisconsin Brass Foundry Co., 1664-1674 Fratney Street, Helen C. Boehm, and Herman Beckman, superintendent of the brass company.

The Board of Education, Clear Lake, Wis., has engaged Edwins & Edwins, 911 Northwestern Building, Minneapolis, Minn., to design a new high school with manual training facilities, to cost not more than \$125,000. Bids will be taken about Jan. 15. J. Enderholm is clerk of the board.

The Combination Door & Screen Co., 180 Ruggles Street, Fond du Lac, Wis., has let the general contract to the Hutter Construction Co., local, for a two-story brick and concrete addition, 50 x 75 ft., estimated to cost \$30,000 with new equipment.

The Automatic Railway Gate Co., Milwaukee, has been incorporated with a capital stock of \$5,000 to manufacture safety devices for railroad crossings. The incorporators are Frank P. Mansfield, 426 Thirty-first Street, and Ottmar Kloetzner, Jr., and Gilbert Lappley, attorneys, 1414 Grand Avenue, Milwaukee. No plans have as yet been made for the establishment of a factory.

The Iola, Wis., Board of Education has plans by Edward Tough, architect, Madison, Wis., for a three-story addition, 52 x 78 ft., to the high school, part of which will be equipped for vocational training. F. C. Wipf is secretary.

Current Metal Prices

On Small Lots, Delivered from Merchants' Stocks, New York City

The quotations given below are for small lots, as sold from stores in New York City by merchants carrying stocks.

As there are many consumers whose requirements are not sufficiently heavy to warrant their placing orders with manufacturers for shipment in carload lots from mills, these prices are given for their convenience.

Iron and Soft Steel Bars and Shapes

Bars:	Per Lb.
Refined bars, base price.....	2.68c.
Swedish bars, base price.....	10.00c.
Soft steel bars, base price.....	2.68c.
Hoops, base price.....	3.53c.
Bands, base price.....	3.28c.
Beams and channels, angles and tees	
3 in. x ¼ in. and larger, base.....	2.78c.
Channels, angles and tees under 3 in. x	
¼ in., base.....	2.68c.

Merchant Steel

	Per Lb.
Tire, 1½ x ¼ in. and larger.....	2.65c.
(Smooth finish, 1 to 2½ x ¼ in. and larger) ..	2.85c.
Toe calk, ½ x ¾ in. and larger.....	3.25c.
Cold-rolled strip, soft and quarter hard.....	6.25c. to 7.25c.
Open-hearth spring steel.....	3.75c. to 6c.
Shafting and Screw Stock:	
Rounds.....	3.55c.
Squares, flats and hex.....	4.05c.
Standard cast steel, base price.....	12.00c.
Extra cast steel.....	17.00c.
Special cast steel.....	22.00c.

Tank Plates—Steel

¼ in. and heavier.....	2.78c.
------------------------	--------

Sheets

Blue Annealed

	Per Lb.
No. 10.....	3.28c. to 3.53c.
No. 12.....	3.33c. to 3.58c.
No. 14.....	3.38c. to 3.63c.
No. 16.....	3.48c. to 3.73c.

Box Annealed—Black

	Soft Steel C. R. One Pass Per Lb.	Blued Stove Pipe Sheet, Per Lb.
Nos. 18 to 20.....	3.80c.	.....
Nos. 22 and 24.....	3.85c.	4.10c.
No. 26.....	3.90c.	4.15c.
No. 28.....	4.00c.	4.25c.
No. 30.....	4.25c.	.....
No. 28 and lighter, 36 in. wide, 10c. higher.		

Galvanized

	Per Lb.
No. 14.....	3.95c. to 4.10c.
No. 16.....	4.10c. to 4.25c.
Nos. 18 and 20.....	4.25c. to 4.40c.
Nos. 22 and 24.....	4.40c. to 4.55c.
No. 26.....	4.55c. to 4.70c.
No. 27.....	4.70c. to 4.85c.
No. 28.....	4.85c. to 5.00c.
No. 30.....	5.35c. to 5.50c.
No. 28 and lighter, 36 in. wide, 20c. higher.	

Welded Pipe

Standard Steel

	Black	Galv.
¾ in. Butt... ..	—56	—40
¾ in. Butt... ..	—61	—47
1-3 in. Butt... ..	—63	—49
3½-6 in. Lap... ..	—60	—46
7-8 in. Lap... ..	—56	—34
9-12 in. Lap... ..	—55	—33

Wrought Iron

	Black	Galv.
¾ in. Butt... ..	—30	—13
1½ in. Butt... ..	—32	—15
2-in. Lap... ..	—27	—10
2½-6 in. Lap... ..	—30	—15
7-12 in. Lap... ..	—23	—7

Steel Wire

BASED PRICE* ON NO. 9 GAGE AND COARSE.

	Per Lb.
Bright basic.....	4.00c.
Annealed soft.....	4.00c.
Galvanized annealed.....	4.75c.
Coppered basic.....	4.50c.
Tinned soft Bessemer.....	5.00c.

*Regular extras for lighter gage.

On a bar of articles the base price only is given, it being possible to name every size.

The wholesale prices at which large lots are sold by manufacturers for direct shipment from mills are given in the market reports appearing in a preceding part of THE IRON AGE under the general heading of "Iron and Steel Markets" and "Non-Ferrous Metals."

Brass Sheet, Rod, Tube and Wire

BASE PRICE

High brass sheet.....	17¼c. to 17½c.
High brass wire.....	17¼c. to 17½c.
Brass rod.....	14¼c. to 15 c.
Brass tube, brazed.....	26 c. to 27½c.
Brass tube, seamless.....	18¼c. to 19 c.
Copper tube, seamless.....	21¼c.

Copper Sheets

Sheet copper, hot rolled, 24 oz.....	21¼c. per lb. base.
Cold rolled, 14 oz. and heavier, 2c. per lb. advance over hot rolled.	

Tin Plates

	Grade "AAA" Charcoal 14x20	Grade "A" Charcoal 14x20	Coke—14-20	Refined Wasters
Bright Tin				
IC.....	\$10.00	\$8.50	80 lb....	\$6.05 \$5.80
IX.....	11.25	10.00	90 lb....	6.15 5.90
IXX.....	13.00	11.50	100 lb....	6.25 6.00
IXXX.....	14.75	13.25	IC....	6.40 6.15
IXXXX.....	16.25	15.00	IX....	7.40 7.15
			IXX....	8.40 8.15
			IXXX....	9.40 9.15
			IXXXX....	10.40 10.15

Terne Plates

8-lb. Coating 14 x 36

100 lb.....	\$7.00
IC.....	7.25
IX.....	7.50
Fire door stock.....	10.00

Tin

Straits, pig.....	35c.
Bar.....	40c. to 45c.

Copper

Lake ingot.....	16 c.
Electrolytic.....	15¼c.
Casting.....	15¼c.

Spelter and Sheet Zinc

Western spelter.....	6¼c. to 7c.
Sheet zinc, No. 9 base, casks.....	10¼c. open 11c.

Lead and Solder*

American pig lead.....	5¾c. to 6¼c.
Bar lead.....	5¾c. to 7 c.
Solder, ½ and ⅓ guaranteed.....	27c.
No. 1 solder.....	25c.
Refined solder.....	21c.

*Prices of solder indicated by private brand vary according to composition.

Babbitt Metal

Best grade, per lb.....	80c.
Commercial grade, per lb.....	40c.
Grade D, per lb.....	35c.

Antimony

Asiatic.....	6¼c. to 6½c.
--------------	--------------

Aluminum

No. 1 aluminum (guaranteed over 99 per cent. pure), in ingots for remelting, per lb.....	29c. to 31c.
--	--------------

Old Metals

The market continues strong with practically no change in values. Dealers' buying prices are nominally as follows:

	Cents Per Lb.
Copper, heavy crucible.....	11.25
Copper, heavy wire.....	10.75
Copper, light and bottoms.....	8.25
Brass, heavy.....	5.50
Brass, light.....	4.50
Heavy machine composition.....	8.00
No. 1 yellow brass turnings.....	5.50
No. 1 red brass or composition turnings.....	7.00
Lead, heavy.....	3.75
Lead, tea.....	2.50
Zinc.....	2.50

THE IRON AGE

New York, January 12, 1922

ESTABLISHED 1855

VOL. 109, No. 2

Semi-Continuous Bar Mill for Alloy Steel

Cooling Equipment Embodies Inclined Escapement and Horizontal Notched Bed Features—Flat Spring Steel Is Self-annealed in Packs

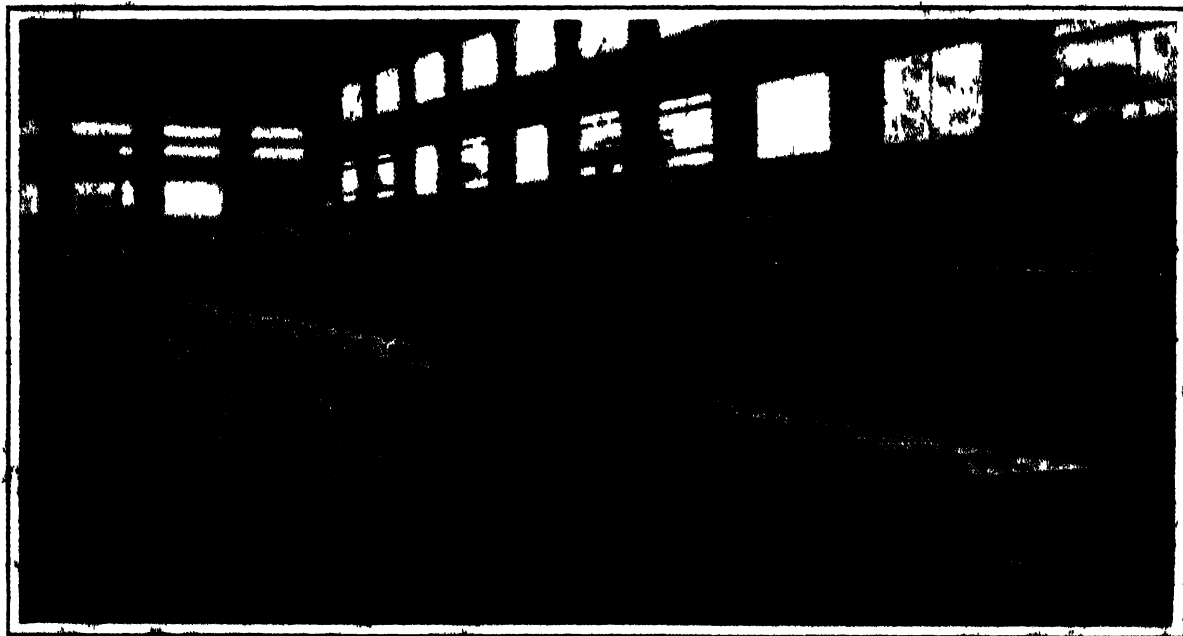
BY F. L. PRENTISS

THE United Alloy Steel Corporation, Canton, Ohio, has recently placed in operation a new 12-in. semi-continuous bar mill, designed and built by the Morgan Construction Co., Worcester, Mass. It is of a special type and includes interesting and novel features to insure the economical production of large outputs of high quality alloy steel products.

The most interesting feature of the installation is the equipment for handling the steel from the time it leaves the finishing rolls until it is cooled and sheared. In modern merchant bar mills, the automatic cooling

eliminate. The problem was put up to the Morgan Construction Co., which incorporated in the cooling bed means for self annealing under temperature control, with neither fuel nor labor costs.

This cooling bed is a combination of two distinct types of bed. The first portion is the well known Edwards inclined escapement bed, which in this case has racks very much shorter than usual. The function of this portion of the bed is to control the bars while they drop from rolling heat to annealing heat. The second portion is a horizontal notched bed capable of

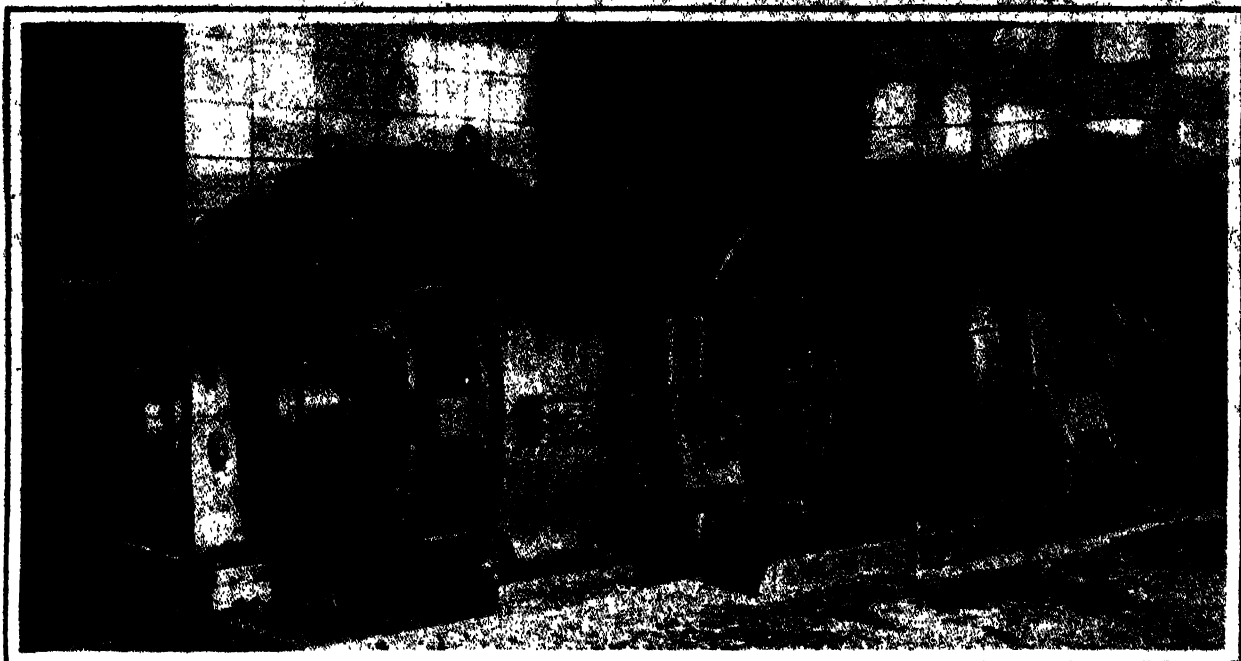


The Cooling Bed Is a Combination of the Inclined Escapement Type and the Horizontal Notched Type. Between the two sections is a packing device, flat alloy spring steel being carried in packs across the horizontal section. The product is self-annealed in these slowly cooling packs. The cooling bed is double (the photograph showing only one side) to take care of the large output in case the mill is operating for some time on alloy steel spring flats, and requiring continuous use of the packing device. The magnetic controllers for the auxiliary motors are on balconies along the side wall a safety first feature.

bed takes up a very large portion of the mill building and, in a way, dwarfs the rolling mill unit proper. In this particular case, the cooling bed is more than ever the predominant feature of the mill, not only because it is a double bed, 240 ft. long, but also because there has been incorporated in this bed means for controlling the physical structure of the rolled product.

The annealing of alloy steel spring flats after rolling is a costly but necessary operation, which the United Alloy Steel Corporation has long sought to

receiving several bars in a single notch. Connecting these two portions of the bed is a mechanism designed to place flat alloy spring steel in an orderly pack in the first notch. Such a pack, having been formed at a high temperature, retains its heat very much longer than a single bar and the necessary self-annealing is thus performed in these slowly cooling packs. The mechanism can handle flats up to 6½ in. wide in packs up to 3 in. to 4 in. high. Each pack is carried as a unit from notch to notch, until it is delivered upon



Both the Roughing and Finishing Mills Are Driven by One Motor. This is a 3000-hp. adjustable speed induction motor which is provided with a Kramer regulating set for controlling the speed.

electrically-driven shuffle bars which separate the pack and carry the bars to the shear table. The cooling bed is operated by electric motors throughout, these being controlled from a pulpit by an operator having a clear view of the entire bed.

To provide for the large output of this mill, the cooling bed is made double, and the product is delivered to two No. 5 "Q" Morgan bar shears and back shear tables. These shears, with their back shear tables, deliver the cut product into cradles, mounted directly upon 100,000 lb. Fairbanks, Morse & Co. scales. Each shear is equipped with two hand-traversed shear gates. The shears and back shear tables are located in the shipping department of the mill, which is a building of 90-ft. span and 360 ft. in length, at right angles to the main building. This is served by two 10-ton Alliance cranes. Extension of this building is possible should the necessity for more shipping space arise. Three standard gage loading tracks serve the shipping building, and in addition, a narrow gage track connects this building with a heat-treating department.

Steel for the 12-in. mill is made on a 35-in. blooming mill, and after the billets have been inspected carefully and chipped for the removal of surface imperfections, they are transferred to the billet storage building, 80 x 300 ft., which adjoins the mill building. This is covered by a 10-ton Alliance crane which delivers the billets to the furnace charging platforms.

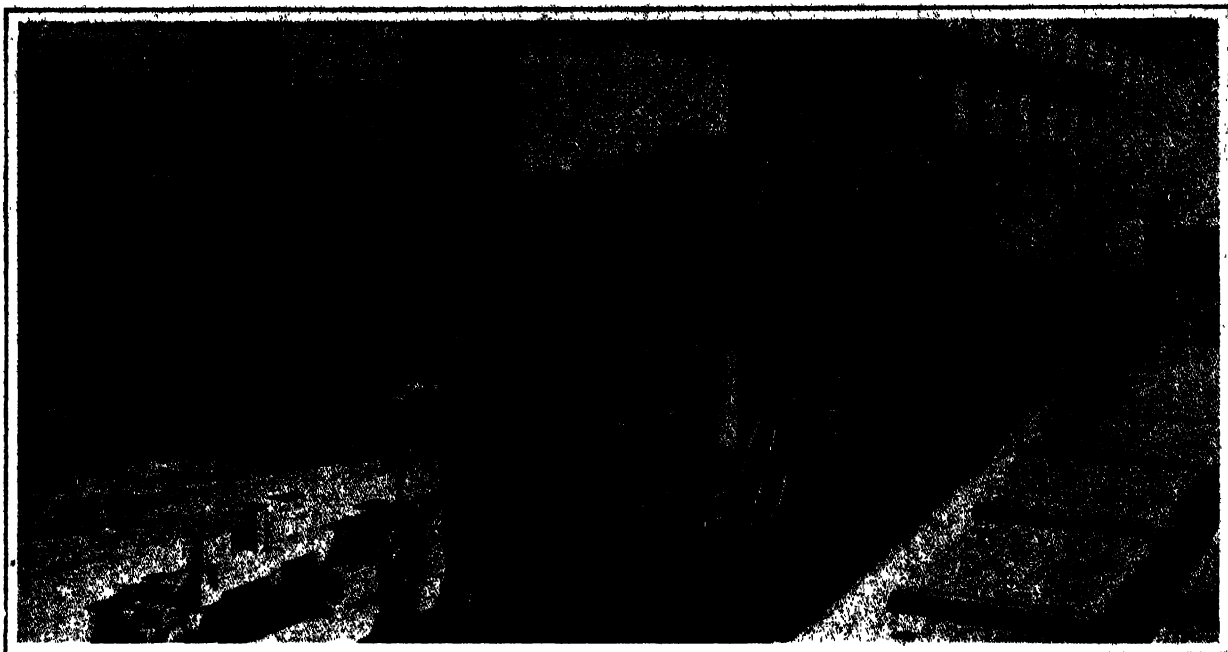
The billets are charged into two Morgan gravity discharge continuous-heating furnaces of the regenerative type with hearths, 34 x 13 ft. They are fired by gas from a battery of eight Morgan producers. This battery of producers also serves the soaking pits of the blooming mill which occupy an adjacent building.

The water-cooled furnace skid pipes extend to within 7 ft. of the discharge end of the furnace where they turn downwards. The remainder of the hearth bottom is of magnesite. On this hearth the cold spots in the billets caused by the water cooled skids disappear.

A new feature of the heating furnaces is the Isley gas regulating valve. This is the first installation of this form of gas regulator. The producers are located



The Finishing Mill Consists of Four 12-in. Stands, of the Staggered Duo Type, Arranged in Two Trains. The mill is equipped with four "Y" reversing skew roller tables which connect the successive passes. These tables are sufficiently long to handle, with any ordinary series of reduction, bars having a finished length of 240 ft.



Sixteen-Inch Vertical Edging Mills Are Used When Rolling Flat Bars, Thereby Greatly Reducing the Number of Slab Sections Required to Cover the Range of Production. Two are shown, one in front of the fifth stand, another following the sixth stand

fully 100 ft. from the furnace. The gas enters the mill building underground, and passes up through the regulating valves, where its admission to the furnace is manually-controlled by the heater from the furnace platform.

Each furnace is equipped with a single Isley reversing valve, which controls the regeneration of the air. Since the products of combustion flow through the heating furnace in one direction only, the valve is necessarily placed between the furnace and the checker chambers, and must handle on one side the products of combustion at their maximum heat, and on the other, the incoming air at its maximum heat. The valve is similar to the Isley valve commonly used under the less severe conditions of open-hearth practice.

Billets discharged from the heating furnace are carried on a standard billet conveyor to the roughing mill. In the table, in front of the first roughing stand, is an electrically-driven shear for dividing billets in order to produce in the finished section the desired length for the cooling bed.

The roughing mill is a special Morgan semi-continuous mill, consisting of six roughing and four finishing stands. The first two roughing stands have 18-in.

rolls, the last four, 16-in. rolls. The roughing mill is broken up into groups with connecting tables, the arrangement being such that the bar runs free between the first and second, the second and third, and the fourth and fifth stands.

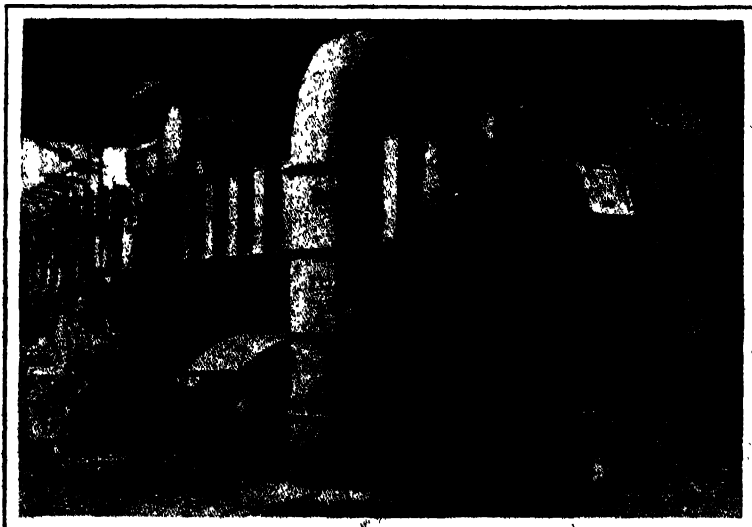
In front of the fifth, and following the sixth roughing stands, are 16-in. vertical edging mills, driven from the cross shafts of the roughing mill. The edging rolls are employed when rolling flats, and by their use the number of slab sections required to cover the range of production is greatly lessened.

The finishing mill consists of four 12-in. stands of the George staggered duo type, the arrangement being two trains of two stands each. The mill is equipped with four "Y" reversing skew roller tables which connect the successive passes. These tables are ample in length to produce, with any ordinary series of reductions, bars having a length of 240 ft. when finished.

The roughing mill is designed to roll its product from billets, 3 in. to 6 in. square, and from slabs, 3 in. to 6 in. wide, and up to 2½ in. thick. The mill uses both billets and slabs up to 11 ft. 6 in. in length.

The usual practice will be to use 4- and 5-in. billets, except when rolling the larger round bars, for which 6-in. billets will be required. The finishing mill can

The Heating Furnaces Are Equipped with Isley Regulating Valves, This Being the First Installation of This Form of Gas Regulator. The gas enters the mill building underground and passes through the regulating valve, its admission to the furnace being manually controlled by a heater from the furnace platform. Each furnace is also equipped with a single Isley reversing valve for controlling the regeneration of the air. The gas regulating valve is shown in the foreground and the reversing valve back of it in front of the discharge end of the furnace



produce rounds from $\frac{3}{4}$ to $2\frac{1}{2}$ in. in diameter, flats up to $6\frac{1}{2}$ in. wide, and equivalent sections. The expected output is upwards of 10,000 tons per month of alloy and carbon steel.

The mill building is 90 x 680 ft., with a 40 x 100 ft. lean-to for the electrical sub-station. The roof is of the ordinary truss type. Ample window space is provided, steel sash on roller bearings being used throughout. The shipping and billet storage buildings are similar in construction. A railroad track extends part way down one side of the mill building for bringing in rolls and carrying out refuse. The building is served by a 10-ton Alliance crane. The water supply comes from the plant's general water works system. Water from the furnaces and mill is discharged to the sewer through two scale pits.

Both the roughing and finishing mills are driven by the same motor through a line shaft and gears. A set of main gears reduces the speed of the main motor to the desired speed for the main shaft. The driving

unit is a 3900 hp., 3-phase, 60-cycle, 2200-volt, Westinghouse induction motor, having a synchronous speed of 507 r.p.m. The motor is provided with a Kraemer regulating set which gives speed control between 500 and 300 r.p.m.

Electric current is supplied from the main power station, and is stepped down from 11,000 volts to 2200 volts through three 2000 kw. transformers. There are also three 333 kw. transformers which step down the 11,000 volt current to 181 volts for a rotary converter which supplies 250 volt direct current to the auxiliary motors that operate the cranes, mill tables, cooling bed and other equipment. All the motors, converters and transformer equipment were furnished by the Westinghouse Electric & Mfg. Co. All motors have magnetic control, either of the Westinghouse or Cutler-Hammer type. A safety feature in the plant arrangement is the placing of the magnetic controllers for the auxiliary motors on balconies along the side wall, several feet above the floor.

DISMANTLING VESSELS

Naval Officials Investigating as to Best Method of Procedure

WASHINGTON, Jan. 10.—Data are being assembled by naval officials with the aid of private interests, looking to the development of practical plans for the dismantling of vessels which the Navy is offering for sale, and others that will be disposed of according to the terms of the Conference on the Limitation of Armament. The material will be of great value in the event a permanent ship salvaging industry is established. The scrapping of the naval vessels would be an important preliminary to the institution of such an industry.

With the co-operation of publishers of technical papers, acetylene torch interests, and shipbuilders, as well as through its own direct efforts, the Navy Department is obtaining information from England, France and Germany as to the precise methods used in those countries in dismantling war vessels. Accompanying these studies will be photographs and possibly diagrams and charts showing the actual work of beaching, dry docking and scrapping the vessels, and the locations of sites of the work with respect to steel plants consuming the scrap that is removed and cut to size.

After this material is assembled, it is likely that another conference, supplementing the one held recently at the Philadelphia Navy Yard, will be held in Washington and specific discussion made of the entire scrapping program. It is believed on that occasion financiers, acetylene torch people, shipbuilders, and others, will be presented with sufficiently concrete studies of the subject so that they can intelligently make offers to the Navy Department for the purchase of vessels, with more assurance than has been possible heretofore, as to the success of their undertaking, which, being new, is in a state of uncertainty. Investigations by private interests themselves also will aid them in preparing estimates, should they become interested in the matter, and correspondence with the Navy Department indicates that they have been giving the question considerable study and are becoming interested in it.

It is believed that as to the iron and steel manufacturers, the only concern they will have will be as consumers of the scrap to be salvaged, and it remains to be seen whether this will be made available to them at attractive prices, and whether or not the tonnage will be desired, in view of the present unsatisfactory condition of the iron and steel markets.

While it has been stated that England has developed the ship salvaging industry to a greater and more scientific point than any other country, this opinion is not accepted by some who have casually studied the question. On the contrary, they think that Germany leads in this respect and that that country, through its experience in dismantling ships since the armistice has established the industry on a more economic and satis-

factory basis than any other. For this reason as much information as possible is to be obtained from the operations of the industry in Germany.

Another fact which indicates that the work of dismantling ships in Germany has developed to a successful point, at least for that country with its low costs of labor, is that several German firms are showing a keen interest in the proposed dismantling of American ships and have written to the Navy Department attempting to get the contracts for the dismantling of American vessels, which would have to be taken to Germany. These offers, however, are not being given the slightest consideration. At the outset, the Naval officials point out that the proposed plan of limiting the building of war vessels has been a severe blow to the shipyards of the United States, and it is not proposed to add to the difficulties of shipbuilders and workers by letting the work go outside of the United States. Secondly, Naval officials consider it absurd to think that a great industrial country like the United States cannot, if it chooses, develop a ship salvaging industry as efficient in every respect as any other country.

The assembling of information from foreign countries regarding salvaging may delay negotiations for the sale of the various naval vessels on which bids have been asked and which are to be opened on Jan. 16.

Time of No Accidents

"I believe the day is coming when we will have no accidents in industry. You and I may live to see that day," says Charles Close, manager of the Bureau of Safety, Sanitation, and Welfare of the United States Steel Corporation, in *National Safety News*.

"Two years ago I would not have said that," he continued, "but when I think of our Farrell Works, with a normal force of 3000 men, with all the hazards of the steel industry, going two months without a lost time accident, and our Edgar Thompson plant with a normal force of 6000 men going 54 days without an accident, and other remarkable records made by many of our plants, I do not hesitate to say I believe the day is coming when we will have no accidents in industry. And it is not very long ago that old timers were saying no steel mill could ever go a week without an accident."

"But to bring about the time of no accidents we have to develop a new generation of workmen. We must train the child so that he will develop habits of safety. We must do more than show him the safe way of doing things once, twice, or ten times. We must teach him the safe way of doing things every day, so that when he comes into the shop as a workman he will habitually do the safe thing just as his father today habitually does the unsafe thing."

The main building of the Pittsburgh Steel Tube Co., Beaver, Pa., was destroyed by fire on the morning of Jan. 1. The building was one story, of brick construction and housed the drawing mill and machine shop.

Light Movement of Lake Superior Ore

**Steel Corporation and Others Give Employment to Miners
to Prevent Suffering—Moving of Hibbing Involves
Great Expense—Interesting Developments**

BY DWIGHT E. WOODBRIDGE, E. M.*

THE Lake Superior iron ore trade of the past year has been at low ebb. Not since 1904, when shipments from Lake Superior were slightly under 22,000,000 tons, has there been a season of so small business. This year water shipments have been 22,852,871 tons, in addition to which there are some 425,000 tons all rail, making the gross tonnage from mines of the lake district 22,778,000 tons. Of this 15,555,000 tons were received at Lake Erie, and about 22,000 tons were sent to the St. Louis district for furnaces there. The figures include 52,145 tons shipped from the Canadian mines north of Michipicoten. Total movement of the year is almost precisely 33½ per cent of the business of 1916, the greatest year in the history of the American iron trade.

So much for statistics. They tell their own story.

This naturally has led to much unemployment in the iron region, and for a time the past fall, conditions were rather serious. Business conditions on all the ranges were very bad, collections slow, new buying slight, and a great number of men were without any work at all. To the everlasting credit of the Steel Corporation be it said that it undeviatingly maintained as nearly as possible a constant force and, while it was unable to furnish work to all its men continuously, it did arrange to keep most of them on a part time basis.

Grateful to the Corporation

While a full employment basis would have been about 12,000 men, it has gone into the winter with some 10,000 at work, half time or better. I well remember the time in Birmingham, a few years after the Steel Corporation became interested there, that the business interests of that city wanted to erect a statue in grateful commemoration of the purchase of the Tennessee Coal, Iron & Railroad Co. The business men of northern Minnesota have this winter had borne in upon them, as never before, the reason for that feeling in Birmingham seven or eight years ago. The Steel Corporation has realized the danger of unrest by unemployment, and its moral obligation to humanity and to the district. These same considerations have influenced the Lake Superior managers for several of the other concerns in the mining business and they have strained every nerve to induce their Eastern boards to follow a similar humanitarian policy, and finally with no small degree of success. As a rule these boards have been in no easy position in this matter, for they have appreciated that ore won now can be delivered only at a heavy loss and that the money for operations largely must be borrowed capital; and perhaps they were not fully awake to the needs of the situation until recently. The Hanna and Pickands, Mather and other smaller employers have ordered several mines into commission and the year closes with a far brighter labor outlook than was believed possible a few weeks ago. It is expected that additional mines will resume in January and that alleviation will continue throughout the rest of the winter. The general situation is more drastic than otherwise on account of the condition of the forest products market. Usually this absorbs thousands of men and is exceedingly active during winters; a year ago there were delivered in Duluth alone over one railway, the Duluth & Iron Range, 200 carloads of pulpwood daily for the entire winter; now this business is trifling, as is that of railway posts, poles, ties, etc.

Hanna Mines Resume

During December the Hanna interests resumed full time operations at four Mesabi mines, adding about 500

*Duluth, Minn.

men to the 250 they had been working there. The rate of pay was reduced to a basis of \$2.75 a day, common labor, so that miners are earning about \$3.75. Pickands, Mather & Co. resumed at three mines on the Menominee, and will start others on the Mesabi in January. Yale, Gogebic range, is to open in January with 300 men, full time; the Oliver mines at Ironwood are running full time; the Hanna interests have taken over the former Hayes properties, Ashland and others, and have been paying the 1921 scale, but no doubt will reduce this soon. Ironton is to be on good production soon. Several mines at Crystal Falls are reopened, paying the 1913 scale which, at that point of low living costs, was about \$2.25.

Almost nothing is going on in mining on the Marquette range. The Gwinn district is idle; stock piles are so large in the entire Marquette region that there is little hope of much activity for some time. At Iron River, Crystal Falls, Norway and Vulcan, on the Menominee, things are fair for the times; the Cuyuna is almost in a state of coma; the Vermillion is more busy, relatively, than any of the lake districts, with most of its mines running and a new one under development.

The Most Hopeful Spot

Really, the most hopeful spot in the region is Iron Mountain, where, to a very limited mine employment, is added the Ford body plant and sawmills, and where there are under negotiation two blast furnace projects. The expectation is that the Ford Motor Co. will construct plants at Iron Mountain for the manufacture of all its motor bodies, and a building 900 ft. long is now under way. By rail shipment to Menominee and from there by water to Detroit, these knocked-down bodies can be delivered cheaply. The Ford purchase of the properties of the Michigan Land & Iron Co. gave it an abundance of hard woods for its requirements.

The lower the price of ore and in general the greater the need for economy in operation, the higher is the Minnesota proportion of the total output of the Lake Superior region; last year Minnesota's percentage of the total was 63, this year it is 79.5. Those figures are eloquent as to the activities of the Michigan districts during the year.

European Ores

Just now the situation is complicated by the advent of northern European ores; while it is probable that the present price for Kiiruna ores delivered at Philadelphia, of say 8.5c. per unit of iron, is less than they will bring later, the fact that contracts are being arranged for perhaps 100,000 tons a year at a vessel rate of twenty shillings the ton, Narvik to Philadelphia, is interesting, to say the least. The price of lake ores is much mixed; at a time when prices are still quoted nominally at \$5.55, Mesabi non-bessemer, it is claimed by some buyers that quotations equivalent to \$4.20 are being made. It is further stated, by operators near St. Louis, that they are able to buy lake ores at \$4 delivered. This would not leave much above freights.

The Proposed Merger

Talk of a merger of various independent steel makers, all with more or less ore in the Lake Superior region, has served to call attention to these holdings and to the life of these deposits under normal mining activities as compared with those of the Steel Corporation; also to the vast reserves of the Mesabi Iron Co., soon now to come on the market as finished product of high grade ores. Of the approximately 250,000,000 tons of merchantable iron ore held by the seven steel companies mentioned as entering this merger, Midvale

has most, and Brier Hill least, but curiously enough, the life of these two, based on their annual consuming capacity, is almost the same. It is generally supposed that the ore interests of Pickands, Mather & Co. will be a part of the proposed organization and it is likely that the ore activities of the merger will be directed to a considerable extent by that company's organization; the situation, in this respect is somewhat analogous to that of the old Oliver Iron Mining Co. at the time of the organization of the Steel Corporation. The ore organization of the Republic is likely to be a factor also. The mines and ships of Pickands, Mather & Co. will be a valuable adjunct to the properties of the merger. These ships have a seasonal capacity for about 6,000,000 tons of ore, or say 45 per cent of the probable annual requirements. Some of the best ores held by companies expected to enter the merger are on short time leases, and it will be impossible to come anywhere near exhaustion of these mines before the expiration of present leases. The only very important ore tonnage classed as independent to be had in the lake district is that of the Mesabi Iron Co. One effect of the consideration of these facts has been to induce a more active inquiry for mines, and a number of transfers seems to be pending. Furthermore, there has been recent inquiry for undeveloped favorably situated ore lands, and this inquiry and examination has included tracts not commercial but containing large deposits of lean magnetites, capable of concentration, in both Minnesota and western Ontario. While there are no such vast bodies of these ores as that held by the Mesabi Iron Co., there are, nevertheless, deposits of fair grades collectively running into hundreds of millions of tons. That these will come into the market in due course there is scarcely a doubt.

Minnesota Grants Rights

After many years of withdrawal from market, the State of Minnesota is again to grant rights on mining lands, and the first bids for leases will be opened Jan. 9, next. There are a few State owned tracts—less than a dozen, perhaps—that present more or less attractive possibilities for mining. The law differs from that which was repealed some years ago in several particulars: The maximum unit of land to be taken under one permit is now 80 acres; formerly 160. The royalty is on a sliding scale based on assay of ore and beginning at 25c. or less (dry analysis) on which grade the minimum royalty is 12c. a ton, with a 5 per cent cumulative increase in royalty for every 1 per cent increase in grade. Under this an ore assaying 50 per cent (dry) will be charged a minimum royalty of 40.3c., formerly 25c. for all grades. These are minimum royalties, but properties are put up for lease under sealed bids which must not be under the minimums, and are disposed of to the highest bidder. Formerly there were no bids, the first applicant having preference, but if there were synchronous applicants, then these were given opportunity to bid against each other. The sum to be advanced by applicants is now \$250, of which \$50 is with the application for a permit and \$200 is to bind the successful applicant to "carry out in good faith the covenants of the permit." Formerly the total cost of a permit was \$50. In case land desired contains ore of a class suitable for magnetic separation, only the contained magnetite is considered as iron in figuring the assay value.

No doubt there will be many bids for the few tracts worth consideration, most of which probably contain one form or another of concentrating ore.

Many old State leases, all of which were for the period of 50 years, are approaching maturity; and it will be the efforts of lessees to exhaust them in the next 20 years. This will result in the concentration of effort at points where State leases still show large tonnages, notably to the Mesabi Mountain mine of the Oliver company; and will tend to disarrange former schedules elsewhere.

The Removal of Hibbing

Of spectacular engineering or development projects there have been few during the year. Perhaps the most notable of these has been the removal of the village of

Hibbing. This, while begun some time ago, is now practically complete. It is the removal of the most densely populated 40 acres of the business and residence portion of a town of some 12,000 people to a site a couple of miles distant, in order to permit the mining of that 40 acres, which has long been under lease to the Oliver Iron mining Co. A reference to the map will show that this tract, the southwest quarter of the northwest quarter of section 6, township 57, 21, is surrounded on three sides by developed large open pit mines; to the east and north the Sellers, and to the west the Rust, all of the Oliver company. There also is a little ore on the Pillsbury forty to the south. Connecting these mines is a narrow railway cut from Sellers into Mahoning ground. Ore exists clear through from Sellers to Rust and underlies most of the 40 acre tract; and the overburden is light. It is generally supposed that from 35 to 40 million tons exist therein. The Oliver company has been at a very heavy expense to clear the ground for the proposed opening of this new mine; there have been purchased all the building lots on the 40 acres, and the plotting and building of a new town with all its street pavements, sewers, sidewalks, etc., all done on the most modern scale. Old buildings have been moved and repaired for occupancy, and new buildings have been put up under arrangements with the owners that permit them to buy on long term payments at very low interest. As all this building has been done during the high cost period and as much of this work has far overrun estimates, the amount of money invested by the company, either for itself or on contract, has been very large. The municipality itself has erected many extravagant buildings, such as a municipal power and steam distributing plant costing \$1,000,000, a high castle of a school costing more than \$3,000,000, and other structures in proportion. As about 95 per cent of the taxes levied in Hibbing have been against iron ore properties, these foolish extravagances, which the mining companies have been unable to curb until very recently, are being paid for almost entirely by them. The Oliver company does not do things by halves, and its own expense in the new town have been great. The finest hotel north of St. Paul, the best equipped hospital in the State, a considerable mileage of concreted streets and sidewalks, are all evidence of its liberal spirit. The new Hibbing is probably the most elaborate and metropolitan mining town in the world; all for the removal of open pit ore, the tonnage of which is numbered.

Ending Reckless Expenditures

There are evidences that the era of reckless spendings on the part of Mesabi range mining communities is about over. The thing has been going so fast from bad to worse that the companies have finally taken a decided stand against it, and have invoked, not only the power of the State legislature but of the courts as well. The State has passed laws limiting the expenditure of municipalities to a certain maximum per capita, and the courts have enjoined them from the construction of such public improvements as great recreation buildings, unnecessary schools, and the like. Of the total Mesabi range iron on tax rolls some 20 per cent is in Hibbing and some 4 per cent in Buhl. These two municipalities are referred to as they are among the chief offenders against decent economy in municipal operation. The first had an expenditure of \$225 and the other \$557 per inhabitant. The State has passed a law limiting municipal expenditures to \$100 for general purposes and \$60 for school purposes, per inhabitant. This will limit the Hibbing tax expenditure to about \$1,200,000 for running this village of 12,000 persons, and to \$720,000 for its schools, and one would think it should be able to worry along on this. Buhl, with its 1500 people, will have to economize down to about 28 per cent of its former orgies. The courts have stopped many of the contemplated municipal projects, some of which were well under way with a lot of contracts let and in progress, and the general attitude of governing bodies is one of returning sanity. Taxes have become such a burden that they were unbearable; those paid in the year 1921 over the Mesabi range as a whole have been not far from an average

of \$1 a ton on the ore produced this year, though the Mahoning mine stands out as a shining example with a tax against the year's production amounting to more than \$4 a ton. Even with a normal production of ore this mine would be paying about 60c. a ton this year.

State Profit Tax

Last winter the State legislature passed a law placing on iron mines a "profit tax" of 6 per cent based on a supposed net return to the property from its operations. No payments are due under this act until 1922, and what they will amount to is hard to say. It is scarcely conceivable that the mining companies will pay this discriminatory tax without legal opinion as to it, and the general opinion is that the law will be found unconstitutional.

The village of Mountain Iron, whose normal population is about 1200, had a tax collection this year of \$236,000; it is now limited by the courts to an expenditure of \$8,000 per month. This is now the general attitude of the courts, and it is quite evident that they will stand little more of the former reckless extravagance, which was not only a crime against the taxpayers but a crime against society as a whole.

An ambitious project of the early part of the year seems to have been postponed somewhat indefinitely; that is, the purchase of the Port Arthur blast furnace of the Atikokan Iron Co. and the development of the Gunflint district of the Mesabi. This was undertaken by a Chicago syndicate which spent considerable money only to find the plan impracticable for the present. No doubt there is a large amount of ore in the Gunflint, most of which is of the same type as that held by the Mesabi Iron Co., but the cost of concentrating works big enough to be commercial is very great. Other reasons also probably have led to a temporary abandonment of the project.

Proposed Blast Furnaces

Two undertakings for erection of charcoal blast furnaces at Iron Mountain, Menominee range, are in progress. The first of these, that of the West Chapin Mines Co., has begun construction and has financed itself to the extent of some \$600,000. This proposes to utilize the ores of the West Chapin, silicious hematites running about 40 per cent iron. Its plant is going in at the mines, to the west of the town. The other, under the direction of M. E. Richards, has not yet completed its financing, but is confident of doing so shortly; it expects to take advantage of various ores, more especially of a high lime deposit near Quinnesec. Both are to be of 100 tons capacity, and both will utilize, in part, waste wood products from the Ford mills and another large hardwood sawmill in Iron Mountain.

Imperial mine at Michigamme, belonging to the Ford Motor Co. interests, is in process of rehabilitation for production during 1922. There are a million or two tons of high moisture ore assaying about 46 per cent iron, and in the old days when operated by the Cleveland-Cliffs Iron Co., the property usually showed a loss. But there was a royalty which does not exist now.

Oglebay, Norton & Co. Operations.

Oglebay, Norton & Co., are sinking a 2000-ft. working shaft at their Montreal mine, western Gogebic, and it is now down to ledge. The Republic Iron & Steel Co. is extending its operations in the same region, taking additional properties and planning larger developments. Sunday Lake shaft is to be concreted and much additional work done there by Pickands, Mather & Co. During the year, the McKinney Steel Co. started its completed electrification at Ironton mine. The hoist is the largest d. c. motor-driven iron ore hoist in America, having a capacity for 210 tons per hr. from a depth of 3000 ft., at a speed of 2500 ft. per minute. The shaft at present is 1500 ft. deep, is vertical, of four compartments, with steel timbering to the bottom, and is concreted from surface to ledge, at 90 ft. Hoists, motors and auxiliary machinery are housed in a steel and brick structure that was erected last winter when the average temperature was 6 deg. above zero, and when there was an extreme low of 37 deg. below. The entire installation is very complete and presages

a far greater development at both Ironton and Colby mines than has ever yet been undertaken there.

Some development is under way on the Mesabi, the chief of which is the stripping of Prindle mine, section 2r, 57, 22, by the Oliver Iron Mining Co. A total of 2,000,000 yards will be moved, exposing some 3,000,000 tons of ore. This is at the village of Kewatin, close to the Sargent, St. Paul and Bennett mines.

At the east end of Vermillion Lake, Vermillion range, the Chippewa Mining Co. is developing its Armstrong Bay mine; the company anticipates shipping 100,000 tons in 1922. Its ore is a typical Vermillion.

Called to South Manchuria

During the summer, a group of Minnesota engineers and geologists were called to South Manchuria by the South Manchurian Railway, to examine low grade iron and large coal deposits. It seems that there are vast tonnages of ore, low in grade, but large part magnetic, situated along the line of the railway, and close to the same company's two blast furnaces at Aushan. The duty of these engineers was to see if these ores might be made treatable by magnetic separation, which they seem to be, although the proportion of hematite in the ore forbids a clean separation. Mining now is by hand on high-grade only, and the work is merely the following of seams that are good enough to use. It is generally understood that if the Japanese retain their Manchurian control, these properties will be developed under the management of Americans.

The Great Northern railway is to build a steel and concrete ore shipping pier to take the place of its No. 2, at Allouez Bay, Superior, at an estimated cost of \$3,000,000. Work began in December, and the pier will be ready for the business of 1923. It will be 2100 ft. long, besides approach, and will have 350 pockets, and a probable capacity for storage of 175,000 tons of ore. No. 2, now being razed, has capacity for 105,000 tons.

The Largest Producers

Shipments for the year by the five largest producers in the Lake Superior country have been as follows:

	Minnesota	Michigan	Total
Oliver Iron Mining Co.	11,700,000	2,144,000	13,844,000
Pickands, Mather & Co.	626,500	968,000	1,694,500
M. A. Hanna interests.	1,119,000	232,000	1,351,000
Cleveland-Cliffs Iron Co.	320,000	667,000	987,000

Decrease in Movement of Raw Products

WASHINGTON, Jan. 10.—The sharp decline in the transportation movement of raw products used by the steel industry and of its manufactured materials for the quarter ending Sept. 30, 1921, compared with the same period of last year, is shown by the regular quarterly statistical summary of the Interstate Commerce Commission made public last Friday, dealing with commodities moving over Class I roads, or those having annual operating revenues above \$1,000,000.

For the entire United States the tonnage of soft coal, coke, iron ore, pig iron and blooms, rails and fastenings, bars, sheets, structural iron and pipe, the shipments on originating roads for the quarter ending Sept. 30 of the current year aggregated 1,860,663 net tons, as compared with 3,302,625 tons for the same quarter of 1920, amounting to a decline of 43 per cent. The grand total of all traffic on originating lines was 7,056,597 carloads for the third quarter of this year and 9,571,611 carloads for the same quarter of 1920.

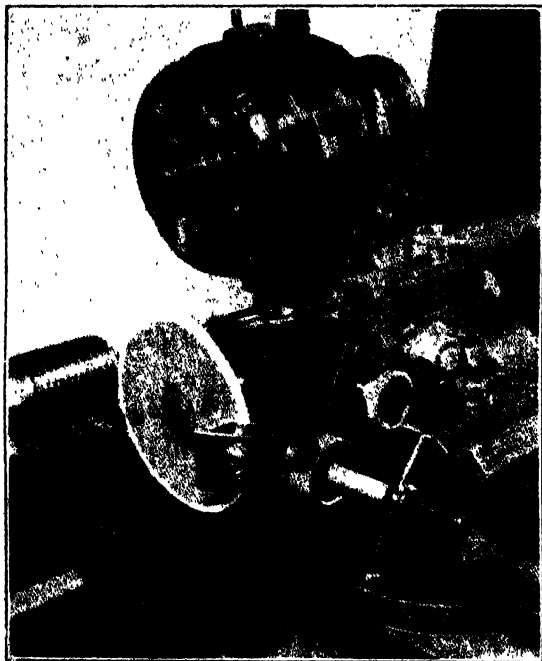
The figures by products consumed and manufactured by the iron and steel industry follow:

Carloads of Freight Hauled on Originating Railroads— United States		
	Quarter Ending—	
	Sept. 30, 1921	Sept. 30, 1920
Bituminous coal	1,402,003	2,057,197
Coke	49,137	196,707
Iron ore	283,683	723,246
Pig iron and blooms	24,014	94,669
Rails and fastenings	13,040	20,775
Bars, sheets, structural and pipe	88,786	210,031
Total carloads	1,860,663	3,302,625

Auxiliary Grinding Wheel Truing Attachment

The Precision & Thread Grinder Mfg. Co., Philadelphia, has placed on the market an improved permanent alinement wheel truing head, shown in the accompanying illustration. It is for use on the company's multigraduated precision thread grinder, but can also be used as an auxiliary wheel truing head on any grinding machine.

The device is intended to keep the wheel always in correct alinement with the lead of the thread being ground. It dresses the V-form on the wheel to a sharper point, facilitating the grinding of much finer pitch threads than usually practicable. There is said to be no limit to the length of thread which may be accurately ground, as the grinding wheel may be trued while grinding. The in-feed for the head is graduated



Permanent Alinement Wheel Truing Head. The diamonds are traversed by operating the double-ended handle on the extended threaded shaft

in 0.001 in. which enables the attachment to be fed-in the same amount as the wheel diameter is reduced by wear and dressing.

The form dressed on the wheel is always in line with the axis of the work centers, as the diamond holder head is graduated in degrees corresponding to the spindle graduation on the grinder proper. The diamonds are traversed by operating the double-ended handle on the extended threaded shaft. They do not cut the wheel simultaneously but in progressive order.

A feature of the attachment lies in the self-sharpening position of the diamonds. They are positioned at an angle of 10 deg. and after slight wear can be rotated a fraction of a turn to present a new point to the wheel. This can be continued until the diamond is worn down to its setting. A stop provided for regulating the return traverse of the two diamonds can be utilized for pre-determining the amount of flat desired at the bottom of the thread angle, thus assuring the same amount of flat regardless of re-dressings and without subsequent re-gaging.

New Combination Drill and Valve Grinder

Following a series of tests by outside interests extending over a period of two years, the Rivett Lathe & Grinder Co., Brighton, Boston, is manufacturing and selling for the Worcester Electric Tool Corporation a combination drill and valve grinder, known as the Huskee combination. The tool has a drilling capacity guaranteed up to $\frac{1}{2}$ -in. in tool steel, although in careful

hands holes up to $\frac{1}{4}$ -in. can be drilled in tool steel and $\frac{1}{2}$ -in. in soft metal. Is specially designed for service station, garage and repair shop work.

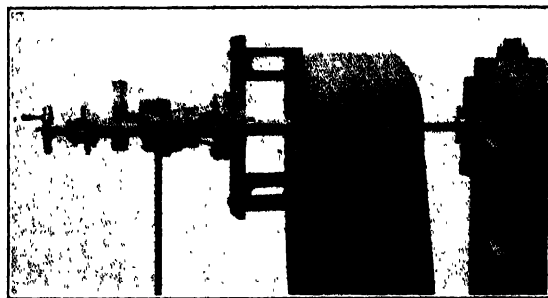
It has a spade handle, which accommodates the largest hand and enables the operator to use the tool as a breast or shoulder drill; the side handle carries the switch, while a heavy head protects the switch buttons. This handle, flattened on two sides and internally reinforced, is designed to be held in a vise. The tool combines the oscillating motion of the valve grinder and the rotary motion of the drill. To change from a drill to a valve grinder it is only necessary to unscrew the drill chuck and slip on the valve grinding sleeve. The tool can be plugged in on any ordinary lamp socket. With the valve grinding attachment it weighs 10 $\frac{1}{2}$ lbs., and with the drill chuck, 11 lb.

New Portable Boring Unit

A new boring unit based largely on the principles of the portable boring bar and similar in several features to the unit described in THE IRON AGE of Nov. 24, 1921, has been placed on the market by the Pedrick Tool & Machine Co., Philadelphia.

The appliance is shown in the accompanying illustration set up for boring the bearings in a large housing, an extension bar being used. It will drill and feed an auxiliary bar 20 ft. long, and operate either horizontally or vertically. It is claimed that, erected on an angle plate in the shop or attached to bridge members 100 ft. in the air, it will start a hole through a blank surface and bore it out to a size up to the range of any machine with the same spindle diameter.

The four members composing it are the bar, the feed, the driving gearing and the crosshead mechanism. The bar is a steel forging having a square-threaded feed screw embedded in a groove almost the full length of the bar. A 3-in. diameter bar is 3 ft. long and affords 18 in. of travel. The lower end of the bar is bored taper to hold other tools. The feed case is at-



Portable Boring Unit Set Up for Boring in Line the Bearings in Large Housings. The device can be used either horizontally or vertically

tached to the other end of the bar and by blocking the handwheel, becomes automatic in action. Two changes of feed are regularly provided and are operated by movement of a slip pin. If required, however, the unit can be equipped with a three-change feed case. The driving gearing is in compound ratio. Power may be applied to the primary pinion by belt, air drill, electric motor, or by hand.

The crosshead supports and guides the bar, and space blocks provide room between the work and the end of the bar. The crosshead has been designed to facilitate accurate and convenient centering of the bar. When the crosshead has been set up roughly central with the work, four radially-disposed set screws, projecting internally against a bearing, permit shifting the bar to its final alinement. Four bolts on the top of the bearing plate are then tightened and the whole firmly secured.

The Joel M. Stearns Co., Greenfield, Mass., with a capital of \$75,000, has been given a charter to deal in iron, steel, builders' hardware, etc. Joel M. Stearns, Greenfield, is president.

INGOT REHEATING FURNACE

New Design to Avoid Imperfect and Unequal Heating by Proper Control of Incoming Gases

BY H. E. SMYTHE*

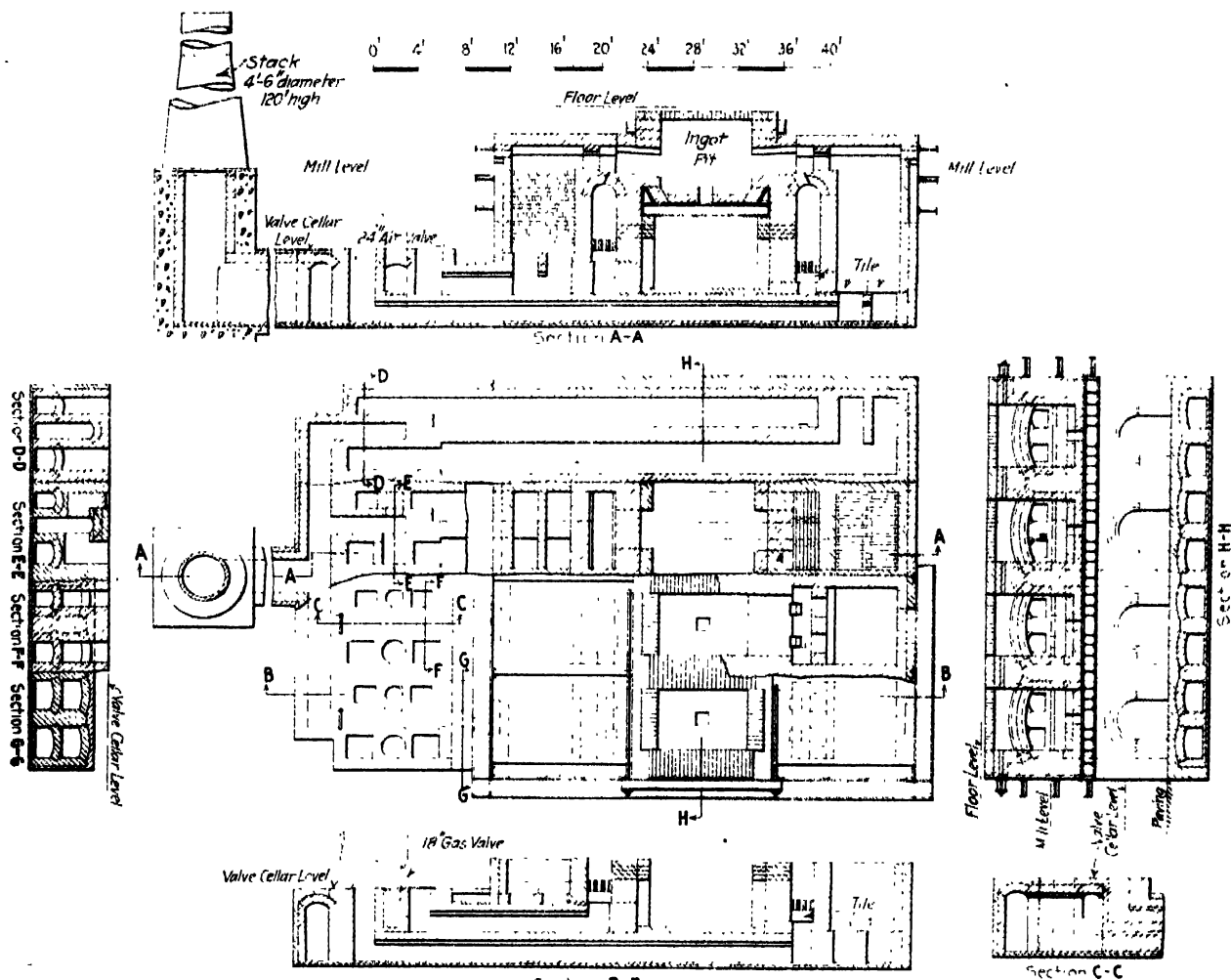
Improper and uncontrolled reheating of ingots, no matter whether they are charged hot or cold into the typical or standard soaking pit furnaces, for the reheating before being delivered to the blooming mill for rolling into blooms, billets or slabs, or to the universal or plate mill for rolling direct into finished plates, has for years been a bone of contention, comment, unfavorable criticism and misunderstanding between the open-hearth operatives producing the steel, and the soaking pit and blooming mill operatives heating and rolling the steel into semi-finished or finished products, all of which contention is to a large degree unnecessary.

After many years of study and experience, both in

after completing the rolling process. The reasons or causes for the majority of these maladies or troubles are improper combustion, lack of heating control and poor mixture of the gas and air before entering the pits.

The drawings show that producer gas is not regenerated; nor is coke oven gas or natural gas. These gases are introduced through slots or ports in which no checkers are placed. When producer gas is used, the reversing valves simply act as a means of diverting it from one side of each soaking pit to the other, and have no connection with the flue leading to the stack, thereby preventing leakage thereto.

All the waste gases leaving the soaking pits pass through the air regenerators only, which are increased somewhat in volume. Therefore, the air is pre-heated to the highest point of efficiency and is introduced through one or more ports or openings, directly over the incoming non-regenerated producer gas, at a point from 4 to 5 ft. before the admixture of the gas and air,



Horizontal, Longitudinal and Transverse Sections of Reheating Furnace, Showing Passages Traversed by Gas and Air

building and operating soaking pits, conclusions have been arrived at which warrant the statement that at least an average of 85 to 90 per cent ingot yield from open-hearth practice can be assured, and considered as good grade and marketable steel. In our judgment, the real trouble commences when the ingots are introduced into the soaking pits, through imperfect and uncontrolled reheating, whereby the ingots are subjected to hot gas and air pockets, streaks, waves of flame, which burn, cut or blemish different parts of the ingot, without properly or uniformly reheating or soaking the ingot at top, bottom and through to center. This causes a heavy jacket or scale formation around the ingot, which means excessive oxidation, honeycombed, pitted, scabby and spongy surfaces, and these blemishes eventually find a permanent position within the steel

or combustion point, thereby assuring a uniform heat, clear flame and proper combustion. This is non-oxidizing, all of the gases being properly consumed within the pits, which is the proper place, and not passing through the checkers out to the stack, which is now the prevailing condition.

When using coke-oven gas or natural gas, the gas pipes are introduced through the sides of the pits directly under the bottom, into the gas slots, which have no connection with the stack. The gases pass up to the gas ports, where they come in contact with the pre-heated air introduced directly over them.

In this construction and type of soaking pit, the products of combustion are laid directly down and upon the soaking pit bottoms, thereby making it possible more easily to remove the cinder. Another feature is the fact that, where coke breeze is used in making bottoms for soaking pits, in ordinary and usual practice,

*President, S. R. Smythe Co., Pittsburgh.

the bottoms chill to such an extent that a considerable amount or quantity adheres and freezes to the ingot bottoms, and is withdrawn with each ingot, especially when cold ingots are charged, which is quite an expense and nuisance. This type of soaking pit eliminates these conditions materially.

Letters patent have been secured upon the improved soaking pit furnaces here described, several of them have been built and are in operation, and the results speak for themselves. Any existing pit furnace can be changed to this principle. The same principle is applicable to other types of furnaces, and for reheating the semi-finished billets, blooms and sheet bars to produce their various finished products.

Very little attention or study has hitherto been

given to improving the method for reheating steel in its various forms and stages of production, and it can safely and conservatively be said that at least from 50 to 60 per cent of the troubles and imperfections known to us and to the steel producer are not from making of steel or ingots, altogether, but from imperfect and improper treatment and reheating.

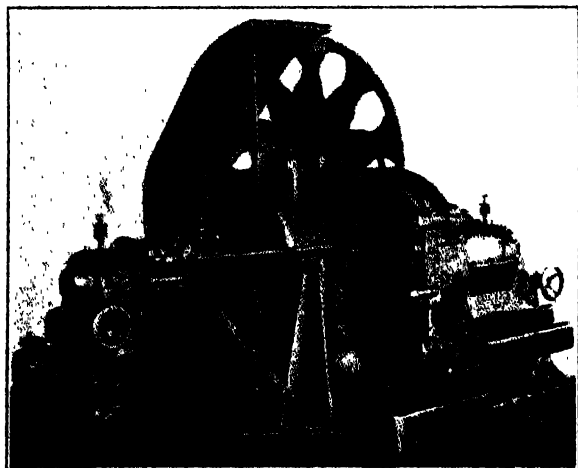
The features above referred to are materially improved in this type of soaking pit furnace, and it can be shown and proved that uniform reheating and high efficiency are obtained with a minimum fuel consumption, maintenance, consumption of bottom material, loss by oxidation, practically smokeless stacks, and furthermore, the blooms, sheet bars and plates have homogeneous, smooth and clean edges and surfaces.

Automatic Double-Spindle Disk Grinders

The Gardner Machine Co., Beloit, Wis., has brought out an automatic double grinder, designated the No. 1, intended for the rapid grinding of two opposite sides of a piece simultaneously.

Parts which are particularly adapted to this type of grinding machine are piston rings, ball and roller bearing races, sad-iron sole plates, thrust washers, gear blanks and other similar pieces. The new machine, which is designed for greater production than possible with the hand-operated type, is automatic in operation and of the continuous feed type. It differs in several features from the ordinary double-spindle disk grinder and is intended to permit of much greater accuracy.

The spindles are parallel and placed in an off-set relation, as shown in the illustration. When the grind-



By Means of Metal Inserts. Openings in the Work Carrier May Be Made to Conform to Hold Work of Various Shapes

ing requires the use of coolant, the grinding members consist of 24-in. diameter abrasive ring wheels carried in special chucks. For dry grinding 24-in. steel disk wheels, faced with the company's improved abrasive disks, are used.

The work is carried to the grinding position by a work carrier which passes between the grinding members. The carrier has a range of feeds from 6 to 40 pieces per min., which is intended to accommodate a variety of work, from pieces with a large surface requiring the removal of considerable stock, to those of small areas requiring a light cut. The work carrier is provided with either 5 or 10 openings, to receive the work. As the work approaches the grinding position, one of the grinding members automatically advances, until it reaches a positive stop. This member approaches the work under an adjustable spring pressure, and consequently advances only as rapidly as the stock is removed, giving a constant pressure to the work being ground. It is returned to the open position by the action of a cam, and the work, as it passes out from between the wheels, is unloaded automatically. The cam also acts to govern the spring pressure feed.

Adjustment of the grinding members is by means of a hand wheel operating through a worm gear and screw. The hand wheel is graduated in 0.0001 in., to permit of extremely close adjustment. Truing devices are provided for dressing the faces of the cutting members and this, with the provision for accurately aligning the spindles of the machine, enables a high degree of accuracy to be obtained. Each grinding member is supported by the entire head. The thrust is carried by hardened and ground steel collars which bear directly upon the spindle bearings. In advancing to the work the entire head slides upon ways.

The automatic feeding device, shown in the illustration, is used to keep the work carrier loaded when the machine is in operation on work which permits of the higher rates of feed. When the larger work, requiring the lower feeding rates is being ground, the carrier is said to be fed more economically by hand.

The truing devices are an integral part of the machine and are ready for use at all times. Dressing does not interfere with the set-up, nor is it necessary to stop the machine to use the dressers. The spindles are of alloy steel, heat treated, and are mounted in bronze bearings of special design, adjustable for wear. Sliding surfaces are wide and the ways protected with shields to exclude dust and dirt. Sliding parts are amply lubricated and are provided with gibs to take up wear.

Rates Declared Unfair

WASHINGTON, Jan. 10.—Complaint has been filed with the Interstate Commerce Commission by the Parkersburg Rig & Reel Co., alleging that rates on fabricated and unfabricated plates and sheets, 12 to 16-gage, in straight or mixed carloads, with structural and other steel products named, including nuts, bolts, castings, and rods, applying from Parkersburg, W. Va., to eastern defined territories to all points in California, are unreasonable.

It is charged that they are excessive to the extent that these rates exceed the commodity rates on plates and sheets, 11-gage and heavier, which take less than the fifth class rate, while the latter is the rate applying to plates and sheets, 12 to 16-gage.

The complainant alleges that the rates charged are discriminatory in favor of shippers who fabricate plates 11-gage and heavier in the Mahoning and Shennango valleys, the Pittsburgh district, Kansas City, Mo.—Kans., St. Louis, Chicago, Denver, and other points.

In association with the National Research Council and other scientific and technical bodies, the Bureau of Standards is interested in formulating a program on a comprehensive scale for the study of the fundamental phenomena relating to corrosion. A steering committee has been appointed, and it is expected that investigation of this difficult subject will be encouraged in several centers, according to a definite plan to be decided upon.

The Black & Decker Mfg. Co., builder of portable electric tools, announces that effective Jan. 3, it will make a freight allowance on shipments of 100 lb. or over to points in the United States and Canada.

Production and Yield of Rolling Mills

Dependence of Material Yield on Oxidation and on Bloom and Billet Cropping—Temperature Limitations Govern Reheating

BY JOSEPH F. SHADGEN

(Continued from page 46, Jan. 5)

OF the greatest importance is the fact, well recognized to-day, that the ratio of operation has the large influence on determining the power demand per unit rolled, as a mill running light takes 50 per cent of the current required for full operation. This can be checked up on the chart of any registering wattmeter, and explains the basis of the efficiency of continuous mills, and incidentally a leading reason for their adoption. It follows logically that by all means a mill should be operated at full capacity, and it is logical, because it is more economical to provide two 8-hr. shifts working 90 per cent than it is to have three 8-hr. shifts working 60 per cent. The present low load factor is of course one of the main reasons for present high production costs.

The author wishes, in concluding this division of the subject, to give credit to numerous sources (proceedings Association of Iron and Steel Electrical Engineers, *Revue de Metallurgie*, *Stahl und Eisen*, *THE IRON AGE*, etc.), out of which part of the underlying data of the above compilations were compiled.

Material Yield

The rolling process entails a certain loss of material that, as suggested, is an important item of the operating cost. The yield of a mill is usually expressed as a percentage of the weight of the material fed into the rolls. To say the yield of a blooming mill is 91 per cent means that, of 100,000 lb. of ingots, finished blooms weighing 91,000 lb. are produced; or, in other words, to secure 100,000 lb. of blooms requires the supply of 109,890 lb. of ingots.

Reasons for loss of material in the rolling process are (a) the oxidation loss in the furnace and mill, and (b) the loss through rolling, including a loss due to the quality of the material.

Losses due to heating, while partly inevitable, should be kept low by close supervision of the furnaces. The amount of steel oxidized is a function of the flame control of the heating device, the length of exposure to the heat and the weight of the ingot or bloom. If the flame or hot gases that supply the heat are of a reducing nature, the loss is naturally smaller than if they carry a surplus of oxygen attacking the metal. Hence the first requisite is to devise proper flame control, and this need explains the present tendency to use gas-fired furnaces, and the vogue of pulverized fuel utilization, permitting easy and instantaneous changes in the condition of the flame.

That the time of exposure influences oxidation is obvious because, the longer the steel is in contact with the gases and the furnace bottom, the greater are the chances of producing scale and slagging. The weight of the material is of importance insofar as it usually fixes the ratio of exposed surface to the total volume of metal, and because the interior has to be heated thoroughly to avoid unexpected rolling resistance and possibly breakage of the mill. It follows that the time of exposure is usually a function of the cross section of the material to be heated, but the bringing to temperature should be done as quickly as compatible with the nature of the steel.

The limit of temperature is governed also by the

quality of the material (1200 to 1800 deg. C., or 2200 to 2375 deg. Fahr., for soft steel and 950 to 1050 deg. C., or 1750 to 1925 deg. Fahr., for high-carbon steels, etc.). If the steel is fed hot to the furnace, as for instance in the form of freshly stripped ingots, the time of heating is considerably reduced. The loss due to scaling varies from $\frac{1}{2}$ per cent of the weight up to 3 or 4 per cent, and should never exceed 4 per cent.

The blooming mill loss is usually small, because the pit furnaces receive hot stock directly into the cast house, the time in the furnaces varying from 1 to 2 hr. according to the size of the ingot. In Europe in non-heated pits it is customary to figure on a 1-per cent scale loss, and in heated furnaces on 2 to $2\frac{1}{2}$ per cent; in the United States $2\frac{1}{2}$ to 3 per cent is a fair average. for all ingots above 14 in. square in cross section. If cold ingots are to be reheated, the soaking time varies from 2 to 3 hr. and the loss in weight averages $3\frac{1}{2}$ per cent.

Blooms and billets are heated relatively quickly. If put into the furnace hot direct from the bloom or billet shear, $1\frac{1}{2}$ per cent scale is good performance, while for cold stock $2\frac{1}{2}$ to 3 per cent is the average. For slabs 3 per cent is a fair figure, because they are bulky and lie flat on the hearth, thus exposed to the slug forming action of the bottom. Continuous furnaces of the pusher type should give better results than the side door furnaces. In Europe furnace builders often guarantee a definite maximum loss to back up their claim of superior regulation of their construction.

Rolling Losses

Losses through the rolling operation consist in the inevitable cropping of ends, cobbles accidents in handling the material in and out of the rolls, cold spots, etc. The lengths of the charged sections are figured to yield definite lengths of finished product plus a small safety factor, usually 2 to 3 per cent, to avoid short lengths. In small mills, where material loops from one pass into another, the accidents create that amount of scrap, entailing additional loss. While in a blooming mill or a rail mill 3 to 5 per cent total loss is normal, on bar mills it commonly reaches 5 to 8 per cent, and on wire mills, 7 to 10 per cent. In plate mills and sheet mills the losses are correspondingly larger, because the finished product has to be cut to size in two dimensions, length and width. The average loss is 15 to 25 per cent, though for universal plate mills 8 to 15 per cent is good practice. Inspection influences the yield, and much depends on the interpretation of specifications and the rigidity of their application.

The third influence creating a loss of material in rolling mills is the quality of the ingots. This has to be dealt with separately, because of its importance from a tonnage standpoint, and because it should not be charged as a factor of blooming mill performance. In large plants the loss due to quality affects primarily the blooming mill, but is, in a measure, beyond the control of the rolling operatives and, as suggested, should be regarded as a separate item. If the ingots are sound, the crop ends at the shear are normal, but if the ingots are infected by blowholes, piping, segregation and other ills, the loss at the bloom shear increases

rapidly, and amounts often to 12 to 15 per cent as a year's average. This means that no less than one-seventh of the ingots cast are rolled to become scrap, or that one-seventh of the heat, power and labor of rolling are spent for nothing, a direct loss and an undeniable waste.

It follows that the material yield is a pretty accurate and severe measure of the quality-performance of the steel-plant that supplies the ingots. While in Europe a 90 per cent total yield of the blooming mill (scale loss $1\frac{1}{2}$ per cent; crop ends $8\frac{1}{2}$ per cent) is considered the average loss, and while many well-managed plants average 8 to 9 per cent over some years of operation, here in the United States it is not uncommon to find an average between 12 and 15 per cent, showing conclusively that there are opportunities for improvements. Experts like De Loisy, in close touch with the achievements in France, figure on only $3\frac{1}{2}$ to 5 per cent loss for cropping (total loss about 7 per cent), and in Germany a number of plants show 8 per cent as the total loss, or a yield of 92 per cent, over years of operation.

It has been conclusively demonstrated that large ingot sections increase the bloom shear loss, and today, with accurate ways of measuring all factors in-

loss produces furnace slag, and the roll mill loss furnishes scale, both of which can be sold, and the crop ends have a value as scrap. This should be credited to the cost of production.

If the power factor per ton of finished product is desired, the data already given must be multiplied by the yield of each mill. Tables II and III give the net operating cost of various products for a pre-war year;

Table II.—Yields and Quantities Based on One Net Ton of Product, Rolling from Ingots

	Bloom		Slab		Rail		Billet	
	Bess.	O.-H.	Bess.	O.-H.	Bess.	O.-H.	Bess.	O.-H.
Ingot Weight, lb.	2223	2378	2319	2420	2717	2585	2385	2451
Yield, per cent	90.0	84.0	86.3	82.4	73.5	77.4	87.5	81.5
Scrap recovered, lb.	172	318	272	364	652	533	238	393
Cost, Cents per Net Ton								
Fuel	7	13	7	9	15	29	13	19
Power	18	15	14	25	34	16	36	23
Labor	21	32	34	35	104	108	56	54
Maintenance, Tools, Ties ..	8	13	15	14	27	27	20	19
Supplies	11	14	15	12	35	50	18	27
Total	65	87	85	95	215	230	142	142

these are based on the returns of rollings amounting in a year to a million tons in each case except for plates. The conversion cost is decidedly affected, as already stated, by the ratio of output to input, and it seems contradictory or unwise to spend a considerable effort of energy and capital to save a few cents on the power factor, while other losses, particularly the matters of scaling and cropping, are accepted philosophi-

Table I.—Average Generating Data of Various Mills

Type of Mill	Rolling from	Product	Furnace	Loss Through Scaling and Cinder, per cent	Loss Through Rolling and Crop Ends, per cent	Total Yield, per cent
Blooming	Ingot	Bloom	Soaking Pits (a) Gas fired	2 to 3	7 to 12	85 to 90
Blooming	Ingot	Billet	Soaking Pits (a) (b)	2.5	5 to 10	89 to 93
Blooming	Slab Ingot	Slab	Soaking Pits (a) Gas fired	3 to 4	9 to 15	82 to 88
Rail	Ingot	Heavy Rail	Ditto	2 to 3	12 to 20	78 to 84
Rail	Bloom	Heavy Rail	Soaking Pits (a) (b)	2 to 3	10 to 15	82 to 88
Structural	Bloom	Shapes	Soaking Pits (a) (b)	2 to 3	8 to 15	82 to 90
Continuous Billet	Bloom	Billets (c) Sheet Bar (d)	None	0	5 to 7	93 to 95
Plate	Slab	Plates sheared	Yes	3 to 4	15 to 25	72 to 85
Universal Plate	Slab	Plates	Yes	3 to 4	12 to 20	76 to 85
Billet and Small Shape	Bloom	Billet and Mine Rail	Yes	2 to 3	8 to 12	89 to 90
Bar	Billets	Bars	Yes	1.5 to 3	7 to 15	88 to 92
Rod	Billets	Rods	Yes	1 to 3	6 to 11	85 to 91
Sheet	Sheet Bar	Black Sheet	Yes	4 to 5	15 to 28	70 to 82

(a)—One-third fired; (b)—Two-thirds not fired; (c)— $1\frac{1}{2} \times 1\frac{1}{2}$ in. (d)— $8 \times \frac{3}{4}$ in.

involved, the tendency is noticeable toward smaller ingots. It is also conceded that blooming down the metal does not improve the quality of the steel very much. The forging action of the process and the increase in density, etc., are rather intangible points that do not always stand close analysis. The logic that the first requisite is sound ingots attracts more followers every day. The overworked slogan of many plants, "production first" should be revised, "quality first, production next."

Table I gives the average results of yields for various mills. The secretiveness of many operating departments on this subject should give way to a broadminded discussion for the ultimate good of the industry.

It must of course not be forgotten that the furnace

Table III. Yields and Quantities, Based on One Net Ton of Product, Rolling from Blooms or Slabs

	Billets		Shapes	Sheared Plate	Universal Plate	
	Bess.	O.-H.	O.-H.	O.-H.	Bess.	O.-H.
Bloom or Slab Weight, lb.	2126	2177	2408	2657	2620	2354
Yield, per cent	84.0	92.0	83.0	75.2	76.0	85.5
Scrap Recovered, lb.	95	130	352	586	524	272
Costs, Cents per Net Ton						
Fuel	2	3	17	27	24	35
Power	29	20	39	38	67	37
Labor	42	29	161	174	113	134
Maintenance	19	11	58	45	45	36
Supplies	18	14	55	50	45	52
Total	110		330	334		294

cally as inevitable. Progress has undoubtedly been made in the last few years, but it is undeniable that the bettering of blooming mill performance offers to the American operator the best opportunity to reduce leaks, and thus to realize a material saving in cost of operation.

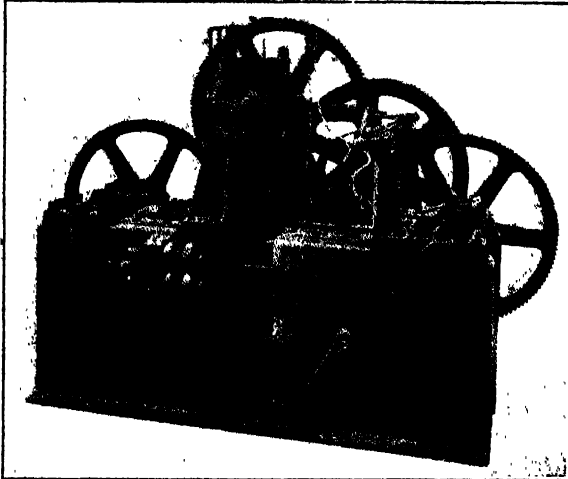
Rogers, Brown & Co. Conference

The annual conference of the members of the firm of Rogers, Brown & Co. with their branch office managers, was held in Cincinnati, Jan. 5 and 6. The sessions opened with a luncheon at the Business Men's Club, to which all members of the firm, branch office managers and local salesmen were invited. On Thursday evening all were present with their wives at a dinner at the home of D. B. Meachem, president of the company. During the evening, Wm. A. Rogers, senior member of the firm, gave an interesting account of his experiences on a recent four months' trip to South America. Mr. and Mrs. Rogers crossed over the Andes Mountains where few white people had ever been before, and Mr. Rogers' account of their trip was a thrilling one. Stereopticon views of scenes along the route were shown. On Friday the guests were again entertained at luncheon at the Business Men's Club. Business conditions during the past year and the prospects for the future were discussed at the conference. It was the general opinion of the members of the firm and the branch managers that this year will show a great improvement over 1921. All indications seemed to point that way in the opinion of those present, and while not unduly optimistic, they all felt that in the last half of the year, conditions in the iron and steel industry will travel a long way back to normal.

New Machine for Making Hot Pressed Nuts

A new machine which, it is claimed, will produce hot pressed hexagon nuts with only 10 per cent waste, as against 50 to 60 per cent by other methods, has been developed by the Acme Machinery Co., Cleveland. The lowering of the percentage of waste in material is accomplished by means of indenters which indent the bar and thus avoid the side scrap.

A nut bar of special section is used which in the first operation is deeply indented on both sides, forming symmetrical angles of 60 deg., one on each side of the bar. As the indenters withdraw, the cut-off slide



Hot Pressed Nut Machine. A nut bar of special section is indented on both sides, the blank sheared off and carried into the die. The nut is then formed, punched and ejected

advances, shearing off the blank and carrying it into the die box. Two punches then advance from opposite sides, going part way through the nut blank and compressing it in the center. The surrounding metal flows and fills all parts of the die, producing the sharp corners on the blank and the crown as well. One of these punches then punches out the core, after which the nut is ejected from the die.

The machine, as shown in the illustration, is of simple design and all parts are easy of access. The bed is an open-hearth steel casting and the gear wheels are of steel with cut teeth. The main slides are protected by the gibs, which serves to preserve the alignment of the guideway and minimize the cost of maintenance. The tools and punches are of simple design and are made of air-hardening steel. The machine is equipped with a simple automatic relief device that prevents undue strain during operation.

Four sizes are made, the capacity of the smallest machine being $\frac{3}{8}$ to $\frac{1}{2}$ in., and that of the largest, 1 to 2 in. The strokes per min. for these machines is 70 to 75 and 35 to 40 respectively.

Antidotes for Carbon Monoxide Poisoning

Carbon monoxide poisoning is one of the most frequent causes of industrial accidents, says the United States Bureau of Mines. It is an ever-present danger about blast and coke furnaces, smelters and foundries. There appears to be no uniformly recognized treatment for a person overcome by carbon monoxide. In the rescue work of the United States Bureau of Mines, however, a method has been developed which has been supported by laboratory investigation, and has proved successful in practical experience over a period of years.

The first and most important thing in caring for a case of acute carbon monoxide poisoning is to get the poison out of the blood. Every moment that it shuts the oxygen out of the hemoglobin adds to the chances for failure of respiration and failure of the heart. Every minute that the tissues are supplied with only a part of the oxygen they need increases the danger of their degeneration and permanent damage.

The first step is to get the victim away from the

atmosphere of carbon monoxide; the next is to supply him with oxygen. Fresh air is one-fifth oxygen. If a tank of pure oxygen is available, it is far better to use it, as the action is much faster and the after-effects, especially the headache, are much less severe.

All ambulances should be equipped with oxygen tanks. When the victim's breathing has stopped, or is very weak and irregular one of the rescuers should begin artificial respiration by the Schaefer method at once.

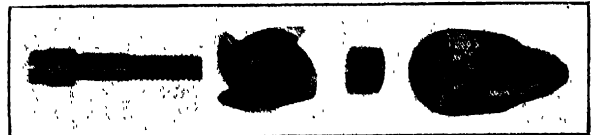
Continue artificial respiration, if necessary, for at least three hours without interruption, or until natural breathing has been restored or a physician has arrived. Even after natural breathing begins, carefully watch that it continues. If it stops, start artificial respiration again.

The patient should be kept quiet and lying flat to help his weakened heart. When he revives he should not be allowed to walk about or in any way exert himself, for there is danger of heart failure. Heat from safety lamps, hot-water bottles, or warm bricks, rubbing the arms and legs, and keeping the patient well covered with blankets all help the circulation and aid in tiding the body over a period of low vitality. The safety lamps, hot bricks, etc., should be well wrapped in cloth or paper as a precaution against burning the patient. Other stimulants, such as hypodermics of caffeine-sodium benzoate or camphor in oil, should not be administered except by a doctor, after he has considered the possibility of over-stimulation and consequent collapse. The patient should be kept in bed for a day at least. Later he should be treated as a convalescent, being given plenty of time to rest and recuperate. Just how long this time should be depends on the severity of his poisoning and should be decided by his physician.

Details of methods employed in the treatment of carbon monoxide poisoning, including a description of the Schaefer method of artificial respiration, are given in a report which may be obtained by applying to the Bureau of Mines, Washington.

New Interchangeable Spot Facer

An interchangeable spot facer intended to meet the demand for a low priced and economical production tool has been placed on the market by the Eclipse In-



The Boss on Cutter Fits Hole in Holder

terchangeable Counterbore Co., Detroit. It is known as the Junior and the component parts are shown in the illustration.

The complete tool consists of a nickel steel holder, an externally and internally threaded nut screwed into the holder, a high-speed steel spot facer with milled flutes and a machine-steel pilot. The ground boss on the spot facer fits into the hole in the holder, serving to align both accurately. The pilot nut is screwed into the holder and permits of instant removal of the shank of the pilot in case of breakage. The pilot nut may also be removed and replaced with one having a smaller internal thread, permitting the same holder to be used with many different pilots and spot facers. The end of the pilot head has a screw driver slot and also flats for removal by pliers or wrench.

The new tool can be used with standard Eclipse holders and standard pilots by using an adapter. Several sizes of spot facers are made from $\frac{1}{2}$ to 3 in., and the shank of the holder is made with a No. 2, 3 and 4 Morse Taper. The tool is also furnished without pilots.

The Studebaker Corporation, South Bend, Ind., made a new record for production, the week ending Dec. 21, when 1080 automobiles were completed. More than 7000 men are employed in the company's South Bend plants.

New England Foundrymen's Association Annual Meeting

The New England Foundrymen's Association held its twenty-sixth annual meeting Wednesday evening, Jan. 11, at the Exchange Club, Boston, with a new high record attendance. C. S. Lovell, president, presided. He was succeeded, in the election, by E. H. Ballard, General Electric Co., Everett, Mass. Mr. Ballard, formerly vice-president of the Association, is succeeded by George A. Ray, Taylor-Fenn Co., Hartford, Conn. George H. Gibby, Gibby Foundry Co., East Boston, and Fred F. Stockwell, Barbour-Stockwell Co., Cambridge, Mass., were re-elected treasurer and secretary, respectively. The executive committee consists of Charles A. Reed, Reed, Pears & Miller, Boston, pig iron and coke; L. M. Sherwin, Brown & Sharpe Mfg. Co., Providence, R. I., small tools and machine tools; Harry T. Welch, Milford Iron Foundry, Milford, Mass.; R. F. Harrington, Hunt-Spiller Mfg. Corporation, Boston, gun castings, etc., and Norman Russell, Albert Russell & Sons Co., Newburyport, Mass.

The meeting was called to order shortly after five o'clock, following which there was an informal reception. Dinner was served later in the evening at which Mr. Ballard presided. After-dinner professional talent, the New England Foundrymen's Association and the New England Coal & Coke Co. orchestras furnished entertainment and music. Charles A. Reed had charge of the arrangements.

First Meeting of Molding Sand Research Committee

The molding sand committee, recently organized under the auspices of the National Research Council and American Foundrymen's Association, held an interesting meeting in the Engineering Societies Building, New York, on Dec. 9. This was the first meeting of the whole committee.

Hundreds of thousands of tons of molding and core sands are used annually in the iron, steel and non-ferrous foundries of America. A large proportion of the expense involved is in the transportation of such sands and their handling in the foundry. A little of it is re-used; much more might be. Moreover, sands are not always correctly selected for specific purposes. Mixing and other treatment can secure improvement.

Under the direction of the Division of Engineering, N. R. C., and the American Foundrymen's Association, a valuable digest of literature has been made by Prof. R. E. Kennedy, University of Illinois, and distributed to the members of the committee and others interested. Practical foundrymen regard this as a most important treatise on the subject.

Three sub-committees are actively at work. The sub-committee on standard tests has reached agreement on six tests which will show the properties that are most indicative of satisfactory working conditions of the sand in almost all lines of foundry practice. The "fineness" test and "cohesiveness" test were reported as the two tests which should be given first consideration. Tests for permeability, water content, and thermal properties, and rational and chemical analyses, should also be considered in a general study of molding sands. The American Society for Testing Materials is to be invited to appoint representatives on this committee to help standardize the methods of making such tests.

The sub-committee on reclamation of old molding sands and greater use of old sands in molding and core-making operations is preparing a questionnaire for submission to the foundries which will bring out the proportions of sands reclaimed and the methods of reclamation.

The sub-committee on synthetic sands will confine its attention at first to mechanical means for mixing.

Under the guidance of Prof. H. Reis, Cornell University, cooperation will be secured from state geologists and the director of the U. S. Geological Survey, in making a thorough survey of sand deposits in this country that are suitable for foundry use. The cooperation

of men having like interests in Canada, England and Belgium has been secured.

R. A. Bull, Spondly Building, 639 Diversey Parkway, Chicago, has been elected chairman of the molding sand research committee, and Prof. R. E. Kennedy, 909 West California Street, Urbana, Ill., is secretary.

Practising Engineers Invited to Meet in Chicago

The American Association of Engineers will hold a conference of practising engineers at the Congress Hotel in Chicago, on Wednesday, Feb. 22. The tentative program includes the following subjects:

- How to sell engineering service.
- Experience of the practicing engineer with licensing:
 - (a) State reciprocity.
 - (b) Licensing of engineering corporations.
- Publicity for practicing engineers.
- Cost accounting for engineering service.
- Bookkeeping for an engineering office.
- How to uphold the standards of services and fees.
- Amendment of schedules of services and fees:
 - (a) Providing for other branches, such as mining and mechanical.
 - (b) To fit them to the practice appertaining to the several parts of the country.
- Computing the practicing engineer's income tax.

Ohio State Foundrymen's Association

The board of administration of the Ohio State Foundrymen's Association at a meeting in Cincinnati on Jan. 5, reviewed the report of the committee appointed to discuss a standard code of foundry practice. The report was returned to the committee for further revision and will later be presented to the entire membership for their criticism. It was decided to hold the next general meeting of the association at Cleveland during the session of the American Foundrymen's Association. This will be the annual meeting of the Ohio State Association and five new members of the board of administration are to be elected. President Weber appointed a nominating committee to compile a list of 10 men who will be balloted on for the positions on the board. Other business taken up at the meeting included the legality of the pig iron contract as approved by the National Association of Purchasing Agents. This contract was discussed in all its phases and was referred to the association's attorney for legal counsel and advice.

Chicago Engineers Will Consider Stabilization

The Chicago chapter of the Society of Industrial Engineers, will hold a series of eight meetings to consider and analyze the various phases of the "Stabilization of Industry." The meetings will be held on the second Tuesday of each month at the Auditorium Hotel, Chicago. Not only because stabilization has a special significance now, but because it has been and will continue to be a practical problem, the Chicago chapter has decided to open these meetings to the public. The first meeting was scheduled to be held on Tuesday evening, Jan. 10, with John W. Thomas, vice-president of the Central Trust Co., Chicago, as chairman. The speakers were announced as Dorr E. Felt, president of Felt & Tarrant Mfg. Co.; Maurice G. Gerard, industrial engineer of Gerard, Graham & Co., and Arthur J. Todd, labor manager of B. Kuppenheimer & Co., all of Chicago. The topic of the first meeting was "Business and Economic Need for Stabilization."

Research Progress in the Metallurgy of Aluminum

At the Pittsburgh Experiment Station of the United States Bureau of Mines, various problems in the metallurgy of aluminum and its alloys are being investigated by R. J. Anderson, metallurgist, aided by J. H. Capps, assistant chemist.

An investigation, made in cooperation with a number of foundries, of inclusions in castings showed that such inclusions, which are a source of much loss, could be practically eliminated by proper precautions. A report describing the investigation is being published by the bureau. Work is now under way on causes and

prevention of cracks—the most important defect in aluminum castings.

A general investigation of scrap losses in aluminum-alloy foundry practice showed that the annual losses in the United States amount to about \$1,200,000, and that universal adoption of methods recommended by the Bureau would probably result in a saving of about \$600,000 per annum. The complete results will be set forth in a bulletin to be issued by the Bureau.

Another proposed bulletin covers the various commercial methods for the preparation of aluminum-copper alloys; a paper prepared discusses gas atmospheres in melting furnaces; and a comprehensive bulletin on the manufacture, properties and uses of aluminum alloys is in course of publication. A study of the melting losses in aluminum metallurgical practice and of the comparative efficiency of various types of furnaces has been completed. A preliminary report has been published by the Bureau in mimeographed form and the complete results have been prepared as a bulletin.

A paper entitled "Iron-pot Melting Practice for Aluminum Alloy" has been prepared. This type of furnace was given special attention because of its general use for aluminum-alloy melting.

In the study of methods for determining aluminum and aluminum oxide in aluminum and aluminum alloys a new rapid method for the direct determination of aluminum has been devised and will be described in a bulletin in course of preparation.

In connection with the aluminum investigations, about 1000 macrographs and micrographs of samples have been prepared. A paper has been prepared by Mr. Anderson on "Ferric Sulphate as a New Etching Agent in the Metallography of Aluminum." Another paper entitled "Castings of Light Aluminum Alloys," deals with the macrography of light aluminum alloys, and a third paper, dealing with the faulty design of castings and the effect of columnar crystallization on cracks and other defects, has been written.

The section has co-operated with aluminum foundries, principally in the Detroit and Cleveland districts, in connection with general problems arising in the melting of aluminum alloys and in the founding of sand castings.

National Research Council Offers Free Information Service

The research information service of the National Research Council is prepared to supply to those interested information about scientific instruments, apparatus and supplies, laboratory construction and equipment. The following are samples of requests answered recently:

"Where may we purchase inexpensive photomicrographic apparatus?" "Where may a human skull be purchased?" "Who manufactures a good grade of selenium cells?" "Advise where lantern slides on European Geography may be obtained." "Where may the Lummer-Brodhun cube be obtained?" "What concern makes gages recording in fractions of an ounce?" "Where may apparatus and accessories for the study of sensitiveness of photographic plates be secured?"

Requests should be addressed to the National Research Council, Information Service, Washington.

Courses of New York University in Labor Handling

The School of Commerce Accounts and Finance, New York University, is offering two courses pertaining to the improvement of labor: One, devoted to labor and employment management, conducted by J. D. Hackett; the other, devoted to the principles and methods of training employees, conducted by J. W. Dietz, Western Electric Co.

The first part of the course conducted by Mr. Hackett, which will have been completed by Jan. 12, was given over to a discussion of specific methods of hiring the worker and placing him in his new position. The second part of the course will start Feb. 2. The following will be considered: Accident prevention, safety organization; fire prevention; medical and surgical care, emergency hospital, physical examination; hygiene; health conservation, ventilation, heating, hu-

midity, lighting; lunchrooms, cafeterias, food supply; sanitation, wash rooms, locker rooms, laundry, sanitary accommodations, cleaning; insurance, pensions, mutual benefits; wage systems, payment methods; profit sharing, stock ownership; hours of work; recreation, games, clubs; trade unions, strikes, collective bargains; industrial unions; industrial democracy and employees' representation.

The first part of Mr. Dietz's course was completed on Jan. 11 and dealt with methods of training minor employees, supervision of such training and the organization and administration of training departments. The second part will start Feb. 1 and will take up: The selection, training and development of technical experts, future executives, foremen and other members of the supervisory force, as well as the special methods used in training the instructors of such groups; co-operative and continuation schools; evening schools, both company and public, and other recognized auxiliary educational agencies; other features which contribute to the success of a training department, including the use of the house organ, library and methods of obtaining close and correct co-operation with trade and national associations.

Results of a Research on Fatigue of Steel

During the world war the question of the strength of airplane parts, and other problems of material under repeated stress, brought the whole subject of fatigue phenomena of metals to the attention of the National Research Council. The result was the organization of an investigation by the cooperation of the National Research Council Division of Engineering, Engineering Foundation, and the Engineering Experiment Station of the University of Illinois.

Bulletin No. 124 of the Engineering Experiment Station of the University of Illinois, entitled "An Investigation of the Fatigue of Metals," is a progress report of the first part of this investigation, having for its object the determination whether or not there exists any clearly defined relation between static properties and ability to resist repeated stresses. It having been decided not to enter the field of non-ferrous metals at this time, a series of tests of materials well scattered over the field of ferrous metals was made, and in most cases two or more distinct heat treatments for each metal were studied.

The results of these tests, and the conclusions to be drawn therefrom are given in Bulletin No. 124, copies of which may be had without charge by addressing the Engineering Experiment Station, Urbana, Ill.

New York Purchasing Agents to Meet

The Purchasing Agents' Association of New York will meet, at the Builders' Exchange Club, 84 West Thirty-third Street, New York, on Jan. 17. Francis H. Sisson, vice-president Guaranty Trust Co. and Jules S. Bache, J. S. Bache & Co., will be the speakers. Mr. Sisson on "Methods of Financing Export Trade," and Mr. Bache on the "Sales Tax." The members of the association as is the custom at the monthly meetings will hold a general discussion on the trend of the times.

COMING MEETINGS

January

Engineering Institute of Canada, Jan. 24 and 25. Annual meeting at Montreal. J. L. Busfield, secretary-treasurer Montreal branch, 260 St. James Street, Montreal.

February

American Boiler Manufacturers' Association, Feb. 13. One-day winter meeting. Fort Pitt Hotel, Pittsburgh. Secretary, H. N. Covell, 191 Dikeman Street, Brooklyn, N. Y.

American Institute of Mining and Metallurgical Engineers, Feb. 20-25. Spring meeting. Engineering Societies Building, New York. Secretary, Frederick F. Sharpless, 29 West Thirty-ninth Street, New York.

STRIKE RENEWED

Chicago Building Trades Council Rejects Landis Award and Stands by Carpenters

CHICAGO, Jan. 9.—The Chicago Building Trades Council has finally rejected the Landis wage award and decided to stand by the carpenters and other unions which have refused to abide by the terms of the award from the very first. Only one union, that of the bricklayers, stood out against the final decision of the council. All of the unions with the possible exception of the bricklayers, are expected to call strikes on all construction jobs where non-union labor is employed in any trade capacity.

The Landis arbitration award, which was announced last September, after an investigation of several months, was formally accepted by all unions except the carpenters and one or two other minor organizations. The failure of these recalcitrant unions to conform with the terms of the award finally led to the formation of a citizens' committee, composed of Chicago's most prominent business men, which set out to force those organizations into line. The decision of the building trades council, as explained by its leaders, was in the nature of taking up the gauntlet which they considered had been thrown down by the citizens' committee, which they believe was trying to make the Landis award a shield for the introduction of the open shop throughout the building industry.

Strike Conditions Improve

Strike conditions at the plant of the Newport Rolling Mill Co., Newport, Ky., are improving steadily. More mills are being operated each week and it will be only a short time before the full plant is in operation. Plans are now being made for a resumption of operations at the plant of the Andrews Steel Co.

Conferences are being held almost daily between officials of the rolling mill company and committees of the strike employees with Safety Director Thomasson of Newport, acting as intermediary. Prospects for settlement of the strike trouble are looking better, though nothing of a definite nature has yet come out of the conferences. Walter Larkin, international vice-president of the Amalgamated Association of Iron, Steel and Tin Workers, is in Newport and it is expected that the other executive offices of the association will also go to Newport and stay there until a settlement is reached.

What was apparently an attempt to blow up the plant of the Newport Rolling Mill Co. was frustrated by the vigilance of the National Guardsmen on strike duty there.

Wages in Iron and Steel

Figures prepared by the Bureau of Labor Statistics, and covering in 1920 a total of 155 plants and 59,960 employees, show the trend in the rise of earnings of employees in the iron and steel industry, which reached its culmination in the fall of 1920. The figures are based upon returns from 28 blast furnace plants, 11 Bessemer converter plants, 19 open-hearth furnace plants, 15 puddling mills, 20 blooming mills, 11 plate mills, 4 standard rail mills, 25 bar mills, 13 sheet mills and 9 tin plate mills. These ten groups employed in 1920, individually, from 1344 men in the 4 rail mills to 12,088 men in the 28 blast furnace departments.

Distinction is made in the 1920 figures between all employees and common labor. The average hourly earnings of the former were 76.6c., ranging from 57.1c. in the blast furnace departments to 103.9c. in the sheet mills. Common labor had a much narrower range, from 47.4c. in the blast furnace departments to 53.7c. around Bessemer converters, and an average of 50.8c. The marked differences in compensation of total employees depend largely upon the proportionate number of those employees who come under the classification of common labor. As this proportion is much heavier in blast furnace departments than in other departments, and relatively lighter in the sheet and tin plate mills, the wide divergencies in average earnings

of all employees as between these departments is explained.

In the chart, the average earnings of all employees in each of the ten departments are shown separately for 1920, 1919, 1917 and 1913, except that the 1917 figures for puddling mills, rail mills, bar mills and tin plate mills are missing. This diagram has, under each department, two shaded belts and two white belts. The top of the diagram represents the 1920 hourly earning; the bottom of the upper shaded section shows the earning for 1919; the top of the lower shaded section that for 1917 and the bottom of the lower shaded section that for 1913. From this it will be easy to compare department with department at any given date.

Colorado Conditions Improved

The labor situation at the plants of the Colorado Fuel & Iron Co., is improving steadily. An additional coal mine, closed by a sympathetic strike, has been reopened upon petition of the men and at the reduced wage scale. A few days ago, the company announced a 10 per cent reduction in wages at the steel works. Shortly thereafter the employees' representatives of the steel works asked the management to make the reduction effective Jan. 1, instead of Jan. 15, as had been announced in order that some of the departments which had been closed might be reopened at an earlier date. Under this new wage scale at the steel works, common labor is getting 33c. an hour.

Proposed Cut in Miners' Wages

Illinois coal operators at a meeting on Jan. 5, sent a telegram to John L. Lewis, president of the United Mine Workers of America, insisting that a meeting be held in the near future to consider a cut in miners' wages. The operators feel that high coal prices are delaying a revival in business and they wish to open negotiations covering the whole subject of wages and working conditions prior to the expiration of the present contract with the union on April 1.

Complaint of Cambria Steel Co. Is Dismissed

WASHINGTON, Jan. 10.—In a decision made public last Saturday, the Interstate Commerce Commission dismissed the complaint of the Cambria Steel Co. vs. Director General, Pennsylvania Railroad, et al., by holding that the denial of the defendants to the complainant of an allowance for spotting cars within its plant at Johnstown, Pa., equal to the cost of such service to the steel company, had not subjected it to the payment of unreasonable rates, or undue prejudice, or to damage.

The Pennsylvania and Baltimore & Ohio railroads in June, 1914, agreed to pay the steel company the cost of doing spotting work, with the understanding that it would not exceed \$2.19 per car. In 23 of the 25 months covered by the cost study of the steel company, the cost of performing the service was shown to have been in excess of the allowance, running as high as \$4 per car. It was shown by the steel company that costs of its railroad, like those on trunk lines, had increased. The commission, however, in its opinion, written by Commissioner Aitchison, said it has not the power to direct the payment of an allowance and therefore had no authority to direct an increase in the allowance.

New York Industrial Cost Meeting.

The next regular monthly meeting of the New York section of the Industrial Cost Association will be held Thursday evening, Jan. 19, at Keen's Chop House, 72 West Thirty-sixth Street, New York. The meeting, at 8 p. m. sharp, will follow dinner at 6.30 p. m. The subject for the meeting will be "Chronometric Valuations or What the Business Man Should Know about Invested Capital, Depreciation, Amortization and Amended Returns." William F. Worcester, vice-president Lloyd Thomas Co., appraisers and engineers, will make the address, after which the meeting will be opened for general discussion.

German Attempts to Fix Steel Prices

So-called Guiding Prices Still Obtain—Scheme of Plan of Maximum Prices Detailed—Production Checked by Strikes and Exports by Competition

(Special Correspondence)

BERLIN, GERMANY, Dec. 18, 1921.—The stubborn fight for the reintroduction of official maximum prices waged by labor has come to a halt for the time being. It will be recalled that the Minister of Economics has been examining production costs at furnaces and rolling mills and on the strength of the data thus obtained proposed the fixing of maximum prices for ingots, blooms, billets, rails, bar iron and light plates, at a considerably lower level than the current so-called guiding prices. Contrary to expectations, the Government refrained from submitting definite proposals when the subject came up for discussion at a recent meeting of the Iron Control Federation but instead suggested that the meeting should put motions in this respect. Labor thereupon moved the reintroduction of maximum prices but this motion was defeated by the opposition of producers, the trade and consumers and the most astonishing part of it was that some labor delegates went over to the opposition.

In view of the prevailing conditions it was decided to continue for the time being the system of guiding prices at present in operation. This system, it was held, offered the industry and trade more elbow room especially in regard to long-term contracts.

The fixing of guiding prices will henceforth be in the hands of an appointed committee composed of representatives of producers, the trade, consumers and labor. The current guiding prices remained in a way unchanged but for the increases due to the advance of coal prices on Dec. 1, by which iron prices automatically advanced by 3.50 m. per ton for each mark of coal price increases. The augmented guiding base prices are now as follows:

So-Called Guiding Base Prices in Germany

Ingots	3,830
Blooms	4,130
Billets	4,230
Sheet bars	4,330
Structural shapes	4,430
Bar iron	5,030
Universal iron	5,430
Hoop iron	5,530
Wire rods	4,30
Sheets, No. 6 U. S. A. gage and lower	4,30
Sheets, No. 6-11 U. S. A. gage	4,30
Plates, No. 11-20 gage	4,60
Plates, below No. 20 gage	4,80

Plan to Figure Prices on Costs

Though the maximum price question has thus been abandoned, or at least shelved for the present, it may nevertheless be of interest to give some space to the system of price calculations as formed the basis for the maximum price policy by the Government. The suggested prices were based (a) on a rate of exchange of 100 m. for one Dutch florin, (b) a scrape price of 3100 m. per ton (this has meanwhile receded) and (c) besides allowing a fair and reasonable quota for the replacement account, included profit at the rate of 5 per cent. Moreover, the principle of utilizing part of the so-called "valuta" profits accruing from export sales was to be revived for the cheapening of domestic prices. (The respective amounts for the different grades were already considered in the proposed maximum prices.)

The calculation and distribution of this valuta profit may be illustrated in the following example: Average production costs for bar iron, including profits, etc., and allowing for the increase of coal prices as by Dec. 1, were found to be slightly less than 5000 m. per metric ton. Figuring on an export price of 90 Dutch florins and converting at the rate of 100 m. for 1 florin, the valuta profit would work out at about 4000 m. per ton. Of this extra profit, the Minister proposed that 75 per cent, equal in this case to 3000 m., should go toward lowering the price of the material in the home market,

while the remaining 1000 m. were to be the clear profit of the exporting firm.

Assuming that, in face of the difficulties in the way of an adequate supply of the domestic market, only 20 per cent of the total output be available for export in the future, the ratio of export to domestic sales would be 20 per cent to 80 per cent, or 1:4. The aforementioned amount of 3000 m. would therefore permit of a cheapening of domestic prices by $3000 \div 4 = 750$ m. per ton, so that the proposed maximum price of 5000 — 750 = 4250 m. was justified.

This method of calculating prices and profits has come in for sharp criticism in interested quarters. The ratio of exchange of 100 m. for one florin is held to be absurd (as a matter of fact the mark has improved since the publishing of the Minister's figures) and the whole idea of inserting an ever fluctuating exchange rate as a factor in such price calculations was declared to be unworkable. The ratio of 1:4 for export and domestic sales was also subject to doubt as the export percentage is held to be below 20 per cent.

Market Strong But Speculative Buying Ceasing

Despite the recent notable appreciation of the mark, the considerable drop in industrial stocks and the sudden discontinuance of the buying craze in all commodity markets, the iron market is still continuing strong. With very isolated exceptions, demand has not lost any of its keenness so far, but it is noteworthy to point out that speculative buying has almost entirely ceased. There are distinct signs of the weak element in jobbers' circles losing nerve, as instanced by the increasing number of advertisements for spot stocks in the daily press.

Interest in the export business seems to have diminished somewhat of late, as the profit margin has been narrowed down by the improvement in the German exchange and export sales are no longer offering that strong incentive they did some weeks ago. A certain tonnage will, of course, nevertheless have to be exported in order to obtain the required amount of foreign bills for the import of raw materials. The slight reticence on the part of foreign buyers is ascribed to the prevailing political uncertainty.

Large Production Loss Through Strikes

The loss in production due to the recent strikes now turns out to be larger than was at first estimated and is now given at some 100,000 tons. The Duisburg works was laid idle for about eight days toward the end of October. The strike of the engineers and firemen at the two Dortmund plants has made doubtful the resumption before February of one of the works on the pre-strike scale. The strike at Düsseldorf, which ended with the defeat of the workers, lasted for three weeks and affected four steel producing works. Resumption of steel production will not be until the beginning of the new year.

The Witten Cast Steel Works had to close down last week for want of coal, after having operated on short time the week before, and a report has just come to hand that the Thale Iron Works had to close in part for the same reason. Krupp's also complain. According to a statement by the management, only 30 per cent of the coal raised at their own collieries is at their disposal, while the total quantity with which they are supplied amounts to 76.5 per cent of the required tonnage only. Owing to this coal shortage, steel production at the works has dropped to 65 per cent of the pre-war output during the latter months.

Exporting Quieter

A somewhat quieter tone obtains in the wire export market where business has been extraordinarily brisk

during the past weeks. Demand is still active, however, especially for barbed wire and fencing wire, which are being bought by South Africa and Argentina at prices averaging £18, f.o.b. Hamburg, for barbed wire. The base price of £12, f.o.b. Hamburg, for galvanized wire, is showing signs of softening as a result of Belgian competition. A falling-off in the wire nail business with Japan is noted. Dutch exporters have lately placed some nail orders for the Dutch Indies at 15 to 16 fl. per 100 kg., f.o.b. Hamburg.

Export prices of wire for netting to the United Kingdom are by about 10s. lower, quotation now being in the neighborhood of £14 per ton, f.o.b. Rotterdam. Here, too, Belgian competition is being felt. A gain in business with the Scandinavian countries is reported, but prices, it is complained, leave next to no "valuta" profit.

A feature of the sheet market is the slump in inquiries for heavy gages. The strong demand for light plates continues. Tubes were quieter but for some buying in boiler tubes and a falling off in demand for gas pipes is largely accounted for by quiet in the building trades due to frost.

During the past week we quoted as follows, average prices per metric ton, unless otherwise observed:

German Quotations on Finished Products

Bar iron	6,700 m.
Channels	6,600 m.
Angles	7,200 m.
Z-iron	6,700 m.
Sheets, Heavy	7,200 m.
Sheets, Medium	9,500 m.
Wire rods	8,750 m.
Wire, bright, base, per 100 kg.	900 m.
Wire, galvanized, base, per 100 kg.	1,100 m.
Wire nails, base, per 100 kg.	1,100 m.
Toes	6,500 m.
Rounds	6,550 m.
Flats	6,650 m.
Hoop iron	6,450 m.
Hoop iron, box band quality.	11,400 m.
Plates, light, according to gage.	13,500 to 15,500 m.

Sale of Materials at Hog Island

WASHINGTON, Jan. 10.—Announcement has been made by Sidney Henry, commercial manager of the United States Shipping Board Emergency Fleet Corporation, that the tentative program outlined for the first half of January by the material sales division embraces negotiations of sale of a number of materials, among them wire rope and cable, the first lot of steel at Hog Island, aggregating about 6000 tons, and machine tools, at Hog Island. At the Bethlehem, Pa., plant of the Bethlehem Steel Co., the Fleet Corporation has about 647 tons of fabricated steel, at the company's Steelton, Pa., plant there are about 900 tons of plain steel, and at the Harland shipbuilding plant, Wilmington, Del., there are approximately 1300 tons. All of the small and pneumatic tools will be segregated and classified within two or three weeks and ready for sales negotiations. During the week of Jan. 15, reclassification of approximately 22,000 tons of valves and fittings at Hog Island will begin and it is expected that by the latter part of the present month the Fleet Corporation will be in a position to sell all materials of this grade.

Sale of Cartridge Cases

WASHINGTON, Jan. 10.—Through the agency of the Philadelphia District Ordnance Salvage Board, Frankford Arsenal, Philadelphia, Pa., there will be offered for sale under sealed bids approximately 5,600,000 lb. of surplus cartridge cases of various sizes and components. Bids will be received not later than 12 o'clock noon Jan. 19. It is estimated that the cartridge cases analyze 68 per cent copper and 32 per cent zinc, but no guarantee is given regarding the percentage of copper and zinc content. All material is to be sold in its present condition, on board cars, at the respective plants where located and as shown.

The Allegheny Steel Co., Brackenridge, Pa., has started up after a shutdown of several weeks. Three open-hearth furnaces are making steel preparatory to starting up 10 sheet mills, on Jan. 17, on a 4-day-a-week schedule.

PITTSBURGH BASING CASE

Steel Corporation Files Answer to Amended Complaint Denying Discrimination in Prices

WASHINGTON, Jan. 9.—Denying charges of discrimination in prices made to its purchasers of different rolled steel products and declaring that the suggested order of the Federal Trade Commission in the Pittsburgh base case would be contrary to the fifth amendment of the Constitution, the United States Steel Corporation last week filed an answer with the commission to the latter's amended complaint. The Steel Corporation, through its general attorney, William W. Corlett, asks that the complaint be dismissed. The answer of the corporation contains but little new matter over and above that incorporated in its original answer, in which it denied charges made by the commission in connection with the general practice in the trade of using Pittsburgh as a base for naming prices.

The amended complaint, according to the commission, was issued in order to simplify the issue and expedite the hearings. The original complaint charged the corporation and its subsidiaries with discriminating in prices among purchasers of rolled steel products. The amended complaint makes precisely the same charges with respect to each particular rolled steel product and sets up the claim that the alleged discriminations are in violation of the Clayton and Federal Trade acts, for the reason that they are not made because of any difference in the grade, quality or quantity of the grade sold, nor because of the difference in cost of selling and transportation, nor because the price was made in good faith to meet competition.

The corporation's answer specifically mentions each rolled product in which price discrimination is charged, and denies each and every allegation, but concedes that the subsidiaries do charge different prices at different times and in different localities and commodities, according to the market price prevailing in the different localities and communities at the time of sales.

The answer states that the different prices are not made on account of differences in the grade or quality and that generally such differences in price are not based on differences in the cost of selling such products, but on difference in the cost of transportation, although in many cases they are. It is stated that such different prices are made in good faith on account of the quantity furnished to meet competition and representing the market prices prevailing from time to time.

Answering another charge, it is stated that to the extent, if any, that Western and Southern consumers may be unable to compete with Eastern consumers of the sale of different products mentioned, and particularly Pittsburgh consumers of such products, such limitation is due to their geographical position, and to the normal and natural market prices for steel prevailing in the different localities and is in no wise due to any unfair, improper or unlawful discrimination against Western and Southern consumers. It is asserted that the fabricators located outside of the Pittsburgh district are and always have been free to locate wherever it appeared to them that their business could be conducted most profitably.

Replying to a charge that the so-called extra price "extorted" through the alleged discriminatory price system applying to public works throughout the United States, which the commission says aggregates a large sum which the general public must pay through taxation, the Steel Corporation makes a sweeping denial, and particularly with reference to the charge of extortion.

In its concluding paragraph, the corporation's answer says that "an order of the kind or effect suggested in said amended complaint would be unwarranted by any law of the United States; that such an order would constitute an unfairness with respondent's liberty of contact and would amount to the taking of respondent's property without due process of law contrary to the fifth amendment of the constitution of the United States."

Waste a Basic National Problem

Secretary Hoover Says Its Elimination Will Solve Economic Distortion—Eulogizes Engineers at Meeting of Engineering Council

ELIMINATION of the waste now causing billions of loss annually was characterized by Secretary of Commerce Herbert Hoover at a dinner given in his honor at the University Club in Washington, Jan. 5, by the American Engineering Council of the Federated American Engineering Societies, as the most fundamental of all problems with which the nation must deal. The dinner in honor of Mr. Hoover was a leading event of the first annual meeting of the American Engineering Council of the Federated American Engineering Societies held at the Cosmos Club, Washington, Jan. 5 and 6.

Great distortion between the cost of commodities to the consumer and the producer exists, Mr. Hoover said, and unless this distortion, which is bearing heavily on the consumer, can be overcome the American farmer will be reduced to the status of a European peasant. The way to a solution for the country, he added, was in the direction pointed by the recently completed findings of the American Engineering Council's committee on the elimination of waste in industry.

As a result of the investigation of the engineers there had been enormous expansion throughout the country, he said, of the consideration of fundamental questions of industrial waste, adding that the standards of living of the American people were being inquired into as never before. Mr. Hoover eulogized the engineering council as a new and powerful force in the life of the nation, saying that it had won confidence as an agency of national and State co-operation which was without the slightest selfish motive and through the efforts of which no man could profit save as a citizen in common with all other citizens. "The organization of the Council," he said, "marked the evolution of the 200,000 engineers of America into public affairs as a mighty instrument possessing rare knowledge of both material and intangible values." He regards it as the duty of the Government to take up some of the problems outlined by the American Engineering Council, and the Department of Commerce had established agencies to this purpose.

Taking 100 as the basis of the cost in 1913 to the producer and consumer, Mr. Hoover pointed out that to-day the cost to the producer could be regarded as 100 while the cost to the consumer has risen to 150 and even 170. Only through the elimination of waste, he declared, can the existing inequalities be wiped out. Taxation, State and federal, has greatly increased the distortion, he said. These conditions he held were not now due to swollen profits, but to the existence of avoidable waste. Economies of manufacture, transportation, distribution and other agencies must be sought. Idle men, he declared, was one of the greatest causes of waste.

One of the biggest problems confronting the country, Mr. Hoover thought, was that of electrification, and suggested that the engineers tackle this problem in the form of a waste survey. Such a survey, he said, afforded at this time the great possibilities in the direction of effective leadership in the elimination of waste.

More than 100 members of the council and their guests attended the dinner at which Mortimer E. Cooley, dean of engineering at the University of Michigan and president of the council, presided. The council presented to Mr. Hoover a copy of a resolution passed by it in which he was extolled for "the distinguished success which has followed him in his past services to his profession, his country and mankind."

The resolution expressed the gratitude of the organized engineers of the nation over the service of Mr. Hoover in helping to organize the council, of which he

was the first president, and recorded appreciation of "the rare judgment and vision with which Mr. Hoover has directed the initial policies of the council."

B. Stefanek, minister from the Republic of Czechoslovakia, paid tribute to the American engineers for their investigation of industrial waste. The report, he said, had been translated by his government and would be widely circulated in Czechoslovakia.

Council to Continue Support of Lampert Bill

Matters taken up at the meeting included the question: Does the council approve or disapprove of the principle of licensing or registering engineers? There was long discussion on this and it was finally decided to direct the appointment of a committee to make a thorough study of the question, embracing conditions nationally. The committee is expected to report at the next meeting of the executive board.

The council voted to continue support of the legislation for the relief of the United States patent office as embodied in the Lampert bill. The report of the council's patent committee, headed by Edwin J. Prindle of New York described conditions in the patent office as alarming. It was brought out that floor leader Mondell of the House opposed the bill on the ground that it carried salaries higher than those for similar service in other departments of the Government, and that the bill calling for a general re-classification of Government employees would take care of the situation. Mr. Prindle showed from the *Official Register* of the Government that there were many Government positions involving legal or technical knowledge which carried salaries above those asked for the patent office examiners and demonstrated that the examining force would be disintegrated if it were delayed until the re-classification bill were passed. The president was authorized to confer with Mr. Prindle and to appoint, if thought advisable, a special committee to co-operate in carrying on the patent office campaign.

The committee on engineering education did not report because "the subject of engineering education is being discussed by many competent agencies and the committee prefers to make a study of these activities and seeks to co-ordinate their conclusions from the standpoint of the profession at large rather than attempt to start a new discussion."

Co-operation in the movement to prepare for cyclical industrial depressions and unemployment by resort to public works projects was voted by the council. On this subject the council received a proposal from Mr. Hoover and it was decided to confer with him as to what way the council could best provide effective aid.

Topographic mapping and the establishment of a department of public works were other legislative matters in which the council decided to continue its support.

The expectation of matters of importance to come before the committee an early date was indicated by the chairman of the military affairs committee, Col. W. B. Parsons, New York. Lieut.-Col. John P. Hogan, New York, was appointed secretary of that committee, to fill the vacancy caused by the death of Colonel Snyder.

The work of the committee on employment, which was working on plans for a paid employment service, has been delayed owing to the illness of Morris L. Cooke of Philadelphia, chairman.

Reports of officers were approved. President Cooley in opening the sessions outlined his plans for more effective organization to be carried out in co-operation with the executive Secretary L. W. Wallace. President

Cooley plans to start soon on a tour of the South and Southwest, one of the biggest meetings he is to address being in St. Louis Jan. 18. He will speak to the Indiana Engineering Society at its annual meeting on Jan. 20. Mr. Wallace has also mapped out a traveling schedule to further the work of organization.

Membership Increases During Year

The Engineers Club of Columbus, Ohio, was admitted to membership. There are more than 20 active prospective members, according to the report of the executive secretary. The report showed that at the close of 1921 there were 8 national and 20 state and local societies, which for the year was a gain of eight member societies representing 1414 member engineers.

Considerable discussion was provoked by a plan proposed to establish a federation journal. It was agreed that some such contact should be established with the enrolled membership but there was sharp diversity as to its form. No definite action was taken. The council made provision for a continuance of its national publicity work under the direction of James T. Grady, director of the department of public information, Columbia University, New York. The results of the publicity work during the past year were described as most gratifying.

Officers

Dexter S. Kimball, dean of the college of engineering, Cornell University and J. Parke Channing of New York, were re-elected vice-presidents. W. W. Varney, New York, was again chosen treasurer, and by unanimous action of the executive board, L. W. Wallace was re-elected executive secretary.

New representatives on the council were announced as follows: *American Society of Mechanical Engineers*,

Francis Blossom, Charles A. Booth, Gano Dunn, H. H. Esselstyn, W. S. Lee, I. E. Moulthrop, John H. Stevens, A. E. Walden; *Society of Industrial Engineers*, Prof. Joseph W. Roe; *American Institute of Mining and Metallurgical Engineers*, C. H. MacDowell (succeeding Professor Richards); *Louisiana Engineering Society*, Prof. Donald Derickson; *Iowa Engineering Society*, Lloyd B. Canfield; *Duluth Engineers Club*, W. H. Hoyt; *Milwaukee Engineering Society*, Albert Blatz, Jr.

The executive board of the council for 1922 is made up as follows: H. E. Howe, Washington, *American Institute of Chemical Engineers*; Prof. C. F. Scott, of Yale University; L. B. Stilwell and Calvert Townley, New York, J. H. Finney, Washington, William McClellan, Philadelphia and L. F. Morehouse, New York, representing the *American Institute of Electrical Engineers*; J. Parke Channing and A. S. Dwight of New York, Charles H. MacDowell, Chicago, and Philip N. Moore, St. Louis, the *American Institute of Mining and Metallurgical Engineers*; L. P. Alford, New York, E. S. Carman, Cleveland, Dean D. S. Kimball, Cornell University, Prof. A. M. Greene, Jr., Troy, Dean Perley, F. Walker, University of Kansas, W. S. Lee, New York, Dean M. E. Cooley, Michigan, *American Society of Mechanical Engineers*; Prof. Joseph W. Roe, New York, *Society of Industrial Engineers*; Morris L. Cooke, Philadelphia, W. W. Varney, Baltimore, *Taylor Society*; W. E. Rolfe, *Associated Engineering Societies of St. Louis*.

The regional directors chosen for 1922 are: District No. 1, W. B. Powell, St. Louis; District No. 2, Gardner S. Williams, Ann Arbor, Mich.; District No. 4, W. J. Fisher, York, Pa.; District No. 5, Paul Wright, Birmingham; District No. 6, Lloyd B. Smith, Topeka, Kan.; District No. 7, O. H. Koch, Dallas, Tex.

BRITISH FOREIGN TRADE

Steel Exports Still Expanding in November—Imports Declining

British steel exports in November continued the upward swing recorded in September and October, according to the official data, just made public. The total was 202,059 gross tons, excluding iron ore and including scrap, which is equal to the combined exports of August and September. The October exports were 161,683 tons. Compared with November a year ago, the outgo was close to what it was then at 238,896 tons. The total for the 11 months this year stands at 1,527,302 tons against 3,107,521 tons to Dec. 1, 1920.

Iron and steel imports in November were about the same as in October. The total, excluding ore and including scrap, was 184,064 gross tons, which compares with 158,940 tons in November, 1920, and with an average per month in 1913 of 195,264 tons. The following table shows comparative data:

British Steel Exports and Imports, Gross Tons

	Exports	Imports
Average per month first quarter, 1921..	183,373	186,040
Average per month second quarter, 1921..	109,670	96,320
Average per month third quarter, 1921..	93,804	160,727
October, 1921	161,683	189,536
November, 1921	202,059	184,064
Average per month, 1919	188,519	70,801
Average per month, 1920	274,881	128,685
Average per month, 1913	420,767	195,264

The trend of some of the principal exports is shown by the following data:

Principal British Exports, Gross Tons

	Average per Month	November
	1913	1920
Pig iron	78,771	38,505
Steel rails	41,676	11,213
Steel plates	11,162	16,571
Galvanized sheets	68,506	34,244
Steel bars	20,921	30,322
Tin plates	41,308	29,418
Black plates	5,679	3,026
Steel sheets .....	.....	9,637

Exports of steel rails have shown the most marked recovery in the above products, with galvanized sheets and tin plates next.

Imports of pig iron in November were 99,279 tons, bringing the total for the 11 months to 620,705 tons,

compared with only 179,927 tons to Dec. 1, 1920. The present rate of imports is the heaviest on record.

Iron ore imports in November were only 176,998 tons, as compared with 541,742 tons per month in 1920. In November, 1920, they were 350,714 tons. The total for the first 11 months of 1921 was 1,742,905 tons, as compared with 5,972,283 tons for the first 11 months of 1920.

Manganese ore imports were only 6174 tons in November, which makes the total to Dec. 1, last year, 165,935 tons against 405,268 tons to Dec. 1, 1920.

Independent Merger Negotiations

CHICAGO, Jan. 9.—Executives of three steel companies which have been mentioned in connection with a proposed merger met in Chicago this week and another meeting will be held in New York in the near future. Negotiations are believed to be at an advanced stage. Whether eventually a consolidation will be effected taking in the four other companies that have been mentioned in that connection may not be determined for some time, but at present, indications are favorable to a union of at least the Inland Steel Co., the Steel & Tube Co. of America and the Youngstown Sheet & Tube Co. The possibility of including a fourth company with these three has also been canvassed.

Great Southern Steel Corporation Plans

BIRMINGHAM, ALA., Jan. 9.—Great Southern Steel Corporation, which was recently organized by Chicago interests and chartered at Dover, Del., with capital stock of \$105,000,000, has taken out a charter in Alabama under capital of \$500,000 and with the announced intention of locating a steel products plant in the Birmingham district. Local mineralogists, who helped the concern to buy 100,000 acres of coal and ore land in several counties, say the new plant is to make a steel product not heretofore manufactured here. Details as to site and like have not been given. The company at present has no operating properties in Alabama.

INTERSTATE TUNNEL

Bids for Vehicular Passageway Will Be Opened Feb. 7—Iron and Steel Tonnages

Tenders for the construction of the New York-New Jersey vehicular tunnel, extending from Canal and Spring streets, New York, to Twelfth and Fourteenth streets, Jersey City, N. J., have been issued by the Bridge and Tunnel Commission, Room 614, Hall of Records, New York. Bids will be opened Feb. 7. The contract for the tunnel calls for 13,512 ft. of tunnel, constructed with cast iron segments, 29 ft. 6 in. outside diameter, with a short section, 30 ft. 4 in. in diameter and 2816 ft. of cut and covered subway at the approaches, making a total length of 18,474 ft. of construction. Entrances and exits at both the New Jersey and New York ends of the tunnel will be about two blocks distant. The contract is divided into two parts; specifications 3 and 4. The former calls for construction of the tunnel from the New York side to about the end of the rock ledge in the Hudson River and includes about 30 per cent of the iron and steel that will be used. The latter calls for the building of the river section of the tunnel and the construction on the Jersey City side, involving about 70 per cent of the total iron and steel that will go into the completed tunnel. The present contracts include all but a few hundred yards of covered subway construction at the approaches on each end.

The largest item of material involved is the tonnage of cast iron segments for the lining, 33,200 tons for specification No. 3 and 72,300 tons for specification No. 4, a total of 105,500 tons. The total iron and steel involved on both specifications is as follows: Structural steel, miscellaneous, 90 tons; structural steel for river shaft caissons, 4460 tons; steel beams and shapes, 184 tons; steel rods and bars for reinforcing, 547 tons; wire mesh, 222 tons; special rolled floor beams (about 100 lb. per ft.), 2490 tons; built up floor beams, 245

tons; steel work connecting caissons, 146 tons; steel in permanent tie rod anchorages, 1330 tons; high tensile steel tunnel bolts and nuts, 4615 tons; permanent tie rods (bolts, nuts, pins and clevises), 332 tons; copper steel plates, bolts, nuts and washers, 238 tons; ladders, hand bars and miscellaneous wrought iron fixtures, $\frac{3}{4}$ ton; wrought iron and steel pipe from .1 to 3 in., about $1\frac{1}{2}$ miles; cast steel lining, 9050 tons; cast steel pile segments, 370 tons; cast iron hub and spigot pipe, 117 tons; manholes and catch basins, 35 tons; non-corrosive alloy metal, about 7 tons; water pipe, 6-in. 13,700 ft., 8-in. 50 ft., 10-in. 1770 ft., 12-in. 10 ft.; bronze bolts, wedges and hinges, about $1\frac{1}{2}$ tons.

The time allotted for completion of the contract is three years from date of the award. At present between 75 and 80 construction and iron and steel companies and foundries have obtained specifications from the commission.

Among the iron and steel companies, foundries, machine shops and shipbuilding companies which will probably submit bids are: United Engineering & Foundry Co.; Eastern Malleable Iron Co.; Wheeling Mold & Foundry Co.; New York Car Wheel Co.; Lake Erie Bolt & Nut Co.; Midvale Steel & Ordnance Co.; Federal Shipbuilding Co.; American Steel Foundries; American Brake Shoe & Foundry Co.; Bethlehem Steel Co.; American Bridge Co.; T. A. Gillespie Pipe Co.; Central Foundry Co.; Woodward Machine Co.; McClintic-Marshall Co.; New York Shipbuilding Co.; Hooven-Owens-Rentschler Co.; United States Cast Iron Pipe & Foundry Co.; Ingersoll-Rand Co.; Chicago Pneumatic Tool Co.; Pittsburgh Screw & Bolt Co.; National Malleable Castings Co.; Lynchburg Foundry Co.; Moline Plow Co.; Diamond Machine Co.; Buffalo Foundry & Machine Co.; Birmingham Iron Foundry, Derby, Conn.; Phoenix Iron Works; Lobdell Car Wheel Co.; Topping Bros.; Sun Shipbuilding Co.; Manning, Maxwell & Moore; Howard Iron Works; Morse Dry Dock & Repair Co.; Hubbard Steel Foundry, East Chicago, Ind.; Westinghouse Electric & Mfg. Co., and the General Electric Co.

Secretary Hoover Holds Conference on Railroad Problems

WASHINGTON, Jan. 10.—Deep interest is manifested in a meeting which was held here last Saturday evening at the home of Secretary of Commerce Herbert Hoover with railroad executives and members of the four railroad brotherhoods, and possibly others.

Replying to a question as to whether the Administration had been requested by the brotherhoods to enlist itself on their behalf in favor of National agreements, a statement was made at the White House to-day that the conference was called to avoid conflicts in connection with the transportation situation. It was neither admitted nor denied that the question of National agreements was taken up, but it was stated that further conferences will be held between Government representatives with railroad executives and brotherhood men. It is understood that the Administration is concerned over the transportation rate and labor situation and is endeavoring to eliminate difficulties prevailing and threatened and to bring about stimulation of industrial activity dependent upon the existing railroad and labor problems.

The railroads, it is claimed, had no part whatever in calling the conference and what their attitude was toward questions discussed is not known. In the absence of definite information shippers have expressed apprehension lest the railroad brotherhoods are trying to compel the adoption of some agreement as to wages, working rules, etc., that would make it impossible for the railroads to further reduce rates, so urgently insisted upon by shippers as a whole. It is considered significant that the meeting was asked for by them at a time when the Interstate Commerce Commission is engaged in its general rate investigation and before it has had time to close and pass upon the case. The opinion has been expressed that the brotherhoods may be trying to have a policy determined, advantageous to themselves,

which would make it impossible for the railroads to reduce rates further and that it has sought to do this before the investigation is closed, so that the commission would have to act adversely upon requests for reduced rates.

Unemployment in Pennsylvania

The number of unemployed in Pennsylvania increased more than 50,000 in December, according to the semi-monthly report of the State Department of Labor and Industry, covering the situation as of Jan. 1. The new year starts with 321,893, men and women, registered for work at the several district offices of the department. The Pittsburgh district office is the only one of 10 which reports no increase in unemployment, and this is explained largely by the fact that no consideration was given the number at present idle as a result of the holiday suspension of steel plant operations, which is regarded as only temporary. The report by districts follows: Altoona, 15,460; Erie, 16,700; Harrisburg, 10,393; Johnstown, 17,765; McKeesport, 4300; New Kensington, 6200; Philadelphia, men, 138,000; women, 12,400; Pittsburgh, 51,400; Scranton, 42,900; Williamsport, 6375.

Charles S. Robinson, vice-president and general manager of the Youngstown Sheet & Tube Co., was re-elected president of the Engineers' Club in the Youngstown district Dec. 29, while W. C. Coryell was re-elected vice-president. G. T. Seeley, Stanley H. McKee and F. B. Thomson were chosen directors for two years, and Charles B. Cushwa, J. W. Deetrick and G. W. Knotts were elected trustees for two years. Officers will be installed at the next general meeting, Jan. 26, when Arthur G. McKee, consulting engineer of Cleveland, will address the members on "The Modern Blast Furnace."

JONES & LAUGHLIN PLANS

Pittsburgh Company Acquires Large Tract in the Chicago District

CHICAGO, Jan. 9.—The Jones & Laughlin Steel Co., Pittsburgh, has entered into a contract with the East Chicago Co. and the Newport Co. to purchase from them 900 acres on the north side of Hammond, Ind., lying on both sides of the west branch of the Indiana Harbor Canal. The price to be paid in the event that certain requirements are complied with by the sellers is \$1,450,000, or \$1,611 an acre, and the funds are now on deposit at the First Trust & Savings Bank at Chicago. The plans of the company are of an elaborate character. Blast furnaces and mills to cost between \$25,000,000 and \$50,000,000 are planned, and employment will be provided for over 7000 people. The importance of the undertaking may be grasped when it is realized that the site of 900 acres is larger than those of the Inland Steel Co. and the Steel & Tube Co. of America combined.

The passing of the Pittsburgh basing point in prices of plates, shapes and bars during the recent period of business depression, and the possibility that this method

of quoting prices will be permanently abandoned as a result of the case now before the Federal Trade Commission, probably account for the desire of the Jones & Laughlin company to have a Western plant. In Chicago circles it is felt that hundreds of other industrial companies which have heretofore served their Western customers from Eastern plants will follow the example of the Jones & Laughlin company and establish Western branches.

Confirmed at Pittsburgh

PITTSBURGH, Jan. 10.—Reports from Chicago that the Jones & Laughlin Steel Co. was negotiating for approximately 900 acres of land on the north side of Hammond, Ind., lying on both sides of the west branch of the Indiana Harbor Canal, are confirmed by officials of the company and successful termination of the deal is expected. It also is admitted that the land is for a new steel works, but it is not expected construction work will be started soon unless there is an early decision by the Federal Trade Commission in the Pittsburgh basing point case and this decision favors the complainants. The plant site gives the Jones & Laughlin Steel Co. an anchor to windward in the event Pittsburgh does not remain the sole basing point of steel prices.

JAPAN ACTIVE

Rail and Pipe Contracts Awarded—Black Sheets Less Active—Other Markets Suggest Barter

NEW YORK, Jan. 10.—The export situation is similar in every respect to the prevailing conditions during the last few months of last year. But little activity is noted from any part of the world except the Far East and buying from these markets is confined almost entirely to Japan. The activity evident in many countries in developing hydro-electric, railroad and other projects may lead to some buying later in the year. The six pipe lines of 48-in. to 52-in. steel pipe for the Taiwan Electric Power Co., which will be installed on the Island of Formosa in connection with a project for hydro-electric power, have been awarded to Mitsui & Co., and it is expected the fabrication will be done by M. W. Kellogg & Co., Jersey City, N. J. The order totals about 2700 tons. The electric equipment is understood to have been placed but the 125 miles of steel transmission towers is still pending. These will probably be fabricated in Japanese shops if the precedent established in past purchases is pursued.

The 13,000 tons of 60-lb. and 75-lb. rails for the Imperial Government Railways were also placed with Mitsui & Co., and will be rolled by the Steel Corporation. This award is reported to have been made on a price c.i.f. Japanese port of between \$46 and \$47 per ton. Other railroad equipment purchases from the Far East include fittings for about 50 passenger coaches of the South Manchuria Railway Co., for which steam heating equipment and window frames were purchased through a Japanese export house. This export house has also booked an order for 18 steam boilers and radiators with 25,000 sq. ft. of radiation. The Japanese Government is reported to be in the market for a total of about 8000 tons of structural material for two bridges.

Sheet buying from Japan shows a slight decline from its previous activity and is not expected to revive to its former proportions until late spring. Slightly more interest is now being shown in sheets of heavier gage than Nos. 30 and 31½, which have been in particular demand.

Chinese activity is confined largely to inquiring for various kinds of material in small lots. One large inquiry now in the hands of a New York exporter calls for 8000 kegs of checkered head wire nails, about 10,000 boxes of light tin plate and about 200 tons of No. 31 gage galvanized sheets.

In addition to the fabricated pipe purchased for Formosa, about two miles of 33-in. steel pipe is reported

to have been placed in the United States by a London exporter and there is an inquiry from the Philippines for about 12,000 tons of 33-in. cast iron pipe. A hydro-electric company has been formed in Chile, according to the Bureau of Foreign and Domestic Commerce. The new organization is a combination of two established companies and will operate as the Chilena de Electricidad. A new hydro-electric station of 50,000 hp. is contemplated and increase from 18,000 hp. to 28,000 hp. in another station is intended. The inquiry of the Argentine Government for several hundred tons of galvanized sheets has been revived, but the terms required of sellers are extremely severe and but little interest is being shown.

Inquiry was recently made in the American market by an Australian company for 1285 tons of barbed wire. Australian buyers often suggest transacting business on a basis of barter, because of their difficulties in marketing their products. These suggestions are not peculiar to Australian business. The Usines Metallurgiques de la Basse-Loire, 25 Rue de Clichy, Paris, recently suggested the bartering of French iron ore for American coal. This company, which claims to consume about 250,000 tons of coal a year, has ore deposits at Segre near Nantes, France.

High Rates in Cast Iron Pipe

WASHINGTON, Jan. 10.—The Interstate Commerce Commission has held to be justified the proposal of railroads to cancel the existing basis for applying rates on cast iron pipe and connections from the Birmingham, Ala., district to Montana points, and also the restoring of the old basis of the combination on St. Louis. This decision is in accordance with a previous one restoring the same basis of rate making to the Southwest. The return to this basis will have the effect of increasing rates on cast iron pipe and connections from 40c. to \$1.20 per ton.

The different rate increases during the past two years threw the rate structure out of line and the joint through rates became less than the combinations on St. Louis, Omaha and St. Paul, and placed some of the carriers at a disadvantage, it was claimed, in comparison with competitors for business through the three gateways of the Northwest.

There was partial resumption at the plant of the Pittsburgh Steel Co., Monaca, Pa., Jan. 4, after a complete shutdown on Dec. 24. No. 1 rod mill, No. 2 wire mill, part of the galvanizing department and a number of nail machines were started.

CONTENTS

JANUARY 12, 1922

Semi-Continuous Bar Mill for Alloy Steel 141

Cooling Equipment Embodies Escapement and Horizontal Notched Bed Features—
Flat Spring Steel Self-Annealed in Packs

Light Movement of Lake Superior Ore in 1921 145

Steel Corporation and Others Give Employment to Miners to Prevent Suffering—
Moving of Hibbing Involves Great Expense

Production and Yield of Rolling Mills 151

Dependence of Material Yield on Oxidation and on Bloom and Billet Cropping—
Temperature Limitations Govern Reheating

German Attempts to Fix Steel Prices 157

Scheme of Plan of Maximum Prices Detailed—Production Checked by Strikes and
Exports by Competition—Guiding Prices

Waste a Basic National Problem 159

Secretary Hoover Says Its Elimination Will Solve Economic Distortion—Eulogizes Engineers at Meeting of Engineering Council

Dismantling Vessels	144	Foreign Market Conditions..160, 162, 186-190
Time of No Accidents.....	144	Independent Merger Negotiations.....
Shipments of Raw Products.....	147	Great Southern Steel Corporation.....
Grinding Wheel Truing Attachment.....	148	Interstate Tunnel
Combination Drill and Valve Grinder....	148	Hoover Conference on Railroad Problems
Portable Boring Unit.....	143	Jones & Laughlin Plans.....
Ingot Reheating Furnace.....	149	Higher Cast Iron Pipe Rate.....
Automatic Double-Spindle Disk Grinders.	150	Editorials
Rate Decision Declared Unfair.....	150	Indices of Business Activity—Labor
Hot Pressed Nut Machine.....	153	Efficiency; Some Comparisons—Cost of
Antidotes for Carbon Monoxide Poisoning	153	Employing Steel—Electrolytic Iron—
Interchangeable Spot Facer.....	153	Splitting Furnace Shafts
New England Foundrymen's Meeting....	154	Steel Ingot Output of December.....
Molding Sand Research Meeting.....	154	Annual Carnegie Dinner.....
Practicing Engineers to Meet in Chicago..	154	Iron Ore Production in 1921.....
Ohio State Foundrymen's Meeting.....	154	Corporation's Unfilled Orders.....
Chicago Engineers Consider Stabilization	154	Bar Iron Institute Dissolves.....
Research in Metallurgy of Aluminum....	154	Open Price Association Policy.....
National Research Council Offers Infor-		Tariff Hearings
mation Service	155	Short Trade Items.....186, 199
Courses in Labor Handling.....	155	Year in Canada.....
Research on Fatigue of Steel.....	155	Ireland's First Electric Steel Foundry...
Purchasing Agents to Meet.....	155	Export Plan for German Wire Ropes....
Coming Meetings	155	Russian Plan to Lease Steel Plants.....
Labor Notes	156	German Machinery Trades.....
Industrial Cost Meeting.....	156	Cold Rolled Strip Rolls of Narrow Face..
Sale of Material at Hog Island.....	158	Prices of Refractories.....
Pittsburgh Basing Case.....158, 181		Industrial Finance

Iron and Steel Markets.....	168
Comparison of Prices.....	169
Non-Ferrous Metal Markets	182
Prices Finished Iron and Steel, f. o. b. Pittsburgh.....	183
Personal Notes	184
Obituary Notes	185
Machinery Markets and News of the Works.....	191
New York Jobbers' Prices.....	200

ESTABLISHED 1856

THE IRON AGE

EDITORS:

A. I. FINDLEY

WILLIAM W. MACON

GEORGE SMART

CHARLES S. BAUR, *Advertising Manager*

Member of the Audit Bureau of Circulations and of
Associated Business Papers, Inc.

Published every Thursday by the IRON AGE PUBLISHING CO., 239 West 39th Street, New York

F. J. Frank, *President*

PRINTED IN U. S. A.

George H. Griffiths, *Secretary*

Owned by the United Publishers Corporation, 243 West 39th Street, New York, H. M. Swethland, *Pres.*, Charles G. Phillips, *Vice Pres.*, A. C. Pearson, *Treas.*, F. J. Frank, *Secy.*
BRANCH OFFICES: Chicago: Otis Building, Pittsburgh: Park Building, Boston: 410 Unity Building, Philadelphia: 1420-1422 Widener Building, Cleveland: Guardian Building.

Detroit: 317 West Fort St. Cincinnati: Mercantile Library Bldg. Washington: 816 Fifteenth St., N. W. San Francisco: 320 Market St. London, Eng.: 11 Haymarket, S.W. 1.
Subscription Price: United States and Possessions, Mexico, Cuba, Shanghai, \$6.00; Canada, \$8.50; Foreign, \$12.00 per year. Single copy 50 cents.

Entered as second class matter, June 18, 1879, at the Post Office at New York, New York, under the Act of March 3, 1879

Indices of Business Activity

There has been a rapid increase of late in the available amount of statistical matter relating to the volume and character of commercial activity. There are the various classes of statistics that long have been in use, there are the presentations made in recent years by the Federal Reserve Board, and there are the ambitiously conceived compilations of the Department of Commerce as recently organized by Secretary Hoover.

Those who wish to study business in detail can be at no loss for material. The price movements of practically all important commodities are known, and in most cases the production also. When it comes to generalizing, however, the course is not so clear, nor can it be expected to be clear. What is called "business" has extremely intricate ramifications, and the statistics cannot be less complicated than the movements of which they are the numerical picture.

It is a habit of many men to take some particular movement and follow it as being typical of "business" in general. Bank clearings make a favorite reference, as do the monthly blast furnace reports of THE IRON AGE and the unfilled tonnage of the United States Steel Corporation. Railroad earnings used to be a favorite, but unfortunately they disappeared.

Only a slight reference to the statistics of 1921 is sufficient to show the necessity for generalizing, if one wishes to obtain an idea as to how business stands, and to show at the same time the extreme difficulty of generalizing from the particulars. Three citations may be made of statistics which, off-hand, one might think ought to be typical of business in general. Debits to individual accounts at banks, freight ton-mileage on the railroads and the production of steel ingots.

Comparing 1920 and 1921, and taking 1920 as 100, the year 1921 stands between 80 and 85 in bank debits, at 75 in freight ton-mileage, on the basis of the first nine months of each year, while steel ingot production is about 48.

Here is certainly no coherence. Allowing for the decreases in commodity prices, salaries and wages, the bank debits indicate that the volume

of business, in commodities transferred and service rendered, increased from 1920 to 1921. Allowing some weight to the claims that high freight rates have not interfered greatly with the movement of valuable commodities, but have handicapped seriously the movement of heavy and cheap materials, the freight movement on the railroads, in point of value, can hardly have decreased much. The production of steel, on the other hand, dropped off by more than one-half in tonnage, while the value decreased much more.

Other divergences would be shown if we should take into the reckoning such matters as coal production, retail store trade, building permits, unemployment, postoffice receipts and the like. In conversation men often refer to "the state of general business," but it becomes evident that there is no such thing as "general business." Some lines of business appear to have been very poor in 1921 as compared with 1920, but the idea that may have been prevalent at one time that practically all business was "good" in 1920 is not tenable. Each line of business has a case of its own. There are relationships, but frequently they are far from close. There is no easy path to a conclusion as to the state of trade in general. One must study the trade movements in detail, and with particular reference to the individual problem which he wishes to solve.

The upward swing in British steel exports which began in September has continued. November had the surprising total of 202,059 gross tons, which is second to the largest movement of the year, 233,114 tons in January. While November fell below the 1920 monthly average by about 70,000 tons, it did better than the 1919 average of 188,519 tons per month and came about halfway up to the 1918 rate. It is significant that British exports were close to 80,000 tons larger than those from the United States in November. It was natural that after the long embargo caused by the coal strike, the British steel industry should show some rebound due to shipments on old contracts, but in view of the high costs of

British manufacturers the extent of the recent export movement in competition with continental countries of lower exchange is noteworthy.

Labor Efficiency—Some Comparisons

Viscount Haldane said recently: "I have no fear of British manufacturers and British workmen, if they will give themselves a chance. I think they are the best in the world." In contrast with this, an article in a London industrial publication in November said: "A quarter million men employed by the United States Steel Corporation produce 50 per cent more steel and steel products than the half million men employed by England's steel companies produce. Half a million American miners produce 10,000,000 tons of coal per week; it takes nearly 1,250,000 British miners to get 4,500,000 tons per week."

In furtherance of the latter statement, a recent issue of the *South African Mining and Engineering Journal*, showing a picture of a gathering of English miners being harangued by an agitator, has in the caption: "This is the sort of ill-reasoned action that has played havoc with the British coal industry, and has reduced her output per man to less than a third of what it is in the United States." Figures from the same publication place the coal output per underground employee in the United States at 4.40 tons per day employed, as compared with 1.19 tons in Great Britain.

Not all of this difference can be explained upon the score of individual working efficiency. It must be remembered that American use of machinery and power is greater than is to be found anywhere else in the world, not only in coal mines and steel mills, but in most other industrial processes. Shipbuilding plants in the United States are equipped with an outfit of cranes and other weight-handling appliances far in advance of those used in any except the best of British plants. High wages have forced us to use much machinery. Hence, a very considerable increase in production per man is inevitable, even with no gain in individual productive efficiency.

When all allowances are made, however, for all mechanical aids to greater production, the fact remains that American workmen, on the average, where their work has not been corroded by interference on the part of walking delegates, have consistently produced more per working day and per working hour than can be shown in other countries. They have received a larger wage and they have earned it.

Reference to the railroad problem brings to mind again the fact that the present rates and wages are beyond the capacity of industry to carry. At the same time it must not be forgotten that even the present swollen freight rates are far lower than the freight rates in any other country, and that in spite of our very great operating costs, brought about in large measure by swollen wage scales. During the first half of 1921 the average freight rate per ton-mile in the United States was 1.278c. This is to be compared with 3.5c. per ton-mile in England during the same period.

It must not be inferred that the above is an expression of satisfaction with present returns from labor. Nothing can be further from the truth; for labor, notably in railroad, building and mining, is giving a much smaller return for the wage received than we have every right to expect. It will be evident, however, that our position in this matter is better than that of other nations with which we are competing for the markets of the world (apart from longer hauls on raw materials, in some cases, and longer hauls to seaboard), and those who have been decrying our ability to hold a reasonable amount of our foreign trade have apparently left out of the account some of the relationships mentioned above.

Cost of Employing Steel

It has been a matter of common remark, and critical remark, that in the decline in commodity prices that began in 1920 prices of manufacturers took the lead in falling, wholesale prices following and retail prices coming far in the rear. Somewhat the same alignment is observed in prices of pig iron, steel and wares made from steel.

While the percentage relations between pig iron, semi-finished steel and the regular rolled products of the mills are much the same as before the war, the influence of the great advance in freight rates, which falls chiefly upon pig iron on account of the large tonnage of raw material that must be assembled, should cause pig iron to show a greater percentage spread above pre-war prices than is shown by finished steel. This is not the case. Relative to cost of manufacture, pig iron is now cheaper than finished steel.

Comparisons of prices now being received by the steel mills for their regular products, such as bars, plates, sheets, etc., with the prices of various things that are made from steel show in the great majority of cases that the finished wares are much farther above pre-war prices than are the steel mill products. Of course there are exceptions, but the average is as indicated. The steel wares that are sold at retail to the ultimate consumer, such as machinists' and carpenters' tools, show the greatest excess.

When cost is the controlling element in determining the volume of consumption, and in the last analysis it usually is, it is the price to the eventual consumer or user that governs, not the price of intermediate materials or the wholesale prices of the finished wares. The obliqueness of view of those who last spring were clamoring that the steel mills should reduce their prices to stimulate business has been fully indicated by subsequent events. Steel prices have been liquidated in a drastic way, yet ultimate consumption has not increased greatly. The ultimate consumer, whether the householder, the artisan or the investor, is not getting the full benefit of the declines that have occurred in what is called "the steel market."

The explanation both for the divergence between manufacturers' prices and retailers' prices

for commodities in general and for the divergence between steel prices and prices of wares made from steel is probably that competition has been more effective at some points than at others. The wholesalers who buy from manufacturers and the retailers who buy from wholesalers are discriminating and induce price competition. The general public, which buys at the drygoods store or the corner grocery, is not so discriminating, the result being that there is less competition in retail trade. In steel, the competition between steel mills in the past six months has been very keen. The competition between those who work up steel into various products has not been so keen. In a sort of way it is a case of what is everybody's business being nobody's business. This is, by the way, the precise thing that afflicts the building trades generally, for in the case of the man wishing to spend money for the erection of a garage, a dwelling house or other structure there is a different individual each time.

The cost of steel in its ultimate use is at a much higher percentage above its pre-war level than is the case with steel mill products, and in that lies one of the obstacles to a great broadening in the use of steel. The relatively low prices of rolled steel may, and probably will, cause buyers to stock up in a moderate way, but that will only temporarily swell the volume of demand upon the mills. What is needed is a lower cost in employing steel in its final form.

Electrolytic Iron

A new and important advance in electrometallurgy is represented by the announcement of a new commercial process for making electrolytic iron from an ore. Electrolytic copper has been a development of only recent years and now has the leading place in that market. Electrolytic tin and zinc are more recent commercial products, already factors in their respective markets. What place will electrolytic iron take in the field that is now occupied by product coming chiefly by the route of the blast furnace, steel works or puddling furnace and rolling mill?

The details of the Eustis process for the manufacture of electrolytic iron tubes and other products were the subject of an illuminating article in *THE IRON AGE* last week. One vital feature distinguishes this American process from the French and older methods. It is the use of an ore instead of scrap iron as an anode. In the new process pyrrhotite, or a high sulphur iron pyrite, largely FeS_2 , is the basis of a cyclical chemical process which furnishes ferrous chloride in constant and ample quantity as an electrolyte. This ore not only exists in the United States and Canada in millions of tons but is practically valueless for iron smelting or for sulphuric acid manufacture. It is possible to burn out only a small percentage of the sulphur. The Eustis process therefore has to its advantage a cheap raw material, the production of copper and sulphur as by-products, and an electrolyte purer than that usually obtainable from iron scrap.

The fields of usefulness for this pure iron—an iron of greater purity than has been attainable by any other process—are outlined by Mr. Stoughton. The application of its striking physical properties to other products than tubes opens up not a few possibilities. The principal drawback is the cost of electricity. This has been largely overcome in the case of electric steel and other commercial applications of the electric current. The elimination of costly smelting and complicated refining processes and the simultaneous recovery of by-products are marked advantages of the American electrolytic process. It is to be noted also that "it is unique in metallurgy for one brief cycle of operations to deliver in marketable form more than 90 per cent of any ore."

Splitting Furnace Shafts

Investigations of swelling and cracked blast furnace shafts have indicated that zinc in the iron ore and possibly in the limestone, even when existing in small amounts, has a cumulative effect that is not to be overlooked. The distortion of the steel plates, with splitting either vertically or horizontally as the final effect of the stresses set up, has commonly been charged to the refractories. At first there was a disposition to claim that the action resulted from inferior brick work, due in part to the lowered efficiency if not indifference of the brick makers; and then the phenomena were seized on by the advocates of hand and machine-pressed bricks, each trying to prove that the product of the other was inferior. The fact that the expansive force in the refractory lining might be explained by the presence of the zinc was not allowed to weaken either case. One or the other type of brick was simply condemned as being more easily permeable by the zinc. Thus disintegration might occur, requiring relatively early relining, or the material allowed impregnation though remaining in firm masses against which the expansion of the zinc could force the outward bulging of the steel shell.

Now, the view is taken that the condition of the brick work is a secondary matter and that the situation naturally results from the inability of the blast furnace easily to rid itself of zinc once introduced. It appears that zinc troubles have been met with in long runs with ores lean as regards zinc and that they are likely to be frequent and pronounced where the furnace burden has high percentages of zinc.

It has been explained that the zinc oxide in the downward passage in the furnace is reduced in the fusion zone and the metallic zinc in vapor form passes upward with the gases, largely to be carried outside of the furnace. A portion is caught in the upper strata of the stock and may be oxidized again by the furnace gases. This zinc oxide then descends and the process is repeated. Meanwhile some of the zinc is deposited on the brick work, impregnating it and the joints in both the metallic and the oxide form. The action is accentuated in regions of the shaft cooled on the outside. The fact that metallic zinc has a linear

co-efficient of expansion fully five or six times that of the brick lining (with some claims of a much higher expansion ratio) is advanced to explain pressures great enough to tear the steel work. The condition is an argument for the thick rather than the thin shell, which a few years ago had some vogue, and it explains the steel banding of shells provided usually after indications of swelling.

Pending a definite contribution to the literature on the subject, it behooves the furnace operator to watch the zinc content of his burden, particularly if, as under present commercial conditions, he expects repeated bankings, with all that the cooling down may do in favoring zinc accumulations.

Plant Purchased by Canton Forge & Axle Co.

The Canton Forge & Axle Co. has purchased the drop forge plant of the Standard Parts Co. at Canton, Ohio. This plant is equipped with modern forging and heat treating equipment, including drop hammers of sizes running up to 12,000 lb. and upsetting machinery. Heretofore the product has been entirely absorbed by the Standard Parts Co. in the manufacture of axles and other drop forgings going into automobiles.

The new corporation will still be the source of supply for Standard Parts Co. forgings. In addition the new management will enter the market for all kinds of general commercial drop forge work.

The officers of the Canton Forge & Axle Co. are: F. A. Poor, chairman of board; F. C. Moore, president; H. C. Holloway, secretary; Thomas F. DuPuy, general manager.

Increased Capacity in Operation at Youngstown

YOUNGSTOWN, OHIO, Jan. 10.—Steel plant operations in the Mahoning Valley are on a moderately broadening scale. Forty-five of the Valley's 113 sheet mills are under power, 12 of 17 pipe furnaces are fired, while 28 of 51 independent open-hearth furnaces are charged. Sheet mill production compares with a recent low of 20 per cent.

The Youngstown Sheet & Tube Co. has reduced the number of its active sheet mills from 15 to eight, while the Brier Hill Steel Co. is operating but 10 of 28 such units. The Republic Iron & Steel Co. has four of 18 sheet mills active, Falcon Steel Co., 5, Newton Steel Co., 10, and Trumbull Steel Co. and Sharon Steel Hoop Co., four each. The plant of the Newton company had been idle two weeks for repairs.

The Carnegie Steel Co. is operating five blast furnaces, while its finishing mills are around 60 per cent.

More Building in Chicago

Building construction in Chicago made an excellent showing in 1921 despite adverse conditions. Permits were taken out for 7800 structures, extending over a frontage of 238,025 ft., and involving a total cost of \$124,028,010, as compared with 3745 buildings, 135,440 ft. of frontage, and a cost of \$79,102,650 in 1920. The record for 1921, in terms of frontage, is the best of that for any year since 1916. It falls below the years 1905 to 1916 inclusive, however, when frontage totals ranged from 243,485 ft. in 1905 to 327,496 ft. in 1916.

Confusion has arisen over the identical names of the National Engineering Co., Chicago, and the National Engineering Co., Irwin, Pa. The Chicago company is the manufacturer of foundry appliances and of the Simpson patented specialties utilized largely in foundries generally, while the Irwin concern is a manufacturer of electrical devices.

Sharp Decline in Steel Ingot Output in December

The steel ingot statistics of the American Iron and Steel Institute show that 30 companies, which in 1920 produced 84.20 per cent of the total, had an output in December of 1,427,093 gross tons, as compared with 1,660,001 tons in November and with 803,376 tons in July. The December decrease from November was 232,908 or 14.03 per cent. The increase in November over October was 2.67 per cent. Estimating the production of other companies on the basis of the 30 companies (though it is probable the small companies did not equal the rate of the larger ones) the total output of ingots in December was 1,694,885 or 67,795 tons per day.

In the table below the output of Bessemer and open-hearth works is separated and the figures for 1920 by months are included:

Monthly Production of Steel Ingots by 30 Companies Which Produced About 84.20 Per Cent of Total in 1920--Gross Tons

	Open Hearth	Bessemer	All Other	Total
January, 1920...	2,242,758	714,657	10,687	2,968,102
February	2,152,106	700,151	12,867	2,865,124
March	2,487,245	795,164	16,640	3,299,049
April	2,056,336	568,952	13,017	2,638,305
May	2,251,544	615,932	15,688	2,883,164
June	2,287,273	675,954	17,463	2,980,690
July	2,135,633	653,888	18,297	2,802,818
August	2,299,645	695,003	5,784	3,000,432
September	2,300,417	693,586	5,548	2,999,551
October	2,335,863	676,634	3,485	3,015,982
November	1,961,861	673,215	3,594	2,638,670
December	1,687,162	649,617	3,586	2,340,365
Total, 1920...	26,197,843	8,112,753	121,656	34,432,252
January, 1921...	1,591,281	608,276	3,629	2,203,186
February	1,295,863	450,818	2,796	1,749,477
March	1,175,591	392,983	2,404	1,570,978
April	1,000,053	211,755	2,150	1,213,958
May	1,047,810	216,497	1,543	1,265,850
June	808,286	193,644	1,476	1,003,406
July	689,489	113,312	575	803,376
August	915,434	221,116	1,621	1,138,071
September	908,381	265,152	1,207	1,174,740
October	1,269,945	345,837	1,028	1,616,810
November	1,294,371	363,912	1,718	1,660,001
December	1,129,174	296,380	1,539	1,427,093
Total, 1921...	13,125,578	3,679,682	21,686	16,826,946

The December ingot production was at a yearly rate of 21,084,245 tons, counting 311 operating days to the year. This compares with a rate in November of 23,581,886 tons and with 11,857,186 tons in July, the year's low point. The December decrease was due largely to reduced operations of independent steel companies.

The decrease of 232,908 tons in the ingot output of all companies reporting in December from that in November contrasts with an increase of 233,605 tons in December pig iron output over that of November.

Annual Carnegie Steel Co. Dinner

The twenty-fifth annual dinner of the executive, sales and operating officials of the Carnegie Steel Co. was held at the William Penn Hotel, Pittsburgh, Saturday evening, Jan. 7. As usual, the affair was strictly a company affair. President James A. Farrell of the Steel Corporation was present. Hugh P. Tiemann, metallurgical engineer, spoke on "Quality Requirements"; James M. Camp, salesmanship engineer, discussed "The Carnegie Steel Co. and Occupational Training"; Louis C. Bihler, traffic manager, discussed "The Present Relations of Transportation to Industry." The subject of Dr. John S. Unger, research expert, was "Future Probabilities."

The Wainwright Engineering Corporation, Connorsville, Ind., manufacturer of piston pins and pistons for automobile motors, has been merged with the McQuay-Norris Mfg. Co., St. Louis, one of the largest manufacturers of piston rings in the world. The Connorsville concern will be known as the McQuay-Norris Mfg. Co. of Indiana, Wainwright division. Harry A. Wainwright, vice-president and general manager will continue in that capacity. As a result of the merger, the volume of business by the plant is expected to increase 25 to 50 per cent.

Iron and Steel Markets

JANUARY QUIETNESS

Some Car and Rail Buying But Little Else

Steel Corporation's Preponderance in 1921 Output—Coal Strike Possibilities

Little activity was expected from the first half of January, with inventories uncompleted, and the quietness in iron and steel in the past ten days is not disappointing. Operations thus far have been slightly less than the average for December, the Steel Corporation's percentage now being 46 or 47, against 49 last month, while the independent companies are to-day about 28 per cent, after averaging 31 per cent last month.

The December steel output of 1,427,000 tons of ingots by 30 companies reporting—a falling off of 233,000 tons from November—indicates that the country produced about 19,300,000 tons of ingots in 1921.

The Steel Corporation, which operated all through last year at a higher rate than the independents, probably produced a larger percentage of the total than in 15 years. While its steel making capacity is about 45 per cent of the total, it changed places with the independents in actually turning out at least 55 per cent of the country's output in 1921. Official returns may show that it nearly equaled the 57.8 per cent which was its share in 1906.

In casting up the prospects for blast furnaces and mills, in looking toward the active season, manufacturers recognize that much hinges on the extent to which freight rates and coal mining and building labor are brought into line with the drastic deflation in steel. The possibility of a bituminous coal strike in April and the check it would put on iron and steel production are also regarded as factors of uncertainty.

Railroad demand, as for some time past, has been the principal item in the limited market news of the week. At Chicago the Union Pacific placed 4500 cars and the Illinois Central 2000. Action by the Great Northern is expected next week.

The Pennsylvania Railroad's rail order for 80,000 tons brings the total of 1922 business above 500,000 tons, but it is to be said that most of the large orders are now out. The Pennsylvania has over 45,000 tons still to come on its 1921 contract, besides having 25,000 tons in stock, so that its probable wants for the year are covered. Track supply orders are coming along with rails, indicating active spring work on track. The Louisville & Nashville is asking for 3500 tons of splice bars.

Rails and tin plate largely account for the Steel Corporation's increase of 17,872 tons in unfilled orders on Dec. 31. Its share of 375,000 base boxes of tin plate bought by the Standard Oil Co. for export was one of the large items.

In the matter of prices plate mills divide into two classes—those that will not sell below 1.50c. and those whose concessions from this figure have been \$1 to \$2 per ton on exceptional business. Some check is noted to recent contracting for oil storage tanks, and oil well pipe feels the effect of the decline in crude oil.

The automobile industry is again under way with a fair production after the holidays. The Ford schedule for January is 50,000 cars, or something over half its maximum.

Large size structural steel awards of the week will require 8000 tons of steel, while fresh projects call for 9000 tons. On foreign account 2700 tons of steel for pipe lines in Formosa has been placed in the United States and over 9000 tons of material for bridges and transmission towers, also for the Far East, is likely to come to domestic mills.

An order from Japan for 13,000 tons of rails, taken at somewhat under \$47 c.i.f., Japanese port, is conspicuous. More rails will be wanted in the Orient, but it is questioned that the 1921 record of 100,000 tons of sheets shipped from this country to Japan can be duplicated this year.

Nearly half the country's total of 2,200,000 tons of steel exports last year was a carry-over from 1920 orders. There is nothing like that to help out in 1922, yet a gradual increase in exports is expected, partly on the score of a world consumption of steel last year only about half the 75,000,000 tons of 1913.

Radiator companies again have been the principal buyers of pig iron and a considerable amount, including 5500 tons placed with a Buffalo company, has been taken. But the buying even for radiator works, which have had a good operation for months, has been conservative and represents only a small part of what has been placed in other years. Birmingham iron at \$16.50 can be sold on the Pacific Coast at a little more than \$30, or very nearly the price of Belgian iron.

Many foundries are figuring on the cast iron segments for the New Jersey and New York vehicular tunnel, which will require somewhat more than 100,000 tons. Bids will be opened Feb. 7. As the delivery of the segments will extend over nearly two years, furnaces are slow to quote on pig iron.

Pittsburgh

PITTSBURGH, Jan. 10.

The new year thus far has failed to develop any pronounced departure on the part of consumers of iron and steel from their policy of meeting only their actual requirements. Business has not developed to any extent since the holidays. This does not cause disappointment except possibly to a very few. It was pretty well understood that the taking of inventories hardly would be completed before the middle of January, and this finds some confirmation in reports that in a general way inventories are not more than 60 per cent completed. Opinions regarding 1922 business do not vary widely. In most quarters the belief is that pending freight rate and railroad labor wage revisions, the liquidation of coal prices and mine labor charges and the bringing of building trades wage rates more nearly in alignment with those in other crafts, there can be no very long sustained periods of activity, and due recognition is given the fact that these matters cannot be satisfactorily settled overnight. Some put the date of a definitely upward swing in the demand as far off as next September, while there are some who feel that it will be 1923 before there is a return to healthy trade conditions.

A Comparison of Prices

Advances Over the Previous Week in Heavy Type, Declines in Italics

At date, one week, one month, and one year previous

For Early Delivery

Pig Iron,	Jan. 10, 1922	Jan. 3, 1922	Dec. 13, 1921	Jan. 11, 1921
Per Gross Ton:				
No. 2X, Philadelphia...	\$21.34	\$21.34	\$22.26	\$33.25
No. 2, Valley furnace...	19.50	19.50	20.50	33.00
No. 2, Southern, Cin'ti...	21.00	21.00	22.00	36.50
No. 2, Birmingham, Ala...	16.50	16.50	17.50	32.00
No. 2 foundry, Chicago...	19.00	19.00	20.00	32.00
Basic, del'd, eastern Pa...	20.25	20.25	21.00	33.86
Basic, Valley furnace...	18.25	18.25	19.00	30.00
Bessemer, Pittsburgh...	21.46	21.96	21.96	33.96
Malleable, Chicago...	19.00	19.00	20.00	32.50
Malleable, Valley...	19.50	19.50	20.00	32.00
Gray forge, Pittsburgh...	20.96	20.96	21.46	33.96
L. S. charcoal, Chicago...	31.50	31.50	31.50	40.50
Ferromanganese, del'd...	60.00	60.00	60.00	100.00

Rails, Billets, etc.,	Per Gross Ton:			
O.-h. rails, heavy, at mill...	\$40.00	\$40.00	\$40.00	\$47.00
Bess. billets, Pittsburgh...	28.00	28.00	29.00	43.50
O.-h. billets, Pittsburgh...	28.00	28.00	29.00	43.50
O.-h. sheet bars, P'gh...	29.00	29.00	30.00	47.00
Forging billets, base, P'gh	32.00	32.00	32.00	48.50
O.-h. billets, Phila...	33.74	33.74	34.74	49.24
Wire rods, Pittsburgh...	36.00	36.00	38.00	57.00
	Cents	Cents	Cents	Cents
Skelp, gr. steel, P'gh, lb...	1.50	1.50	1.50	2.45
Light rails at mill...	1.46	1.55	1.55	8.00

Finished Iron and Steel,				
<i>Per Lb. to Large Buyers:</i>	Cents	Cents	Cents	Cents
Iron bars, Philadelphia...	1.85	1.85	1.95	2.70
Iron bars, Chicago...	1.60	1.60	1.65	2.68
Steel bars, Pittsburgh...	1.50	1.50	1.50	2.35
Steel bars, Chicago...	1.60	1.60	1.60	2.73
Steel bars, New York...	1.88	1.88	1.88	2.73
Tank plates, Pittsburgh...	1.50	1.50	1.50	2.65
Tank plates, Chicago...	1.60	1.60	1.60	3.03
Tank plates, New York...	1.83	1.83	1.83	3.08
Beams, Pittsburgh...	1.50	1.50	1.50	2.45
Beams, Chicago...	1.60	1.60	1.65	2.83
Beams, New York...	1.88	1.88	1.88	2.83
Steel hoops, Pittsburgh...	2.00	2.00	2.00	3.05

*The average switching charge for delivery to foundries in the Chicago district is 70c. per ton.
 †Silicon, 1.75 to 2.25. ‡Silicon, 2.25 to 2.75.

The prices in the above table are for domestic delivery and do not necessarily apply to export business.

Sheets, Nails and Wire,	Jan. 10, 1922	Jan. 3, 1922	Dec. 13, 1921	Jan. 11, 1921
Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Sheets, black, No. 28, P'gh	3.00	3.00	3.00	4.35
Sheets, galv., No. 28, P'gh	4.00	4.00	4.00	5.70
Sheets, blue an't'd, 9 & 10	2.25	2.25	2.25	3.55
Wire nails, Pittsburgh...	2.50	2.50	2.75	3.25
Plain wire, Pittsburgh...	2.25	2.25	2.50	3.25
Barbed wire, galv., P'gh...	3.15	3.15	3.40	4.10
Tin plate, 100-lb. box, P'gh	\$4.75	\$4.75	\$4.65	\$7.00

Old Material, Per Gross Ton:	Jan. 10, 1922	Jan. 3, 1922	Dec. 13, 1921	Jan. 11, 1921
Carwheels, Chicago...	\$15.50	\$15.50	\$16.00	\$21.00
Carwheels, Philadelphia...	16.50	16.50	16.50	25.00
Heavy steel scrap, P'gh...	14.50	14.50	14.00	15.00
Heavy steel scrap, Phila...	11.50	11.50	11.50	14.50
Heavy steel scrap, Ch'go...	11.50	11.50	11.00	15.00
No. 1 cast, Pittsburgh...	16.25	16.25	16.00	25.00
No. 1 cast, Philadelphia...	16.50	16.50	16.50	22.50
No. 1 cast, Ch'go (net ton)	13.00	12.50	12.50	17.00
No. 1 RR. wrot, Phila...	14.50	14.50	14.50	20.00
No. 1 RR. wrot, Ch'go (net)	10.50	10.50	10.50	13.50

Coke, Connellsville, Per Net Ton at Oven:	Jan. 10, 1922	Jan. 3, 1922	Dec. 13, 1921	Jan. 11, 1921
Furnace coke, prompt...	\$2.75	\$2.75	\$2.75	\$5.00
Foundry coke, prompt...	3.75	3.75	3.75	6.50

Metals,					
<i>Per Lb. to Large Buyers:</i>	Cents	Cents	Cents	Cents	
Lake copper, New York..	13.87 ½	13.87 ¾	13.75		13.25
Electrolytic copper, refinery	13.62 ½	13.62 ¾	13.50		13.00
Zinc, St. Louis.....	4.77 ¼	4.82 ½	4.85		5.50
Zinc, New York.....	5.12 ½	5.17 ½	5.20		6.00
Lead, St. Louis.....	4.40	4.40	4.40		4.85
Lead, New York.....	4.70	4.70	4.70		5.00
Tin (Straits), New York.	32.12 ½	32.75	32.75		38.75
Antimony (Asiatic), N. Y.	4.50	4.50	4.50		5.20

Composite Price, Jan. 10, 1922, Finished Steel, 2.062c. Per Lb.

Based on prices of steel bars, beams, tank plates, plain wire, open-hearth rails, black pipe and black sheets	Jan. 3, 1922, 2.062c. Dec. 13, 1921, 2.135c. Jan. 11, 1921, 3.057c. 10-year pre-war average, 1.684c.
These products constitute 88 per cent of the United States output of finished steel.	

Composite Price, Jan. 10, 1922, Pig Iron, \$18.60 Per Gross Ton

Based on average of basic and foundry irons, the basic being Valley quotation, the foundry an average of Chicago, Philadelphia and Birmingham	Jan. 3, 1922, \$18.60 Dec. 13, 1921, 19.46 Jan. 11, 1921, 31.21 10-year pre-war average, 15.72
---	---

The week under review has brought no particular change in prices. Frequent intimations that less than 1.50c., Pittsburgh, has been done on plates are not disputed by producers here, but they assert that the lower prices are Pittsburgh equivalents rather than prices made by the Pittsburgh mills. The tendency of mills outside the Pittsburgh district to quote on an f.o.b. mill basis still is pronounced and unusually sales by these mills figure back to less than the prices quoted by Pittsburgh producers. On the whole, it must be said that as far as business in this district is concerned, there is more resistance to the effort to put prices down than was the case even as recently as last month.

The week likewise has been productive of little or no change in mill operations in this and nearby districts. The Pittsburgh Steel Co. has started up some finishing capacity and the Allegheny Steel Co. has put on some steel making units preparatory to starting up some sheet mills next week. The Carnegie Steel Co., on the other hand, is running at a lower rate this week than it did last week. There has been no change to speak of in the Valley and Wheeling districts. The monthly unfilled tonnage statement of the Steel Corporation showing an increase in its obligations of about 17,000 tons, occasions little surprise since December was the last month of the quarter and a

good many orders for rails and tin plate went upon its books during that month.

The pig iron market is showing a little more life, but actual business still is unsatisfactory as regards both volume and prices. Old material prices show considerable firmness in the lighter grades of open-hearth material. So many of the blast furnaces now active are protected against fuel requirements that there is practically no market whatever in prompt coke.

Pig Iron.—Inquiry for foundry iron is rather more active than it has been and sales reach a somewhat heavier total than before in several weeks. The National Radiator Co., which recently put out an inquiry for 1500 tons for shipment in equal quantities to its three plants, is understood to have closed for the 500 tons for its Johnstown works, at \$19.50 for No. 2 grade, at a western Pennsylvania furnace. A Pittsburgh foundry interest has taken 500 tons of No. 2 iron at \$19.50, Valley furnace. There is before sellers an inquiry for 2000 tons of foundry or malleable iron from a maker of fittings, while local concerns which are preparing to bid on a portion of the requirements for the new Manhattan tunnel are seeking protection on 5000 tons of foundry grade. There is also an inquiry for 500 tons of No. 2 foundry from a Pittsburgh melter. The common price both on in-

quiries for and sales of No. 2 foundry iron has been \$19.50 at furnace. It is reported, however, that Lake furnaces have gone as low as \$19, Valley furnace, on local business. The most interesting piece of business in steel making iron was a sale of 1500 tons of Bessemer to an Ohio ingot mold manufacturer at \$19.50, Valley furnace. This is a drop of 50c. per ton from the former nominal quotation on this grade. A Pittsburgh district sheet maker has inquired for 500 tons of basic for early delivery, against which the common quotation has been \$18.25, Valley furnace. Talk is heard of \$18 for Valley basic, but a sale at that price is yet to be reported. Follansbee Brothers Co. recently closed for 1000 tons of basic, the business going to a nearby maker at about \$19.75, delivered, Follansbee, West Virginia.

We quote Valley furnace, the freight rate for delivery to the Cleveland or Pittsburgh district being \$1.96 per gross ton:

Basic	\$18.25
Bessemer	19.50
Gray forg.	\$19.00 to 19.50
No. 2 foundry	19.50 to 20.00
No. 3 foundry	19.00 to 19.50
Malleable	19.50 to 20.00

Ferroalloys.—Interest in the market on the part of consumers is extremely limited, and in the absence of important transactions, it is impossible to make any material change in prices. Makers of 50 per cent ferrosilicon still are quoting \$60 furnace, freight allowed, or more, but the effect of business done a few weeks ago at \$54 to \$55 still lingers and it is difficult to get consumers' ideas up to even \$60. The common quotation on 80 per cent ferromanganese is \$58.35, Atlantic seaboard, this price applying to domestic, English and German material. As far as this immediate district is concerned, that price is unobtainable since it means a delivered price of \$1 to \$2 per ton above the price of the Steel Corporation subsidiary making and offering this material. The inquiry for 300 tons of 15 to 19 per cent spiegelisen by a central Ohio steel maker, referred to in these columns a week ago, has been closed on a basis of \$24 furnace, or \$27.60 delivered. Interest in Bessemer ferrosilicon and silveries in this district is very limited. This is partly due to the fact that the steel foundries are getting a good deal of Government material in their scrap purchases, and his steel runs so high in silicon as to obviate the necessity of using the usual amount of high silicon iron.

We quote 78 to 82 per cent domestic ferromanganese at \$59 to \$63.67 delivered; 78 to 82 per cent foreign ferromanganese, \$58.35, c.i.f. Atlantic seaboard; German, for 76 to 80 per cent, \$54, seaboard. Average 20 per cent spiegelisen at \$30 delivered, Pittsburgh or Valleys; 16 to 18 per cent spiegelisen, \$26 to \$30 delivered Pittsburgh; 50 per cent ferrosilicon, domestic, \$54 to \$57, freight allowed. Bessemer ferrosilicon is quoted f.o.b. Jackson and New Straitsville, Ohio, furnaces as follows: 10 per cent, \$38.50; 11 per cent, \$41.80; 12 per cent, \$45.10; 13 per cent, \$49.10; 14 per cent, \$54.10; silvery iron, 6 per cent, \$27; 7 per cent, \$28; 8 per cent, \$29.50; 9 per cent, \$31.50; 10 per cent, \$33.50; 11 per cent, \$36; 12 per cent, \$38.50. The present freight rate from Jackson and New Straitsville, Ohio, into the Pittsburgh district is \$4.06 per gross ton.

Billets, Sheet Bars and Slabs.—The market still is a very narrow affair, with little business being placed and prices still rather indefinite. These conditions are in keeping with those existing in finished products. Mills which do not make their own steel are not heavily booked and the common impression is that the demand for sheets, plates and merchant mill products, for the next few months at least, will be much as it has been during the past few months, namely, the covering of actual needs. The common asking price on billets, sheet bars and slabs is \$30, but there is reason to suppose that that price can be shaded at least \$1 on sheet bars and that a sizable inquiry for 4-in. billets would develop a price as low as \$28.

We quote 4 x 4 in. soft Bessemer and open-hearth billets at \$28 to \$29; 2 x 2 in. billets, \$29 to \$30; Bessemer and open-hearth sheet bars, \$30; slabs, \$29 to \$30; forging billets, ordinary carbons, \$32 to \$33, all f.o.b. Youngstown or Pittsburgh mills.

Wire Rods.—There is a fairly good demand from wire manufacturers and some export business, but inquiries from other sources are few and small. The quotations of all makers is \$38 Pittsburgh or Youngstown, for the base size of soft rods, but this price refers only to retail lots, and on quantity tonnages \$36 to \$37 is the range. Prices are given on page 183.

Steel Skelp.—The usual quotation on steel pipe skelp is 1.50c., but there is hardly enough demand to provide a test of this price. On steel boiler tube skelp, most makers are quoting 1.65c.

Steel Rails.—No improvement is noted in the demand for light sections and prices are largely nominal. On rails rolled from new steel, makers generally are asking 1.60c. base, but find it almost impossible to obtain that figure because of rather keen competition for passing business, notably on the part of makers of re-rolled rails, who are said to have gone as low as 1.45c. mill, to obtain orders. Specifications against orders for standard rails are not especially heavy as yet.

We quote 25 to 45-lb. sections, rolled from new steel, 1.45c. to 1.50c. base; rolled from old rails, 1.50c. base; standard rails, \$40 per gross ton mill for Bessemer and open-hearth sections.

Wire Products.—The impression is so widespread that present prices will not be maintained, that buyers are extremely cautious, and the common report is that there is room for much improvement in business. Inventories hardly are more than half completed and this also is a factor in the lack of activity. It is too early for any considerable amount of business from the agricultural districts and until what is regarded as a deplorable financial situation among the farmers is corrected, there is not much hope of normal demands from this source. Manufacturers here reiterate that there is no shading of the Dec. 21 prices of \$2.50 base per keg for nails and \$2.25 base per 100 lb. on plain wire.

We quote wire nails at \$2.50 base per keg, Pittsburgh, and bright basic and Bessemer wire at \$2.25 base per 100 lb., Pittsburgh.

Iron and Steel Bars.—Demand is exceedingly light and prices for that reason are untested and nominal. All makers are quoting both mild and carbon bars at 1.50c. On the latter, however, there is such sharp competition from re-rolled bars, which have gone as low as 1.35c., that it is rather difficult to effect sales at the full quotation. Activity also is lacking in iron bars. Bars made from pig iron are quoted at 4c. base, with those containing scrap ranging down to 2c.

We quote steel bars rolled from billets at 1.50c.; reinforcing bars, rolled from billets, 1.45c. to 1.50c. base; reinforcing bars, rolled from old rails, 1.35c. to 1.40c.; refined iron bars, 2c. to 2.10c. in carloads, f.o.b. mill, Pittsburgh.

Sheets.—There has been no appreciable increase either in orders or specifications, probably because most consumers still have supplies on hand or due them at prices \$5 per ton below those now quoted, and which are being adhered to with remarkable tenacity. In the passing business, the American Sheet & Tin Plate Co. seems to be faring better than the independents, as is evident from the fact that it is operating more than 70 per cent of its mills, against a rate of only slightly more than 30 per cent by independent manufacturers. The effort to break prices has not ceased, but continues to be unsuccessful. It is commented upon that 2.25c. base has become fairly easy to obtain on the lighter gages of blue annealed sheets, but the heavier gages still are being sold on the plate base which, with the latter product at 1.50c., would mean slightly less than 2c. for heavy blue annealed stock. Prices are given on page 183.

Tin Plate.—The most important development of the past week is that there has been a considerable lessening in the tendency to shade the regular price of \$4.75 per base box on standard coke. This is probably explained by a little better distribution of the business than was the case recently, and fewer mills now feel the need of making concessions to secure orders. The movement of tin plate against orders is unusually good for this time of the year, and mill operations rarely have been as heavy at this season as they are this year. The American Sheet & Tin Plate Co. is operating more than 90 per cent, while among the independents full operations are noted by Standard Tin Plate Co., Canonsburg, and 80 per cent operations or better, by the Jones & Laughlin Steel Co. and Weirton Steel Co. The McKeesport Tin Plate Co., the Wheeling Steel & Iron Co. and the Washington Tin Plate Co. are idle, but the first named is expected

to resume operations next week and the Wheeling Steel & Iron Co. is making an effort to start up its Yorkville, Ohio, plant.

We quote standard production coke tin plate at \$4.75 per base box f.o.b. Pittsburgh for carload lots.

Cold-Finished Steel Bars and Shafting.—Business still is of very moderate proportions, and not especially well distributed. There is some buying of shafting by oil well supply houses, while the locomotive companies also are taking on fair sized tonnages and the demand from makers of motors has been better in the past few weeks than before in some time. The big outlets for screw stock, the automotive industry and the machine tool manufacturers, however, still are largely closed. The going price on the bulk of the business in cold-finished bars and shafting, is 2c. base, Pittsburgh, but sales have been made both below and above that figure. The full range of prices is from 1.85c. to 2.25c. base. Ground shafting is unchanged at \$2.50 base per 100-lb. f.o.b. Mill.

Hoops and Bands.—Prices still are very poorly defined and because of the uncertainty as to where they will ultimately land, business is extremely small. There is no question but that band steel can be bought as low as 1.75c., although the asking price of regular makers is 2c. That price also is quoted on hoops, but the \$10 per ton differential which that price means over the current price for steel bars, is proving something of an obstacle to business, since even adding 50 per cent to the pre-war differential to cover the increased cost of labor and handling charges still would leave the margin wide as compared with what it was before the war.

Hot-rolled and Cold-rolled Strips.—There has been little, if any, increase in actual business, but because of the common belief that stocks in consuming hands are pretty well liquidated, the outlook is considered good for the more active market in the next 45 or 60 days. The going price on hot-rolled strips is 2c. base, Pittsburgh, for carload lots, but there are intimations that large buyers, as usual, are getting some preferential price treatment. All makers now are down to a base of 3.50c. Pittsburgh, for cold-rolled strips, and there is no important shading of that price.

Nuts and Bolts.—Business with makers in this district shows no appreciable improvement and business in consuming industries is so slack that hopes of early improvement are not especially strong. Since present quotations fully discount present prices of raw material, there is not much disposition to shade them. It is not so much a question of price as of needs that hinders business. Discounts are given on page 183.

Rivets.—Recent reduction in prices by the leading Cleveland maker has been followed by makers in this district. Business is no better at the new quotations than it was at the old ones. Prices and discounts are given on page 183.

Spikes.—The market is showing a little more life on standard spikes than it did recently. The Norfolk & Western Railway recently closed with a Pittsburgh maker for 6000 kegs at around \$2.25 base, per 100 lb. while new inquiries include 2000 kegs for the Southern Pacific Co., and 1000 kegs for the Missouri Pacific Railroad. It is probable that Western mills will be awarded these orders. Small spikes are in light demand. Prices are unchanged, but the market is steady rather than firm. Prices are given on page 183.

Structural Material.—Fabricating interests in this district note some increase in inquiries, but actual awards are few and not much tonnage is involved. The Jones & Laughlin Steel Co. will furnish 700 or 800 tons of concrete bars for the Scottish Rite Cathedral, St. Louis, and also 400 tons of structural material for the new Langley School, Pittsburgh. Plain material is inactive, but fairly steady at 1.50c., Pittsburgh. Prices are given on page 183.

Plates.—Local mills are experiencing a very slow demand. Railroad equipment companies in this district do not seem to be faring nearly as well on orders as those in other parts of the country, and the recent

downward reaction in oil prices has put a quietus upon the demand for storage tanks.

We quote sheared plates, ¼ in. and heavier, tank quality, at 1.50c. f.o.b. Pittsburgh.

Iron and Steel Pipe.—The South reports building activity the coming spring and building projects in the New York district also point to some good sized future orders for merchant pipe from that center. The drop in oil prices, which now amounts to 75c. per barrel in Pennsylvania crude from the recent high point, is having its effect upon the demand for oil well pipe, but there are two promising inquiries for line pipe out of the natural gas field in Louisiana. One of these is for 400 miles and the other is for 250 miles. There is good observance of the Dec. 16 steel pipe card and the makers of wrought iron pipe are holding to their last card, dated Sept. 1, last year. Discounts are given on page 183.

Boiler Tubes.—Demand is steady rather than active. All makers of lap weld steel boiler tubes now are giving a supplementary discount of 5 per cent in addition to the regular card discount on carload lots. There has been no change in charcoal iron tubes. Discounts are given on page 183.

Coke and Coal.—The spot market in furnace coke has practically disappeared since all furnaces in this and nearby districts dependent on outside sources for fuel supplies now are covered by contract. As nearly as can be determined from the limited spot business in progress, the market is quotable at the recent range of \$2.75 to \$3 per net ton oven. Spot foundry coke is available at the usual premium of \$1 per ton over furnace grade. The 1921 production of Connellsville coke is estimated by the Connellsville *Courier* to have been 3,572,417 net tons, as compared with 10,738,227 tons, in 1920.

Steel Chain.—Effective Jan. 4, leading makers of steel chain issued a new price list reducing base price from \$5.90 to \$5.50 per 100-lb. There has been a slight revision on the size extras in the new card, that of 3/16-in. to ¼-in., having been increased 10c. per 100-lb.; on 5/16-in. to ¾-in. inclusive 15c. per 100-lb.; on 9/16-in. 25c. per 100-lb. and on 11/16-in. to 5/8-in. 10c. per 100-lb. The new list reduces the price on wagon chains from 25c. to \$1 per 100-lb. and the smaller sizes of loading chain have been cut \$2 per 100-lb. for ¼-in. and 9/16-in., and \$1 per 100-lb. for 5/16-in. There has been an increase in the discount on cold shuts, slip and grab hooks, all kinds of bright chain and cow ties of 5 per cent.

Old Material.—Recent sales of machine shop turnings have been at from \$9.50 to \$10; of shoveling turnings at \$10.75 to \$11 and the same price has been paid for cast iron borings. There is a pretty good market for compressed sheets at \$11.75 and for hand bundled sheets at \$1 per ton less.

We quote for delivery to consumers' mills in the Pittsburgh and other districts taking the Pittsburgh freight rate, as follows:

Heavy melting steel, Steubenville, Follansbee, Bracknridge, Monessen, Midland and Pittsburgh.....	\$14.50 to \$15.00
No. 1 cast, cupola size.....	16.25 to 16.75
Re-rolling rails, Newark and Cambridge, Ohio; Cumberland, Md.; Huntington, W. Va., and Franklin, Pa.....	15.50 to 16.00
Compressed sheet steel.....	11.75 to 12.00
Bundled sheets, sides and ends.....	10.50 to 11.00
Railroad knuckles and couplers.....	15.00 to 15.50
Railroad coil and leaf springs.....	15.00 to 15.50
Low phosphorus standard bloom and billet ends.....	17.50 to 18.00
Low phosphorus plates and other grades.....	17.00 to 17.50
Railroad malleable.....	12.50 to 13.00
Iron car axles.....	24.00 to 25.00
Locomotive axles, steel.....	22.00 to 23.00
Steel car axles.....	18.00 to 18.50
Cast iron wheels.....	15.00 to 15.50
Rolled steel wheels.....	15.00 to 15.50
Machine shop turnings.....	9.50 to 10.00
Sheet bar crop ends.....	14.50 to 15.00
Heavy steel axle turnings.....	11.50 to 12.00
Short shoveling turnings.....	10.75 to 11.00
Heavy breakable cast.....	14.00 to 14.50
Stove plate.....	13.00 to 13.50
Cast iron borings.....	10.75 to 11.00
No. 1 railroad wrought.....	11.50 to 12.00

Chicago

CHICAGO, Jan. 9.

The placing of large orders for railroad cars and the probability of further important purchases within the next week or two have given the iron and steel market an undertone of confidence. Although actual bookings by mills and furnaces during the first week of the new year are not appreciably larger than those of the closing week of 1921, the car buying now under way is bound to put considerable tonnage on the books of producers. Another source of encouragement is the failure of the general strike of the local building trades unions to materialize. Scheduled for to-day, the walkout was prevented by a last-minute refusal of three crafts to follow the dictates of the Building Trades Council.

One discouraging recent development is the rumored discovery of salt water in the new Mexia, Tex., oil fields which has had the effect of halting negotiations on storage tanks now on inquiry. The report has not been verified, however, and it is hoped that it will prove to be merely a bear story. Demand for iron and steel from miscellaneous sources is still very light. The expectation that jobbers would replenish their stocks after the first of the year has not yet been fulfilled.

Mill operations in this district have declined. The Illinois Steel Co. has 10 active blast furnaces, or one less than a week ago, and is producing steel at the rate of 28½ per cent of ingot capacity. The Inland Steel Co. continues to operate two blast furnaces, but has reduced its steel output to a 35 to 40 per cent basis. It has eight open-hearth furnaces running and all of its sheet mills; its continuous merchant and 24-inch structural mills are active.

Pig Iron.—Buying is light and new inquiries are few. With few orders of size being placed, the price situation remains largely untested. That the market is none too steady, however, is evidenced by the fact that concessions have been made in competitive territory. For Indianapolis delivery, 350 tons of malleable was bought at a price which figures back to less than \$18.75, base Chicago furnace. In the Chicago district proper, \$19, base local furnace, appears to be the minimum. A number of carload sales of Southern foundry have been made at \$16.50 base, Birmingham, and it is said that \$16 could be done on tonnage. Little activity is reported in charcoal, low phosphorous or silvery. While Jackson County producers continue to adhere to \$29.50, furnace, for 8 per cent silvery, resale and electrolytic material is being offered for less.

Quotations on Northern foundry, high phosphorus malleable and basic irons are f.o.b. local furnace and do not include a switching charge averaging 70c. per ton. Other prices are for iron delivered at consumers' yards, or when so indicated, f.o.b. furnace other than local.

Lake Superior charcoal, averaging sil. 1.50, delivered at Chicago....	\$31.50
Northern coke, No. 1, sil. 2.25 to 2.75.	\$19.50 to 20.00
Northern coke, foundry, No. 2, sil. 1.75 to 2.25.....	19.00 to 19.50
Northern high phos.....	19.00 to 19.50
Southern foundry, sil. 1.75 to 2.25..	23.17
Malleable, not over 2.25 sil.....	19.00 to 19.50
Basic.....	19.00 to 19.50
Low phos., Valley furnace, sil. 1. to 2 per cent copper free.....	33.00
Silvery, sil. 8 per cent.....	32.82 to 34.82

Ferroalloys.—A local melter has closed for 100 tons of 15 per cent ferrosilicon at slightly under \$38 delivered and for a carload of spiegeleisen at \$31.50 delivered. The spiegeleisen was brought from a furnace with a freight of \$6.50 and it is understood that this producer has now exhausted its stocks of that material.

We quote 78 to 82 per cent ferromanganese, \$66.75, delivered; 50 per cent ferrosilicon, \$60, delivered; spiegeleisen, 18 to 22 per cent, \$36 to \$37, delivered.

Railroad Equipment.—The Union Pacific has placed orders for 4500 cars as following: One thousand automobile cars to General American Car Co., 500 automobile cars to Standard Steel Car Co., 1000 box cars each to Mount Vernon Car Mfg. Co. and the American Car & Foundry Co.; and 1000 all-steel automobile cars to the Pullman Co. The same road is expected to

place orders for 2000 additional cars. The Illinois Central to-day placed orders for 2000 gondola cars distributed as follows: Five hundred 46-ft. cars to the American Car & Foundry Co., 700 41-ft. cars to Haskell & Barker Car Co., 400 41-ft. cars each to Western Steel Car & Foundry Co. and Standard Steel Car Co. The board of directors of the Burlington has authorized the purchase of 7300 freight cars and orders are expected to be placed in the near future. The Great Northern will probably take action on its car inquiry next week.

Rails and Track Supplies.—No new rail orders are reported in this territory and the Gary mill is temporarily idle. While this is not the season for purchases of track supplies by roads of this locality, some attractive orders are being closed by lines passing through the South. The Illinois Central has bought 500,000 iron tie plates and the Louisville & Nashville, which recently ordered 50,000 tons of rails, is now in the market for necessary angle bars, bolts and spikes.

Standard Bessemer and open-hearth rails, \$40; light rails rolled from new steel, 1.60c. to 1.65c. f.o.b. makers' mills. Standard railroad spikes, 2.15c. to 2.25c., Pittsburgh; track bolts with square nuts, 3.20c. to 3.25c., Pittsburgh; tie plates, steel and iron, 1.875c. to 2c., f.o.b. mill; angle bars, 2.40c., f.o.b. mill.

Bars.—Jobbers have bought in a moderate way during the past week and some reinforcing tonnage has been placed, but on the whole, demand for mild steel bars in unsatisfactory. Considerable reinforcing steel for road work in Iowa and Illinois has been placed for March delivery and more of this business is pending. Numerous building projects requiring reinforcing are being figured on, one of the largest being a structure in this city for the Continental Insurance Co. This calls for 1200 tons and the Leonard Construction Co., Chicago, prepared the plans and has the contract for the excavation work. Bids on the 5000 tons of reinforcing for the sedimentation and aeration tanks at the Jones Island Sewage Disposal plant, Milwaukee, will be taken on Feb. 3. Bids on the warehouse for the Belknap Hardware & Mfg. Co., Louisville, Ky., will be taken Jan. 30. Other pending business includes 800 tons for Minnesota road work, on which bids will be taken at St. Paul, and 350 tons for a grain elevator at Galveston, Tex. The Kansas City Bolt & Nut Co. has the contract for 1000 tons for a dam at Wichita Falls, Tex. The Jones & Laughlin Steel Co. has been awarded 250 tons for a Scottish Rite Cathedral at St. Louis. The Truscon Steel Co. has received an order for 100 tons for road work near Blue Island, Ill. Bar iron mills report bookings somewhat improved, although still far from satisfactory. Bar iron is generally quoted at a flat price of 1.60c., Chicago.

Mill prices are: Mild steel bars, 1.60c. to 1.70c., Chicago; common bar iron, 1.60c., Chicago; rail carbon, 1.65c., mill or Chicago.

Jobbers quote 2.53c. for steel bars out of warehouse. The warehouse quotation on cold-rolled steel bars and shafting is 3.40c. for rounds and 3.90c. for flats, squares and hexagons. Jobbers quote hard and medium deformed steel bars at 2.38c. base. Hoops and bands, 3.18c.

Wire Products.—Jobbers are buying somewhat more freely, but demand is still light. The new prices are holding so far as finished products are concerned, but weakness has appeared in wire rods, \$37 a ton being a fairly common quotation while as low as \$35 a ton is said to have been named. For mill prices see finished iron and steel, f.o.b. Pittsburgh, page 183.

We quote warehouse prices f.o.b. Chicago: No. 9 and heavier black annealed wire, \$3.13 per 100 lb.; No. 9 and heavier bright basic wire, \$3.28 per 100 lb.; common wire nails, \$3.25 per 100 lb.; cement coated nails, \$2.65 per keg. The mill quotation on plain material ranges from 1.60c. to 1.75c., Chicago. Jobbers quote 2.78c. for materials out of warehouse.

Sheets.—Demand from domestic sources remains light, but considerable export business has been taken. One local mill has booked 4600 tons for Japan within the past week. Prices are firm.

Mill quotations are 2c. for No. 28 black, 2.35c. for No. 19 blue annealed and 4c. for No. 18 galvanized, all being Pittsburgh prices, subject to a freight rate to Chicago of 39c. per 100 lb.

Jobbers quote: Chicago delivery out of stocks, No. 18 blue annealed, 2.35c.; No. 18 black, 2.15c.; No. 18 galvanized, 5.15c.

Plates.—While new bookings during the first week of the new year were disappointing, mills are encouraged because of the prospects of heavy car buying by the railroads. The Union Pacific has placed orders for 4500 freight cars and large purchases by the Burlington and Illinois Central will be made shortly. The reported appearance of salt water in the new Mexia, Tex., oil fields has had the effect of halting negotiations on storage tanks on inquiry. The price situation is substantially unchanged. It is probable that car builders participating in the Union Pacific order will be able to place their steel requirements at 1.50c., Chicago, or \$2 under the general market.

The ruling mill quotations range from 1.60c. to 1.70c., Chicago. Jobbers quote 2.63c. for plates out of stock.

Bolts and Nuts.—Buying is at a minimum and discounts are weak. For nominal mill prices, see finished iron and steel, f.o.b. Pittsburgh, page 183.

Jobbers quote structural rivets, 3.43c.; boiler rivets, 3.53c.; machine bolts up to $\frac{3}{4}$ x 4 in., 60, 10 and 10 per cent off; larger sizes, 60 and 10 off; carriage bolts up to $\frac{3}{4}$ x 6 in., 60 and 10 off; larger sizes, 55 and 5 off; hot pressed nuts square and hexagon tapped, \$3.75 off; blank nuts, \$4 off; coach or lag screws, gimlet points, square heads, 65 and 5 per cent off. Quantity extras are unchanged.

Cast Iron Pipe.—The United States Cast Iron Pipe & Foundry Co. is low bidder on 900 tons for Akron, Ohio, and the National Cast Iron Pipe Co. submitted the low figure on 80 tons for Woodward, Okla. Ellis, Kan., let 269 tons to a contractor, who will sublet. Chicago takes bids Jan. 17 on 1353 tons and Milwaukee is expected to issue an inquiry soon for a round tonnage of 54-in. pipe. The price situation is unchanged except that occasional shading is reported.

We quote per net ton, f.o.b. Chicago, as follows: Water pipe, 4-in., \$47.10 to \$48.10; 6-in. and above, \$43.10 to \$44.10, class A and gas pipe, \$4 extra.

Old Material.—Except for moderate purchases of wrought by two local iron mills and a few orders for cast and malleable from foundries, there was no consumptive buying to speak of during the first week of 1922. Speculative buying by dealers has also dropped off. Prices remain practically stationary. Re-rolling rails have declined 50c., while No. 1 cast has advanced a similar amount, but otherwise no changes have been made. Railroad offerings include the Union Pacific, 3000 tons; the Wabash, 1000 tons; the Northern Pacific, 750 tons; and the Southern, 10,000 tons.

We quote delivery in consumers' yards Chicago and vicinity, all freight and transfer charges paid, as follows:

Per Gross Ton	
Iron rails	\$16.00 to \$16.50
Relaying rails	23.00 to 27.50
Cast iron car wheels	13.00 to 13.50
Rolled or forged steel car wheels	13.00 to 13.50
Steel rails, re-rolling	12.00 to 12.50
Steel rails, less than 3 ft.	12.50 to 13.00
Heavy melting steel	11.50 to 12.00
Frogs, switches and guards cut apart	11.50 to 12.00
Shoveling steel	11.00 to 11.50
Low phos. heavy melting steel	13.50 to 14.00
Drop forge flashings	7.50 to 8.00
Hydraulic compressed sheet	7.50 to 8.00
Axle turnings	8.50 to 9.00

Per Net Ton	
Iron angles and splice bars	14.00 to 14.50
Steel angle bars	10.50 to 11.00
Iron arch bars and transoms	15.00 to 15.50
Iron car axles	19.00 to 19.50
Steel car axles	12.50 to 13.00
No. 1 busheling	8.25 to 8.75
No. 2 busheling	6.00 to 6.50
Cut forge	10.25 to 10.75
Pipes and flues	7.00 to 7.50
No. 1 railroad wrought	10.50 to 11.00
No. 2 railroad wrought	10.00 to 10.50
Steel knuckles and couplers	11.50 to 12.00
Coil springs	12.50 to 13.00
No. 1 machinery cast	13.00 to 13.50
No. 1 railroad cast	12.50 to 13.00
Low phos. punchings	11.00 to 11.50
Locomotive tires, smooth	10.00 to 10.50
Machine shop turnings	3.50 to 4.00
Cast borings	5.50 to 6.00
Stove plate	12.00 to 12.50
Grate bars	10.50 to 11.00
Brake shoes	10.50 to 11.00
Railroad malleable	11.50 to 12.00
Agricultural malleable	11.50 to 12.00

Structural Material.—With strikes breaking out again in the local building trades, the construction outlook in Chicago is none too bright. A strike called to-day by local craftsmen constitutes a repudiation of their agreement to abide by the Landis award of last September and gives the contractors an opportunity to introduce the open shop, which is regarded in many quarters as the only solution of an exceedingly unsatisfactory situation. Mill prices remain unchanged. Few

fabricating awards were made during the first week of the new year. Recent lettings include:

Cadillac Foundry Co., annealing foundry and service buildings, Cadillac, Mich., 301 tons, to Indiana Bridge Co.
Melrose, Wis., bridge, 276 tons, to Worden-Allen Co.
Chicago, Wilmington & Franklin Coal Co., coal tipples, West Frankfort, Ill., 166 tons, to unnamed fabricator.

Pending business includes:

Municipal auditorium and market house, Memphis, Tenn., 2169 tons of structural steel and 300 tons of reinforcing, James Alexander Construction Co., Memphis, low bidder on general contract.

The mill quotation on plain material ranges from 1.60c. to 1.70c., Chicago. Jobbers quote 2.63c. for plain material out of warehouse.

Warehouse Prices.—Local jobbers have made reductions of \$3 a ton on plates, shapes, bars, shafting and hoops and bands. The new prices are shown under the paragraphs covering plates, structural material and bars.

St. Louis

ST. LOUIS, Jan. 10.

Pig Iron.—The first week of the new year brought forth an improvement in the pig iron market in inquiries and sales. Stocks in hands of melters are said to be down to the point where they can do no more business unless they buy something, and when purchases are made these days there is keen interest on the part of melters to have shipment and delivery expedited. The biggest sale of the week was 500 tons of foundry to a radiator company; a Quincy, Ill., implement manufacturer bought 200 tons of foundry iron; a local melter bought 100 tons of 3.25 to 3.75 silicon, with small lots to local melters. A few scattering sales were made of charcoal iron. Inquiries are from a carload to 150 tons. One inquiry is reported for 50 tons of 50 per cent Bessemer ferrosilicon. The market on Northern iron is \$19, Chicago, although offers of considerable tonnage would bring forth a lower quotation, while Southern iron is at \$16.50, Birmingham.

We quote delivered consumers' yards, St. Louis, as follows having added to furnace prices \$2.88 freight and war tax from Chicago and \$5.91 from Birmingham.

Northern foundry, sil. 1.75 to 2.35	\$21.88
Northern malleable, sil. 1.75 to 2.25	21.88
Basic	21.88
Southern foundry, sil. 1.75 to 2.25	22.41

Finished Iron and Steel.—The only business of consequence for structural material placed for some time for use in St. Louis was 240 tons of reinforcing bars, which went to the Jones & Laughlin Steel Co., Pittsburgh, at a delivered price. The structural steel, 3000 tons, went to the American Bridge Co. last October. Word has been received here that the awarding of the contract for the Belknap Warehouse, a 14-story building at Louisville, Ky., has been postponed until the last of the month. The job involves about 800 tons of bars and 800 tons of structural steel. Graham, Anderson, Probst & White, Chicago, are the architects. Barnett, Haynes & Barnett, St. Louis, are architects for a hotel in Memphis, plans for which are completed, but work has been delayed because of business conditions. The tonnage is approximately 850. Nearly all structural work here is being held up until the wage scale is adjusted. Nothing of consequence has come from the railroads thus far in 1922. It is understood by steel men here that the Prairie Oil & Gas Co. is in the market for 18 55,000-bbl. steel storage tanks, involving about 2500 tons of plates. Warehouse prices on bars, plates, structural shapes, bands and hoops are off 0.15c. per lb.

For stock out of warehouse we quote: Soft steel bars, 2.62 $\frac{1}{2}$ c. per lb.; iron bars, 2.62 $\frac{1}{2}$ c.; structural shapes, 2.72 $\frac{1}{2}$ c.; tank plates, 2.72 $\frac{1}{2}$ c.; No. 10 blue annealed sheets, 3.47 $\frac{1}{2}$ c.; No. 28 black sheets, cold rolled, one pass, 4.16c.; cold drawn rounds, shafting and screw stock, 3.65c.; structural rivets, \$3.62 $\frac{1}{2}$ per 100 lb.; boiler rivets, \$3.62 $\frac{1}{2}$; tank rivets, 7/16 in. and smaller, 65 and 5 per cent off list; machine bolts, large, 60-10 per cent; small, 60, 10 and 10 per cent; carriage bolts, large, 65-5 per cent; small, 60 and 10 per cent; lag screws, 65-5 per cent; hot pressed nuts, square or hexagon blank, \$4; and tapped, \$3.75 off list.

Coke.—The biggest prospect in coke is an inquiry for 600 tons for January and February shipment to California. A few orders were received for carloads and up to 100 tons. The coke market began the year with

a little better tendency in the right direction; buyers seemed to think that the market has about reached the bottom. There has been a better movement of domestic coke as the result of colder weather. The market is at \$3.75 to \$4.50 for Connellsville coke, which price is being met by local by-product producers.

Old Material.—The market for old material is inactive as far as purchases by steel mills and rolling mills is concerned, but maintains a fairly firm tone because of the expectation of dealers that the steel mills shortly will increase operations and consequently consumption. Most of the yard dealers have laid down large tonnages of old material in anticipation of better business early this year, although consumers contend that the expected turn for the better has not yet arrived. Railroad offerings are light for a change, the only lists out being the Mobile & Ohio, 850 tons, and the Kansas City Southern, 100 tons.

We quote dealers' prices f.o.b. consumers' works, St. Louis industrial district and dealers' yards, as follows:

Per Gross Ton

Old iron rails.....	\$15.00 to \$15.50
Steel rails, rerolling.....	11.50 to 12.00
Steel rails, less than 3 ft.....	11.50 to 12.00
Relaying rails, standard section.....	23.00 to 28.00
Cast iron car wheels.....	14.00 to 14.50
No. 1 heavy railroad melting steel.....	10.50 to 11.00
No. 1 heavy shoveling steel.....	10.00 to 10.50
Ordinary shoveling steel.....	9.00 to 9.50
Frogs, switches and guards cut apart.....	10.50 to 11.00
Ordinary bundle sheet.....	4.50 to 5.00

Per Net Ton

Heavy axles and tire turnings.....	5.00 to 5.50
Iron angle bars.....	13.50 to 14.00
Steel angle bars.....	9.00 to 9.50
Iron car axles.....	18.00 to 18.50
Steel car axles.....	13.50 to 14.00
Wrought iron arch bars and transoms.....	13.00 to 13.50
No. 1 railroad wrought.....	9.50 to 10.00
No. 2 railroad wrought.....	8.50 to 9.00
Railroad springs.....	11.25 to 11.75
Steel couplers and knuckles.....	11.25 to 11.75
Locomotive tires, 42 in. and over, smooth inside.....	8.00 to 8.50
No. 1 dealers' forge.....	7.00 to 7.50
Cast iron borings.....	5.50 to 6.00
No. 1 bushelings.....	8.50 to 9.00
No. 1 boilers cut in sheets and rings.....	7.00 to 7.50
No. 1 railroad cast.....	13.00 to 13.50
Stove plate and light cast.....	11.50 to 12.00
Railroad malleable.....	9.50 to 10.00
Agricultural malleable.....	9.00 to 9.50
Pipes and flues.....	7.50 to 8.00
Heavy railroad sheet and tank.....	6.00 to 6.50
Light railroad sheet.....	4.50 to 5.00
Railroad grate bars.....	9.50 to 10.00
Machine shop turnings.....	4.50 to 5.00
Country mixed iron.....	6.50 to 7.00
Uncut railroad mixed.....	7.00 to 7.50
Horseshoes.....	9.50 to 10.00
Railroad brake shoes.....	9.00 to 9.50

Buffalo

BUFFALO, Jan. 9.

Pig Iron.—Exclusive of purchases by radiator interests, sales for the week were about 12,000 tons; the radiator purchases being part of current requirements of 7000 tons. One furnace has filled a portion of this order and the price was lower than \$20, the ruling quotation. Some encouragement is developing out of increased inquiry and while foundries generally are asking for small tonnages in each instance, the outlook is promising. On an Eastern inquiry for 2.75 to 3.25 silicon, a furnace quoted \$21, but was unsuccessful. The New York vehicular tunnel project is more actively interesting Buffalo furnaces and while the actual inquiry has not been issued, it is expected about the middle of February. No contracts have been made for delivery beyond first quarter. Furnace operation is virtually the same; the Donner Steel Co. has one furnace temporarily out of blast.

We quote f.o.b. per gross ton Buffalo as follows:

No. 1 foundry, 2.75 to 3.25 sil.....	\$20.00 to \$21.00
No. 2X foundry, 2.25 to 2.75 sil.....	19.50 to 20.50
No. 2 plain, 1.75 to 2.25 sil.....	19.00 to 20.00
Basic.....	20.00 to 21.00
Malleable.....	20.00 to 21.00
Lake Superior charcoal.....	21.75

Finished Iron and Steel.—While improvement in inquiry is felt by most of the selling agencies, it is not regarded in all instances as indicative of a more active demand; rather, it is reflective of a desire to get prices for purposes of computing inventories for tax statements. The leading rail interest has increased operation due to receipt of several orders in addition to the one large order entered several weeks ago. The Buffalo Steel Car Co. has started work on 1000 steel hopper

cars for the Buffalo, Rochester & Pittsburgh Railway. No large structural awards have developed, but a number of small tonnages are engaging the two largest fabricators; one has sufficient tonnage booked to warrant its present basis of operation to continue three months.

Warehouse Business.—Effective Jan. 6, prices on heavy lines were reduced to conform to present mill schedules. Some betterment in the volume of inquiry has appeared since the first of the new year, but it can hardly be said to be a material improvement as yet.

We quote warehouse prices f.o.b. Buffalo as follows: Structural shapes, 2.65c.; plates, 2.65c.; plates, No. 8 gage, 3.50c.; soft steel bars and shapes, 2.55c.; hoops and bands, 3.15c.; blue annealed sheets, No. 10, 3.65c.; galvanized steel sheets, No. 28, 5.25c.; black sheets, No. 28, 4.25c.; cold-rolled strip steel, 5.90c.; cold-rolled round shafting, 3.55c.

Coke.—The market has weakened to the point that best grades are obtainable at \$4.25 f.o.b. ovens. Heating coke is quoted at \$2.75 to \$3.00.

Old Material.—Youngstown and Eastern Pennsylvania buyers have asked for prices on turnings and borings but production is too light to bring forth any great response. Heavy melting steel production is light and with the exception of a few purchases of less than 500 tons by the two mills which have consistently bought, little has developed. The slightest interest in any old material would be quickly followed by a price advance.

We quote dealers' asking prices per gross ton f.o.b. Buffalo as follows:

Heavy melting steel.....	\$13.00 to \$14.00
Low phos., 0.04 and under.....	17.00 to 18.00
No. 1 railroad wrought.....	15.00 to 16.00
Car wheels.....	16.50 to 17.50
Machine shop turnings.....	7.50 to 8.00
Cast iron borings.....	7.00 to 8.00
Heavy axle turnings.....	10.50 to 11.50
Grate bars.....	12.00 to 13.00
No. 1 busheling.....	10.00 to 11.00
Stove plate.....	15.00 to 16.00
Bundled sheet stampings.....	8.00 to 9.00
No. 1 machinery cast.....	17.00 to 18.00
Hydraulic compressed.....	10.50 to 11.50
Railroad malleable.....	13.00 to 14.00

Boston

BOSTON, Jan. 10.

Pig Iron.—Practically all makers of stove parts in this section of the country, as well as some of the heater and a large number of jobbing foundries, up to yesterday, have been closed for cleaning up stock and inventory purposes. Melters naturally have shown little disposition to purchase pig iron until their requirements are more clearly defined. Sales reported this week involve approximately 2000 tons, of which 1400 tons No. 2 plain eastern Pennsylvania, first quarter, was taken by a Bridgeport, Conn., maker of valves at private terms, delivery to be made by barge. Other transactions mostly were car lots, although a Massachusetts foundry took 100 tons Buffalo No. 2X at \$19.50 furnace and a Vermont melter 150 tons No. 2X eastern Pennsylvania at \$21.50 furnace. The last sale was fully 50c. above the lowest price quoted by any other furnace, the market for eastern Pennsylvania iron being \$20 to \$20.50 base in all but this one instance. Buffalo No. 2 plain and No. 2X continue available at \$19. There is not enough being done in Virginia and Alabama irons to establish a market. Most of the large users have covered their first quarter pig iron requirements, consequently furnaces will have to accept more extended datings to secure desirable tonnages. Local brokers report collections as slow.

We quote delivered at common New England points as follows, having added to furnace prices \$1.08 freight from eastern Pennsylvania, \$5.46 from Buffalo, \$6.54 from Virginia and \$10.66 from Alabama:

East. Penn., silicon 2.25 to 2.75.....	\$24.96 to \$25.96
East. Penn., silicon 1.75 to 2.25.....	23.88 to 24.88
Buffalo, silicon 2.25 to 2.75.....	24.44 to 25.44
Buffalo, silicon 1.75 to 2.25.....	24.44 to 25.44
Virginia, silicon 2.25 to 2.75.....	25.91 to 26.91
Virginia, silicon 1.75 to 2.25.....	25.91 to 26.91
Alabama, silicon 2.25 to 2.75.....	25.91 to 26.91
Alabama, silicon 1.75 to 2.25.....	25.91 to 26.91

Finished Material.—Structural steel is the only finished material showing any degree of activity in this market. Since Jan. 1 a considerable aggregate tonnage of possibilities has developed, including 2000 tons for a new Boston hotel, 2400 to 2500 tons for the Chamber of Commerce, and numerous smaller amounts.

New England Structural Co. is awarded 1200 tons for a local bank addition, while a Providence, R. I., fabricator is awarded 350 tons for a textile mill and 800 tons for a dry goods store. Plain material is firm at 1.50c. or \$30 per net ton f.o.b. Pittsburgh. Buying of plates continues in small tonnages at 1.50c. and occasionally 1.55c. and 1.60c. The demand for bars is limited. The New York, Ontario & Western Railroad, a subsidiary of the New York, New Haven & Hartford Railroad Co., has placed an order for 30 all-steel cars with the Osgood-Bradley Car Co., Worcester, Mass., involving \$600,000. Local warehouses report some improvement in business since Jan. 1, but say consumption is far from active.

Jobbers now quote: Soft steel bars, \$2.71½, per 100 lb. base; flats, \$3.31½; concrete bars, \$2.20 to \$2.71½; tire steel, \$4 to \$4.40; spring steel, open hearth, \$4.50; crucible, \$11.50; steel bands, \$3.31½ to \$3.78; steel hoops, \$3.81½; toe calk steel, \$5; cold rolled steel, \$3.55 to \$4.05; structural steel, \$2.71½; plates, \$2.81½ to \$2.99; No. 10 blue annealed sheets, \$3.78; No. 28 black sheets, \$4.50; No. 28 galvanized sheets, \$5.50; refined iron, \$2.71½; best refined, \$4.35; Wayne iron, \$5.50; Norway iron, \$5.50 base.

Coke.—Little of interest has developed in the local by-product foundry coke market since a week ago, when both the New England Coal & Coke Co. and the Providence Gas Co. reduced their price from \$10.66 to \$10.40 delivered where the local freight does not exceed \$3.40. This reduction was based on values here being somewhat out of line with those quoted for Connellsville foundry cokes. Most of the large New England consumers of foundry coke have covered their first half requirements at price ruling date of shipment, consequently new bookings in each individual case involve small tonnages. The Providence Gas Co. is delivering foundry coke as fast as it is made, but the New England Coal & Coke Co. reports limited shipping instructions, with indications of a betterment by Jan. 15.

Old Material.—The strength of cast iron borings is the outstanding feature. Prices for same are easily \$1 higher, due to a scarcity of material and efforts by dealers to cover on old contracts. Otherwise little has developed since Jan. 1, except, perhaps, some shading of quotations on railroad and yard wrought, street car axles, shafting and car wheels, due to the lack of business rather than any pressure to sell. A Massachusetts manufacturer is offering a fair tonnage of shafting at 2¼c. Heavy melting steel, if anything, is firmer, in anticipation of better business before the close of the month by dealers. Two cars of special steel, grading better than ordinary lots of heavy melting, sold this week to a Massachusetts foundry at \$12 delivered. Some brokers are still endeavoring to secure \$19 delivered for No. 1 machinery cast, but New England foundries display little interest at that price inasmuch as they can secure all material necessary on a basis of \$17.50 to \$18.50 delivered, either in large or small tonnages.

The following prices are for gross ton lots delivered consuming points:

No. 1 machinery cast.....	\$17.50 to \$18.50
No. 2 machinery cast.....	15.50 to 16.50
Stove plate	15.00
Railroad malleable	13.00 to 13.50

The following prices are offered per gross ton lots f.o.b. Boston rate shipping points:

No. 1 heavy melting steel.....	\$8.00 to \$8.25
No. 1 railroad wrought.....	10.50 to 11.00
No. 1 yard wrought.....	9.50 to 10.00
Wrought pipe (1-in. in diam. over 2 ft. long).....	7.00 to 7.25
Machine shop turnings.....	3.50 to 4.00
Cast iron borings, rolling mill.....	7.00 to 7.50
Cast iron borings, chemical.....	7.50 to 8.00
Blast furnace borings and turnings.....	3.50 to 3.75
Forged scrap and bundled skeleton.....	4.50 to 5.00
Street car axles and shafting.....	10.50 to 11.00
Car wheels	11.50 to 12.00
Re-rolling rails	10.00 to 10.50

A technical session covering the subject of stokers, will be held Saturday evening, Feb. 4, at the Hotel Chatham, Pittsburgh, under the auspices of the Combustion Engineering Section of the Association of Iron and Steel Electrical Engineers. The following manufacturers have signified their intentions of participating in this discussion: American Engineering Co., Green Engineering Co., Combustion Engineering Co., James A. Brady Foundry Co., Underfeed Stoker Co. of America, Westinghouse Electric & Mfg. Co. and Sanford & Stoker Co.

New York

New York, Jan. 10.

Pig Iron.—Most of the purchasing done by the American Radiator Co. at Buffalo was for plants in that vicinity. It is understood that about 6000 tons was bought from one company. The purchases included 1000 tons of No. 2 plain and 500 tons of No. 3 for its Bayonne plant. The price is not announced, but it seems probable that it was under \$20, eastern Pennsylvania. Buffalo is reported selling at \$19 furnace for No. 2X. Some melters who did not buy at all last year are now buying moderate quantities. There is no disposition, however, to cover for requirements far into the future. Much interest is felt in the bidding on the segments for the vehicular tunnel between New York and New Jersey. As the delivery of the segments will cover about two years, it will be necessary to do some careful figuring and furnaces are cautious about committing themselves so far in advance.

We quote delivered in the New York district as follows, having added to furnace prices \$2.52 freight from eastern Pennsylvania, \$5.46 from Buffalo and \$6.16 from Virginia:

East. Pa. No. 1 fdy., sil. 2.75 to 3.25.....	\$22.52 to \$23.02
East. Pa. No. 2X fdy., sil. 2.25 to 2.75.....	23.02 to 23.52
East. Pa. No. 2 fdy., sil. 1.75 to 2.25.....	22.52 to 23.02
Buffalo, sil. 1.75 to 2.25.....	24.46 to 24.96
No. 2 Virginia, sil. 1.75 to 2.25.....	27.16 to 28.16

Ferroalloys.—Buying of ferromanganese is limited to carload and small lots for immediate needs of consumers and several sales of both British and American alloy are reported as made by the leading steel maker on a basis of \$60, Pittsburgh, and by British representatives at \$58.35, seaboard. While some consumers have been inquiring for 100 to 200 tons in several cases, these have not resulted in purchases of anything more than small lots. The spiegeleisen market is more active and sales are reported of at least 250 tons with the 20 per cent alloy going at \$26, furnace, and the lower grades at proportionately lower prices or around \$25, furnace. There is no demand for manganese ore and quotations continue nominal. The same conditions rule in the 50 per cent ferrosilicon market as in the ferromanganese market. Consumers buying only to fill their immediate needs. There have been sales of several carload and small lots on a basis of \$55 to \$57 per ton, delivered. Imports of ferromanganese in November were only 270 tons as contrasted with 7091 tons in November, 1920. The total to Dec. 1, 1921, was 8818 tons as contrasted with 53,830 tons to Dec. 1, 1920. Imports of manganese ore in November were 8620 tons as against 74,477 tons in November, 1920. The total for the 11 months of last year was 386,454 tons as against 542,189 tons to Dec. 1, 1920. Of the imports last November 8600 tons came from Brazil.

Quotations are as follows:

Ferroalloys

Ferromanganese, domestic, delivered, per ton,	\$60.00 to \$63.00
Ferromanganese, British, seaboard, per ton	\$58.35
Spiegeleisen, 20 per cent, furnace, per ton.....	\$26.00
Ferrosilicon, 50 per cent, delivered, per ton,	\$55.00 to \$57.00
Ferrotungsten, per lb. of contained metal.....	40c. to 50c.
Ferrochromium, 6 to 8 per cent carbon, 80 to 70 per cent Cr., per lb. Cr., delivered.....	11c. to 14c.
Ferrovanadium, per lb. of contained vanadium	\$4.50

Ores

Manganese ore, foreign, per unit, seaboard.....	20c.
Tungsten ore, per unit, lu 60 per cent concentrates	\$2.00 up
Chrome ore, 40 to 45 per cent Cr ₂ O ₃ , crude, per net ton, Atlantic seaboard.....	\$20.00 to \$25.00
Chrome ore, 45 to 50 per cent Cr ₂ O ₃ , crude, per net ton, Atlantic seaboard.....	\$30.00
Molybdenum ore, 85 per cent concentrates, per lb. of MoS ₂ , New York.....	50c. to 60c.

Finished Iron and Steel.—Expected improvement in the demand for steel products has not yet materialized so far as this market is concerned. Inquiries and orders are few and for small tonnages, being a reflection largely of the business that has been done in the past two months. In structural steel, in which there has been the most activity locally, there are many prospects, but comparatively little business is being placed. February is expected to produce more orders as work under contemplation for spring will probably come into the market at that time. Jobs which have been awarded during the week include the following: One thousand

tons for bridges for the Baltimore & Ohio Railroad, to American Bridge Co.; pier at Forty-fourth Street, New York, 250 tons, to Blaw-Knox Co.; 500 tons for viaduct at Trenton, N. J., to McClintic-Marshall Co.; 1000 tons for a hotel at Frederick, Md., and 800 tons for an apartment house at Park Avenue and Eighty-eighth Street, New York, to Bethlehem Fabricators, Inc.; 300 tons for Fifth Street bridge, Philadelphia, to a Philadelphia fabricator; 400 tons for a factory at Providence, R. I., to Berlin Construction Co.; 300 tons for an apartment house on Fifty-first Street, New York, to Paterson Bridge Co.; 500 tons for a clothing factory at Rochester, N. Y., to Genesee Bridge Co. New projects up for bids include the following: Two hundred and fifty tons for a highway bridge in Monmouth County, New Jersey; 1000 tons for an apartment house on Grand Concourse, New York; 2000 tons of shapes, bars and plates for the New York-New Jersey vehicular tunnel, bids closing Feb. 10. The placing of orders for 4500 freight cars by the Union Pacific system is expected to be the forerunner of others by Western roads which have been pending for some time. The Union Pacific awarded 1000 box cars to the American Car & Foundry Co., 1000 box cars to the Mount Vernon Car Mfg. Co., 1000 automobile cars to the General American Car Co., 500 automobile cars to the Standard Steel Car Co. and 1000 all-steel automobile cars to the Pullman Co. About 3000 refrigerator cars are still to be bought by the Union Pacific. The Philadelphia & Reading is inquiring for 50 all-steel passenger cars; 50 of the suburban type were recently purchased. The Pennsylvania Railroad has asked prices on 20 all-steel dining cars. An inquiry for 1000 narrow gage box cars from the National Railways of Mexico is not being figured on by some of the car builders because of the three-year credit feature involved. The New York, Ontario & Western Railroad has ordered 30 steel passenger cars from the Standard Steel Car Co. Prices of steel products are nominally unchanged, though some weakness appears. On plates, for example, mills have shown a willingness to take car plates as low as 1.40c., Pittsburgh, though protection is not given at this price. Small lots command 1.50c., Pittsburgh. Shapes and bars are quoted at 1.50c., but many structural jobs are being figured at less than this price.

We quote for mill shipments, New York, as follows: Soft steel bars, 1.88c.; plates, 1.88c. to 1.88c.; structural shapes, 1.88c.; bar iron, 1.88c. to 1.98c. On export shipments the freight rate is now 28.5c. per 100 lb., instead of 38c., the domestic rate.

Warehouse Business.—The week has been extremely dull, devoid of interest, except for a general change in prices. In accordance with the prevailing mill quotations on bars, warehouses in this district, including the leading interest and the leading independent, have revised quotations by a reduction of about 15c. per 100-lb. Mild steel bars are now quoted at 2.53c. per lb., base, and structural material 2.63c. per lb., base. Plates, ¼-in. and heavier are 2.63c. per lb. and hoops 3.38c. per lb. and bands 3.13c. per lb. Tire and toe calk steel have been dropped to 2.50c. per lb. for the former and 3.20c. per lb. for the latter. Shafting and screw stock were reduced Jan. 9, to 3.45c. per lb. for rounds and 3.95c. per lb. for flats, squares and hexagons. While the prevailing price on galvanized sheets is 4.85c. per lb., base, sales have been made as low as 4.50c. per lb. and small lots of a few sheets will bring up to 5c. per lb. The brass and copper market is fairly active and prices firm. We quote prices on page 200.

High Speed Steel.—The market shows no change. Producers continue to quote 18 per cent tungsten high speed steel at 85c. to 95c. per lb. with special brands of some companies quoted as high as \$1.05 per lb.

Cast Iron Pipe.—The first part of the year witnesses a pleasing contrast to conditions a year ago. Then no plant was operating at more than 25 per cent capacity and was then making for stock; to-day the busiest plant is operating at 80 per cent capacity on actual orders. One pipe foundry a year ago had 600 tons of orders on books, whereas to-day orders total 10,000 tons. At present there is considerable private buying. We quote per net ton, f. o. b. New York, car-load lots, as follows: 6-in. and larger, \$47.30; 4-in. and 5-in., \$52.30; 3-in., \$62.30, with \$4 additional for Class A and gas pipe.

Coke.—By-product coke has been reduced from \$8.97 to \$8.59 per ton, delivered to New Jersey points. Foundry coke remains from \$4 to \$4.50, Connellsville base.

Old Material.—The market tends toward strength rather than weakness, buying prices having been raised on clean cast borings, mixed borings and turnings and specification pipe. Borings are being shipped to Claymont, Del., and \$12, delivered Lebanon, has been paid for specification pipe. An eastern Pennsylvania mill is still very particular about the heavy melting steel being shipped to it and has been giving less than market price, claiming that the steel was below specifications. Some local dealers have received no more than \$6.50, New York, on some of this alleged inferior steel. A broker who has been warning his buyers that the "market shows further signs of weakness" and urging them to make contracts call for prompt shipment, has now omitted the "market weakness" warning and has extended orders for prompt shipment to "shipment in three weeks."

Buying prices per gross ton, New York, follow:

Heavy melting steel, yard.....	\$8.00 to \$8.50
Steel rails, short lengths, or equivalent.....	8.50 to 9.00
Rolling rails.....	9.50 to 10.00
Relaying rails, nominal.....	28.00 to 30.00
Steel car axles.....	10.00 to 10.50
Iron car axles.....	18.50 to 19.00
No. 1 railroad wrought.....	10.50 to 11.00
Wrought iron track.....	8.50 to 9.00
Forge fire.....	5.00 to 5.50
No. 1 yard wrought, long.....	9.00 to 9.50
Cast borings (clean).....	7.00 to 7.50
Machine-shop turnings.....	4.00 to 5.00
Mixed borings and turnings.....	4.50 to 5.00
Iron and steel pipe (1 in. diam. not under 2 ft. long).....	7.00 to 7.50
Stove plate.....	9.00 to 10.00
Locomotive grate bars.....	8.00 to 10.00
Malleable cast (railroad).....	8.00 to 8.50
Car wheels.....	10.50 to 11.50

Prices which dealers in New York and Brooklyn are quoting to local foundries, per gross ton, follow:

No. 1 machinery cast.....	\$16.50 to \$17.00
No. 1 heavy cast (columns, building materials, etc.), cupola size.....	15.50 to 16.00
No. 1 heavy cast, not cupola size.....	14.00 to 14.50
No. 2 cast (radiators, cast boilers, etc.).....	10.00 to 10.50

Birmingham

BIRMINGHAM, ALA., Jan. 10.

Pig Iron.—A report of large tonnage having been booked could not be verified. It was probably due to agreements reached between a maker and consumer to take higher-priced and overdue iron mixed with some new iron at current prices. Business coming to the surface consisted of small lots for prompt delivery and the prevailing base was \$16.50. It is reported that Southern Pacific got 350 tons for San Francisco delivery at \$16 following strictly competitive bids. The 1300-ton movement to the Pacific Coast mentioned in some news comments last week was to Los Angeles via Mobile. The Pacific Coast base on foreign iron is now \$30 delivered, which, coupled with \$16.50 Birmingham base and freight rate via Mobile of \$14.18, comes very near establishing a Southern iron parity in that quarter. Increase in stocks on Alabama furnace yards Jan. 1 of 25,000 tons was expected following hold-up orders during the holidays. Stocks Dec. 1 and Jan. 1 were: Foundry, 51,000 and 74,000 tons; machine cast, 27,000 and 35,000; warrants, 5900 and 4800; basic, 43,000 and 37,000; totals, 127,000 and 152,000.

We quote per gross ton f.o.b. Birmingham district furnaces as follows:

Foundry, silicon 1.75 to 2.25.....	\$16.50
Basic.....	15.50
Charcoal, warm blast.....	35.00

Finishing Mills.—The Tennessee company entered the second week of the year at 66 2/3 ingot capacity. The Ensley rail mill has 130,000 tons of rail orders, which stand for more than five months of steady operations at normal production capacity of 6000 tons a week. The Chickasaw Shipbuilding & Car Co. has booked the Seaboard Air Line order, which is 200 steel phosphate dump cars and 1000 ventilated box cars, besides repairs on 5000 road order cars. This order and orders on hand means six months steady operations at the car plant. Hoop and band mills are idle. The

Gulf States Steel Co. is at 50 per cent of ingot capacity.

Cast Iron Pipe.—The pipe market has not developed much new business either in high pressure or sanitary. High pressure base is nominally \$33. Atlanta's water pipe specifications, expected soon, will approximate 8000 to 9000 tons. Nashville, Chattanooga and other cities are expected in the high pressure market this spring. The Stockham Pipe & Fittings Co., maker of pipe fittings, is on 50 per cent base.

Coal and Coke.—Coke base remains at \$5.50. Steam coal is selling at \$2 and under per ton f.o.b. mines. All coal is weak and listless.

Old Material.—Scrap dealers do not report any improvement in an extremely dull season. Yards have complete line of stocks, but very little is moving out except a few cast grades.

We quote per gross ton f.o.b. Birmingham district yards as follows:

Steel rails	.....	\$11.00 to \$12.00
No. 1 steel	.....	10.00 to 11.00
No. 1 cast	.....	14.00 to 15.00
Car wheels	.....	13.00 to 14.00
Tramcar wheels	.....	12.00 to 13.00
No. 1 wrought	.....	12.00 to 13.00
Stove plate	.....	11.00 to 12.00
Cast iron borings	.....	6.00 to 7.00
Machine shop turnings	.....	6.00 to 7.00

Cincinnati

CINCINNATI, Jan. 10.

Pig Iron.—The iron market showed a little more activity during the week, and while it still can be termed dull, the prospects are more encouraging. Inquiries, while mostly confined to carload lots, are more numerous, indicating in a great many cases shortage of iron on foundry yards. A Southern melter is understood to have made a firm offer for 2000 tons of Southern iron of \$15.50, Birmingham, but so far the offer has not been accepted. The Southern market can still be quoted at \$16.50, but a round tonnage could probably be negotiated at \$16. In the North, \$19 to \$19.50 represents the market, although reports are current that \$19 is being shaded on round tonnages, there were a few sales of a hundred tons each reported. A southern Ohio stove maker took 200 tons of iron on a \$20 furnace basis, and a Springfield manufacturer 150 tons at \$19.50. Two sales of 100 tons each were made to Indiana melters on the basis of \$19, Chicago. Inquiries include 250 tons from the Louisville & Nashville Railroad, 300 tons for a central Ohio melter and 500 tons for a Southern melter. There are also several carload inquiries for ferroalloys before the trade.

Based on freight rates of \$4.50 from Birmingham and \$2.52 from Ironton, we quote f.o.b. Cincinnati:

Southern coke, sil. 1.75 to 2.25 (base)	.....	\$21.00
Southern coke, sil. 2.25 to 2.75 (No. 2 soft)	.....	21.50
Ohio silvery, 8 per cent sil.	.....	22.02
Southern Ohio coke, sil. 1.75 to 2.25 (No. 2)	.....	\$22.02 to 22.52
Basic, Northern	.....	22.02
Malleable	.....	22.52

Finished Material.—During the week the finished material market was rather dull, although a number of small orders for various products were placed. One of the largest orders for sheets placed for some time was booked by a southern Ohio mill, the tonnage involved being 300. This was taken at the base price of 4c. for galvanized. On bars, shapes and plates there was very little activity, orders being confined mostly to carload lots. The Big Four Railroad opened bids on its first quarter requirement for bars, shapes, plates, forging billets and tires. The low bid on the bars, shapes and plates was 1.50c. Pittsburgh, made by practically all companies. On forging billets, \$34 a ton was quoted by a Valley mill and on tires, 5.25c. for rough and 6c. for finished bored were the low bids. Some business developed in wire products, mostly for nails, at the \$2.50 base. In the structural field, a number of new projects came up. Included in these was the Wilde Bank Building, Indianapolis, 700 tons being involved. Bids are now being taken on this job. Plans will be sent out on Jan. 16 for the new building of the Indianapolis Athletic Club for which 800 tons of structural steel will be fabricated. Bids will close on Jan. 26 for the Jewish Hospital at Memphis, taking 300 tons of bars. There were few lettings of importance. The

general contract for the Capital Hotel at Frankfort, Ky., was let to Parks & Co. of Chattanooga. Bids were opened on Jan. 8 for an auditorium and market building at Memphis, Tenn., taking 3500 tons; all bids were rejected and new ones will be called for. Extension of time till Jan. 30 has been made for taking bids on the Belknap Warehouse at Louisville, Ky.; bids are being taken on both the concrete and steel structures. Pending projects include a \$3,000,000 hotel building planned for Columbus, Ohio. The hotel will be 16 stories and will contain 600 rooms. It will be operated by the Deshler Hotel interests. Frank L. Packard, Columbus, Ohio, has been retained as the architect. The Tri-State Hotel, Memphis, a 14-story building, will be up shortly, plans having been completed.

Warehouse Business.—Local jobbers report business as fair in wire products, but in steel conditions are about the same as last reported, there being little activity. Wire jobbers have reduced the price of nails to \$3 per keg, base, and No. 9 annealed wire to \$2.85 per 100 lb. Corresponding reductions were also made in other wire products following the reductions recently made by the mills. No price changes have been made on iron and steel products other than wire, but it is expected that reductions will be made within the next week or ten days.

Iron and steel bars, 2.90c. base; hoops and bands, 3.50c. base; shapes and plates, 3c. base; reinforcing bars, 2.97½c. base; cold rolled rounds, 1¼-in. and larger, 3.70c.; under 1¼-in. and flats, squares and hexagons, 4.20c.; No. 10 blue annealed sheets, 3.60c.; No. 28 black sheets, 4.25c.; No. 28 galvanized sheets, 5.25c.; wire nails, \$3 per keg base; No. 9 annealed wire, \$2.85 per 100 lb.

Coke.—There is only fair activity in the coke market, with orders confined mostly to single carloads. There is very little contract coke being sold, buyers apparently having decided to depend on the spot market for supplies. Prices are not quotably changed.

Old Material.—There is very little demand for scrap in the local market, although dealers report some activity from other districts. Carload orders predominate. Prices rule about the same as have been quoted for some weeks.

We quote dealers' buying prices, f.o.b. cars.

Per Gross Ton	
Bundled sheets	..... \$3.50 to \$4.00
Iron rails	..... 12.00 to 12.50
Relaying rails, 50 lb and up	..... 25.00 to 26.00
Rolling steel rails	..... 10.50 to 11.00
Heavy melting steel	..... 9.00 to 9.50
Steel rails for melting	..... 9.00 to 9.50
Car wheels	..... 12.00 to 13.00
Per Net Ton	
No. 1 railroad wrought	..... 8.50 to 9.50
Cast borings	..... 3.00 to 3.50
Steel turnings	..... 2.00 to 2.50
Railroad cast	..... 12.00 to 12.50
No. 1 machinery	..... 13.50 to 14.50
Burnt scrap	..... 7.50 to 8.00
Iron axes	..... 15.50 to 16.50
Locomotive tires (smooth inside)	..... 9.50 to 10.00
Pipes and flues	..... 4.00 to 4.50

Cleveland

CLEVELAND, Jan. 10.

Iron Ore.—Owing to the policy of many consumers to ship, before the restoration of the higher freight rates, all the ore on docks that they would need for some time, shipments from Lake Erie docks held up well during December, amounting to 597,398 gross tons. Dock shipments in December, 1920, were 1,251,315 tons. The dock balance on Jan. 1 was 8,434,324 tons as compared with 9,927,317 tons on the same date a year ago. Total shipments from Lake Erie docks for the season were 12,793,077 tons as compared with 33,267,969 tons during the previous year.

We quote delivered lower lake ports: Old range Bessemer, 55 per cent iron, \$6.45; Old range non-Bessemer, 51½ per cent iron, \$5.70; Mesabi Bessemer, 55 per cent iron, \$6.20; Mesabi non-Bessemer, 51½ per cent iron, \$5.55.

Pig Iron.—The demand for foundry iron has improved somewhat since the first of the year, but the buying is mostly in small lots. Some of the orders were for the first quarter or 60 days delivery, but in the majority of cases, for prompt shipment. The American Radiator Co. again came into the market, placing 2000 tons of iron for its Detroit plant, 1500 tons of which went to a Detroit furnace, and 5000 tons for Buffalo, the latter being placed at a reported price of

\$19.50. One lake furnace during the week sold 4000 tons, mostly in small lots of foundry iron and including 500 tons placed by a Michigan automobile foundry. Prices show no change, with lake furnace quotations ranging from \$19 to \$20 on No. 2 foundry iron. A sale of 250 tons was made by a western Pennsylvania furnace on a \$19.50 Valley basis and other sales are reported at \$20 Valley. For Cleveland delivery, local furnaces appear to be no longer trying to get over \$20 for foundry iron. A sale of 200 tons of No. 1 was made to a local consumer at \$21 furnace. The Trumbull Steel Co., Warren, Ohio, has definitely decided to blow in its new furnace Jan. 16.

Quotations below are f.o.b. local furnace for Northern foundry iron, not including a 56c. switching charge. Other quotations are delivered Cleveland, being based on a \$1.96 freight rate from Valley points, a \$3.36 rate from Jackson and a \$6.67 rate from Birmingham:

Basic	\$20.21 to \$20.71
Northern No. 2 fdy., sil. 1.75 to 2.25	19.00 to 20.00
Southern fdy., sil. 2.25 to 2.75	24.17
Ohio silvery, sil. 8 per cent.	32.86
Standard low phos., Valley furnace	33.00

Finished Iron and Steel.—The new year has not as yet brought out an increased demand for finished iron and steel. Orders placed during the week were in miscellaneous lots in about the same volume as during December, and there is nothing to indicate a material increase in business during the next few weeks, although a somewhat better volume of orders is expected with the completion of inventories. Consumers are buying only for their immediate requirements. The automobile industry generally has gotten under way with good production after the holiday shutdown. The Ford Motor Co., which resumed operations Monday, has a January production schedule of 50,000 cars, or about half its maximum for a full month. Some new inquiry has come from the railroads. The Ralston Steel Car Co. is inquiring for 4000 tons of steel for cars and for axles and wheels and the Louisville & Nashville Railroad has an inquiry out for 3500 tons of splice bars. The New York, Ontario & Western Railroad is inquiring for six mountain type locomotives. The dock cranes for New York taken by the Wellman-Seaver-Morgan Co. will require 900 tons of steel bars, plates and structural shapes. The price situation shows little change. On steel bars, 1.50c. is the generally recognized price even for a small lot. While large mills are quoting plates at 1.50c., small lot sales are being made at 1.60c. and 1.65c., which are the minimum prices quoted by local mills. Hard steel reinforcing bars are dull and weak, with one sale made at 1.45c. Quotations of 1.75c. are still reported on bands in strip mill sizes. With little working prospect, the outlook for an early resumption of demand for structural material in the building field is not bright. No lettings are reported and the only new inquiry is for 400 tons for a sewage disposal plant in Milwaukee.

Jobbers quote steel bars, 2.36c.; plates and structural shapes, 2.46c.; No. 9 galvanized wire, 3.25c.; No. 9 annealed wire, 2.75c.; No. 28 black sheets, 3.75c.; No. 28 galvanized sheets, 4.75c.; No. 10 blue annealed sheets, 3.10c.; hoops and bands, 2.96c.; cold-rolled rounds, 3.25c.; flats, squares and hexagons, 3.75c.

Sheets.—The demand for sheets has improved somewhat since the first of the year, but buying is almost wholly in small lots. The Ford Motor Co. has an inquiry out for an unspecified tonnage for frame stock. Regular mill prices are being maintained.

Warehouse Business.—Cleveland warehouses have reduced prices \$3.60 a ton on steel bars, plates, shapes and hoops and bands. The new prices recognize a reduction of \$3 a ton in mill prices, being based on 1.50c. for steel bars and 1.60c. for plates and structural material, and buyers are given the advantage of 60c. a ton because of the freight differential of 3c. per 100 lb. allowed in the short haul rates as compared with the through Pittsburgh Cleveland rate. Warehouse prices on cold-rolled steel have been reduced \$5 a ton. Warehouse business is light.

Bolts, Nuts and Rivets.—Bids will be taken Feb. 7 for 5000 to 10,000 tons of 1½-in., 8-in. long, alloy steel bolts for the vehicular tunnel, New York. Preliminary estimates were asked for these bolts several weeks ago, but the inquiry has just come out in definite form. There was little activity in the past week, but with the

inventories over, makers expect that the present week will indicate how much of a buying movement there will be. Consumers have been withholding purchases until the first of the year and stocks generally are low. The demand for rivets shows some improvement. A local maker has taken 350 tons from a Chicago car builder and two other orders aggregating 155 tons from boiler and bridge shops. These orders were placed at 2.25c. for structural rivets and 2.35c. for boiler rivets. A number of first quarter contracts have been taken at these prices.

Coke.—The demand for foundry coke became rather lively during the week, many foundries placing orders for from one to four carloads for prompt shipment. No contract business is being placed. Prices range from \$4 to \$4.25 for standard Connellsville makes.

Old Material.—The market has a better tone owing largely to the fact that Valley mills that had held up shipments before the holidays are again taking scrap and this has resulted in some activity between dealers. A local mill is in the market for heavy melting steel scrap at \$13 delivered and is reported to have purchased a small tonnage at that price. This local demand has resulted in an advance of about 50c. a ton on this grade. There is also some local demand for machine shop turnings for which \$8.75 delivered is being offered. Valley district mills have not come into the market for scrap since the first of the year, but one Youngstown consumer has advised the trade that it will buy scrap about Feb. 1. Mixed borings and turnings are rather weak owing to the absence at present of local demand. Sales of compressed steel scrap are reported at \$9 to \$9.50, Cleveland, for Youngstown delivery.

We quote per gross ton, f.o.b. Cleveland, as follows:

Heavy melting steel	\$12.00 to \$12.50
Steel rails, under 3 ft.	12.50 to 13.00
Steel rails, rerolling	14.00 to 14.50
Iron rails	12.00 to 12.50
Iron car axles	13.00 to 19.00
Low phosphorus melting	13.00 to 13.50
Cast borings	8.50 to 9.00
Machine shop turnings	8.00 to 8.25
Mixed borings and short turnings	8.50 to 9.00
Compressed steel	9.00 to 9.50
Railroad wrought	12.00 to 12.50
Railroad malleable	12.50 to 13.00
Light bundled sheet stampings	6.00 to 7.00
Steel axle turnings	9.00 to 10.00
No. 1 cast	15.00 to 16.00
No. 1 busheling	8.25 to 8.75
Drop forge flashings, over 10 in.	7.50 to 8.00
Drop forge flashings, under 10 in.	7.50 to 8.00
Railroad grate bars	12.75 to 13.00
Stove plate	13.00 to 13.25
Pipes and flues	8.50 to 9.00

Philadelphia

PHILADELPHIA, Jan. 10.

New year developments in the local iron and steel trade have been so few and so unimportant that no definite trend is indicated. The attitude of sellers is still one of expectation, with no groundwork on which to base predictions as to when trade recovery is likely to set in. Many manufacturing consumers are still engrossed in details of annual inventory and are not in a buying mood. Neither inquiries nor orders have shown any increase within the past week; in fact, some steel companies report the market the dulllest in many weeks, and the same holds true to a large extent of pig iron, ferroalloys and scrap.

Pig Iron.—Though the local pig iron market was extremely dull during the past week, a better inquiry is expected soon, as many foundry iron users have not covered for their first quarter requirements. Little iron has been sold since the first of the year. We note one sale of 800 tons of foundry grade last week, but most of the sales have been small lots. Eastern Pennsylvania furnaces are firm in quotations of \$20, furnace, on No. 2, plain, \$20.50 on No. 2X and \$21 on No. 1X. There have been no sales of basic, but a Delaware steel maker is considering the purchase of 1000 tons. Gray forge, in small lots, has sold at \$19.50 to \$20.50, furnace. A railroad equipment company is inquiring for 1000 to 2000 tons of scrap-bearing low

phosphorus iron. A sale of 100 tons of copper free low phosphorus iron has been made at \$30, furnace.

The following quotations are, with the exception of those on low phosphorus iron, for delivery at Philadelphia, and include freight rates varying from 34 cents to \$1.54 per gross ton:

East. Pa. No. 2 plain, 1.75 to 2.25 sil.	\$20.34 to \$21.26
East. Pa. No. 2X, 2.25 to 2.75 sil.	21.34 to 21.78
Virginia No. 2 plain, 1.75 to 2.25 sil.	27.24 to 27.74
Virginia No. 2X, 2.25 to 2.75 sil.	27.74 to 28.24
Basic delivery eastern Pa.	20.25
Gray forge	20.50 to 21.50
Malleable	28.00 to 24.00
Standard low phos. (f.o.b. furnace)	30.00
Copper bearing low phos. (f.o.b. furnace)	28.00

Ferromanganese.—Ferromanganese is offered at \$58.35, seaboard, and spiegeleisen at \$25, furnace, but there is very little business.

Billets.—Open-hearth rerolling billets are offered at \$28 and forging billets at \$32, Pittsburgh, some makers asking \$1 higher.

Rails.—The Pennsylvania Railroad has distributed orders for 80,000 tons of 130-lb. rails for 1922 delivery as follows: Carnegie Steel Co., 40,000 tons; Bethlehem Steel Co., 18,000 tons; Cambria Steel Co., 18,000 tons; Lackawanna Steel Co., 4,000 tons. The road has 25,000 tons of rails on hand but not laid, and 48,000 tons on order from its 1921 contracts which has not been rolled.

Finished Steel.—There is a dearth of orders and inquiries for plates, shapes, bars, sheets and other forms of rolled steel. It is probably yet too early in the new year to expect any marked change for the better. Many manufacturing consumers are still deeply engrossed in problems of inventory and settling up last year's affairs and are giving little or no thought to purchases. Steel company salesmen, in making their rounds, find many plants closed down, or virtually so, with no plans for early resumption of activities. Prices of plates, shapes and bars are nominally 1.50c., Pittsburgh. One leading Eastern independent is holding rigidly to this schedule and some others have a fairly steadfast price policy. Buyers continue to tell steel sales departments that 1.50c. can be shaded, but definite transactions at lower prices have not recently been reported in such a way as to be readily substantiated. It is admitted by some sellers that concessions might be offered on very attractive tonnages, but there has been little or no attractive business in the past two weeks. Sheets are holding firmly at 2.25c. for blue annealed, 3c. for black and 4c. for galvanized, base, Pittsburgh.

Bar Iron.—There is little demand for bar iron, which is still quoted by Eastern mills at 1.50c., Pittsburgh.

Warehouse Business.—Local warehouses have reduced prices 15c. per 100 lb. on soft steel bars and small shapes, iron bars, except bands and steel bands, No. 12 gage to 3/16-in. inclusive, and 25c. per 100 lb. on steel hoops, No. 13 gage and lighter.

Old Material.—With the exception of a slight advance in cast iron borings, which are in demand and none too plentiful, the scrap market is dull and prices are unchanged. We quote for delivery at consumers' works in this district as follows:

No. 1 heavy melting steel	\$11.50 to \$12.00
Scrap rail	11.50 to 12.00
Steel rails, rerolling	16.25 to 16.75
No. 1 low phos., heavy 0.04 and under	17.00 to 18.00
Car wheels	16.50 to 17.00
No. 1 railroad wrought	14.50 to 15.00
No. 1 yard wrought	12.00 to 12.50
No. 1 forge fire	10.00 to 10.50
Bundled sheets (for steel works)	9.50 to 10.00
No. 1 busheling	12.00 to 13.00
No. 2 busheling	10.00 to 11.00
Turnings (short shoveling grade for blast furnace use)	9.00 to 9.50
Mixed borings and turnings (for blast furnace use)	9.00 to 9.50
Machine-shop turnings (for rolling mill and steel works use)	9.00 to 9.50
Heavy axle turnings (or equivalent)	9.50 to 10.00
Cast borings (for steel works and rolling mills)	12.00 to 12.50
Cast borings (for chemical plants)	13.50 to 14.00
No. 1 cast	16.50 to 17.00
Railroad grade bars	14.00 to 14.50
Stove plate (for steel plant use)	14.00 to 14.50
Railroad malleable	13.50 to 14.00
Wrought iron and soft steel pipes and tubes (new specifications)	11.50 to 12.00
Iron car axles	No market
Steel car axles	17.00 to 18.00

IRON ORE PRODUCTION OF 1921

Lowest Output Since 1904—Shipments Below Production—Stocks Increased

Figures of the United States Geological Survey show that the iron ore mined in 1921 amounted to 29,547,000 gross tons, compared with 67,604,465 tons in 1920, a reduction of 53.6 per cent. These figures are exclusive of ore containing more than 5½ per cent of manganese. Minnesota furnished 61.2 per cent of the ore mined, compared with 58.4 per cent in 1920. The Lake Superior region furnished 85.9 per cent, compared with 85.7 per cent. Alabama furnished 9.9 per cent, compared with 8.7 per cent in 1920. The output of 1921 was the lowest since 1904, when 27,644,330 tons was mined.

Shipments of ore from the mines are estimated for 1921 at 27,009,000 gross tons, compared with 69,281,341 tons in 1920, a decrease of 61 per cent. The value of ore shipped was given as \$89,688,000 compared with \$285,006,327 in 1920, a decrease of 68.9 per cent. The average price per ton was estimated at \$3.32 in 1921 and \$4.11 in 1920. Stocks of ore held at the mines, mainly in Michigan and Minnesota, increased from 11,379,000 gross tons in 1920 to 13,872,000 tons in 1921, a gain of 22 per cent. More than 2,070,000 tons of this increase was in Michigan, and about 325,000 tons in New York.

Of the tonnage shipped from the mines in the Lake Superior district, amounting, according to the estimate, to 23,155,000 tons, the great bulk as usual went by water. Figures of the Lake Superior Iron Ore Association show water shipments at 22,300,726 tons, a decrease of 62 per cent compared with 1920.

Imports of iron ore for the first eleven months of the calendar year amounted to 313,613 gross tons, valued at \$1,065,033 or \$3.40 per ton. Imports for the entire year 1920 were 1,278,456 tons, valued at \$4,963,654 or \$3.90 per ton. Exports of iron ore for the eleven months were 438,126 tons, valued at \$2,069,897 or \$4.72 per ton, compared with exports for all of 1920 amounting to 1,145,037 tons, valued at \$6,198,927, or \$5.41 per ton.

In the appended table will be found the principal particulars relating to the ore mined and shipped in the United States in the two years, figures for principal producing states being given separately.

State or District	Ore Mined, Gross Tons			Ore Shipped, Gross Tons		
	1920	1921	Decrease Per Cent	1920	1921	Decrease Per Cent
Minn.	39,453,173	18,093,000	54.1	39,747,594	18,056,000	54.6
Mich.	17,510,742	7,054,000	59.7	18,862,578	4,981,000	73.6
Wis.	981,134	247,000	74.8	1,067,159	118,000	88.9
Lake Superior	57,945,049	25,394,000	56.2	59,677,331	23,155,000	61.2
Ala.	5,894,011	2,927,000	50.3	5,838,317	2,875,000	50.7
Other South-eastern*	872,783	95,000	89.1	869,413	71,000	91.8
N. Y.	920,009	470,000	48.9	959,408	154,000	83.9
N. J.	431,567	58,000	86.6	417,100	108,000	74.1
Pa.	734,383	140,000	80.9	719,813	182,000	74.7
Western States†	740,226	429,000	42.0	740,537	429,000	42.1
Other States‡	66,437	34,000	48.8	64,422	35,000	45.7
Total	67,604,465	29,547,000	56.3	69,281,341	27,009,000	61.0

*Georgia, North Carolina, Tennessee and Virginia.

†Arizona, California, Colorado, Idaho, Montana, Nevada, New Mexico, Utah, Washington and Wyoming.

‡Connecticut, Maryland, Massachusetts and Missouri.

Dwight P. Robinson & Co., engineers and constructors, New York and Chicago, have secured important contracts from the Duquesne Light Co., Pittsburgh, and the New Orleans Railway & Light Co. The work for the Duquesne Light Co., of which A. W. Thompson is president and C. S. Cook general manager, includes the installation of the second unit of 60,000 kw. at the Colfax power station, together with three additional substations along the company's lines in the Pittsburgh district. The Colfax station is designed ultimately to be one of the largest steam stations in the country, containing six 60,000 kw. units.

British Iron and Steel Market

General Improvement in Both Iron and Steel—
Continental Competition Less Felt—Freight
Rate Reduction Demanded

(By Cable)

LONDON, ENGLAND, Jan. 10.

Expansion of pig iron business is confidently anticipated if prices are further reduced. Makers are anxious to restart more furnaces. Hematite demand has improved, stocks are diminishing and additional furnaces are expected to start. Prices are easier.

Welsh works are buying low-grade Spanish ores. Other consumers are purchasing North African ore at 22½s. (\$4.75) c.i.f. Bilbao Rubio is nominally 26½s. (\$5.59) c.i.f.

Steel position is improving, as English makers are now less ready to accept low figures for export. Scotch works are reducing prices; quarter-inch ship plates are now £9 15s. (1.84c. per lb.) delivered. Scottish trade is pressing for a reduction in railroad rates.

Few sellers of Belgian merchant bars are quoting below £8 (1.51c. per lb.) f.o.b. German merchant bars are held at £7 15s. (1.46c. per lb.) f.o.b. Belgian beams are now offered at £9 7½s. (1.77c. per lb.) delivered Midlands. Merchants are quoting Belgian beams at £8 7½s. (1.58c. per lb.) c.i.f. India.

German wire nails to Japanese assortments are offered at 25s. (\$5.27) c.i.f., with shipments in from six to eight weeks. American makers are quoting wire nails at 24s. (\$5.06) c.i.f. Japan.

Tin plates are steadier on bear covering of contracts, and there is less pressure to realize on stocks, by certain works. Export demand is improving; Canada has been inquiring.

Galvanized sheet demand is slow. Black sheets, to Japanese specifications, are being sold at £19 5s. (3.63c. per lb.) c.i.f. Scotch works are taking orders on thick sheets at low prices.

We quote gross ton, except where otherwise stated, f.o.b. maker's works, with American equivalent figured at \$4.22 per £1 as follows:

Durham coke, delivered..	£1 8		\$5.91
Cleveland No. 1 foundry	5 5	& 5 10*	22.11 & 23.21*
Cleveland No. 3 foundry	5 0	& 5 5*	21.10 & 22.11*
Cleveland No. 4 foundry	4 15		20.05
Cleveland No. 4 forge	4 10		18.99
Hematite	7 0*		29.54*
East Coast mixed	4 16½	& 5 0*	20.36 & 21.10*
Perronmanganese	15 0	& 14 10*	63.30 & 61.19*
Rails, 60 lb. and up	8 0	to 9 10	33.76 to 40.09
Billets	7 15	to 8 0	32.71 to 33.76
Sheet and tin plate bars.			
Welsh	7 5	to 7 15	30.60
Tin plate, base box	0 19¼	to 1 0¾	4.06 to 4.27
			C. per lb.
Ship plates	9 10	to 10 10	1.79 to 1.98
Boiler plates	14 0	to 14 10	2.84 to 2.73
Tees	10 0	to 11 0	1.88 to 2.07
Channels	9 5	to 10 15	1.74 to 2.03
Beams	8 0	to 10 0	1.51 to 1.88
Round bars, ¾ to 3 in.	10 10		1.98
Galvanized sheets, 24 g.	16 10		3.11
Black sheets	13 10		2.54
Steel hoops	12 0	& 12 5*	2.26 & 2.31*
Cold rolled steel strip, 20 g.	24 10		4.62

* Export price.

Cleveland Blastfurnacemen Take Reduction in Wages—Price Cut by Scottish Producers —Shipbuilding in 1921

LONDON, ENGLAND, Dec. 28.—Practically all works closed down at the end of last week for the holidays, and will not resume until after the new year. A point of interest, however, is that Cleveland blast furnacemen have agreed to a reduction in wages, or rather to a temporary suspension of the sliding scale, and from Jan. 1 the district percentage payable on base rates will be reduced from 77¼ to 36 per cent. It will thus be seen that workers are at last beginning to realize that their future prosperity is dependent upon their agreeing to take less money, as it is only by this means that selling prices can come down to levels at which buyers will show an inclination to purchase.

The *Labor Gazette* states that the cost of living index figure is down to 99 per cent above that of July,

1914, and is now at the lowest recorded since May, three years ago.

Cleveland pig iron is still held for \$5, but there is talk that the new year will see a further reduction. Whether this will be so or not remains to be seen, but the recent concessions by the railroads have not been met with open arms, as traders were hoping that the cut would amount to at least 50 per cent, and are now asking when there will be a concession on rates for finished steel which furnish quite a considerable portion of the transport revenue of the roads. Railroad companies in Scotland have not yet reduced rates at all in spite of urgent representations made by the Scottish iron and steel trades. They have, however, offered certain small concessions in demurrage charges and an extension of the free time allowed for loading and unloading wagons.

Scottish steel makers have further been cutting prices and quote £9 10s., delivered, for ship plates to home consumers and £9 2s. 6d. f.o.b. for export, while for angles for export they quote £9 7s. 6d. f.o.b., these prices all being generally lower than English makers will take. Business is naturally quiet this time of the year, especially as the works in general will not resume until next week.

The Clyde shipbuilding output for the year is returned as 314 vessels of a total of 514,549 tons against 569,960 tons in 1920. There were no large liners but many vessels for mail and passengers were completed, the largest one being "Windsor Castle" of 19,000 tons built by John Brown & Co.

The Firth of Forth shipbuilding output for the year totaled 15 vessels of an aggregate tonnage of 37,203 against 28 vessels of total tonnage 64,399 in 1920. One prominent builder is reported to have said that he does not think the trade depression will last many months, though the immediate outlook is not promising.

Corporation's Unfilled Orders Increased in December

Unfilled orders on the books of the United States Steel Corporation, Dec. 31, were 4,268,414 tons compared with 4,250,542 tons on Nov. 30, an increase of 17,872 tons. This compares with a decrease of 36,287 tons in November and an increase of 28,744 tons in September, the rest of the months of the year showing decreases, the largest having been in March at 649,102 tons. The unfilled tonnage a year ago was 8,148,122 tons, or 3,879,708 tons more. The table below gives the unfilled tonnage at the close of each month, beginning with January, 1918:

	1921	1920	1919	1918
Jan. 31	7,573,164	9,285,441	6,884,268	9,477,853
Feb. 28	6,933,867	9,502,081	6,010,787	9,288,443
Mar. 31	6,284,765	9,892,075	5,430,572	9,056,404
Apr. 30	5,845,224	10,859,747	4,800,866	8,741,832
May 31	5,482,487	10,940,465	4,282,310	8,337,623
June 30	5,117,868	10,978,817	4,892,855	8,918,866
July 31	4,830,324	11,118,468	5,578,661	8,883,601
Aug. 31	4,531,926	10,805,038	6,109,103	8,759,042
Sept. 30	4,560,670	10,374,804	6,284,638	8,297,905
Oct. 31	4,286,329	9,836,852	6,472,668	8,358,293
Nov. 30	4,250,542	9,031,481	7,123,330	8,124,663
Dec. 31	4,268,414	8,148,122	8,265,366	7,379,173

The largest total of unfilled orders was on April 30, 1917, when it was 12,183,083 tons. The lowest was on Dec. 31, 1910, at 2,605,747 tons.

Eastern Bar Iron Institute Dissolves

The Eastern Bar Iron Institute, which was established under the Eddy system of open price competition, with offices at 103 Park Avenue, New York, passed a resolution at a special meeting in Philadelphia late in December to dissolve on Dec. 31. The decision appears not to represent any concern that the association operated under any of the conditions which obtained in the so-called hardwood lumber case, but rather that it is a result of chaotic trade association and business conditions which prevailed before the announcement of the decision and which have seemingly multiplied since that time. Albert C. Taylor, secretary of the association, is at present engaged in closing out the affairs of the organization.

OPEN PRICE POLICY

Government Will Not Announce Policy as to Supreme Court Decision

WASHINGTON, Jan. 10.—The Department of Justice will not announce in any form a Government policy relating to open price associations. This statement was made this afternoon by Attorney General Daugherty, and came as a complete surprise. Previous statements from other Government sources had led to the well-defined belief that the Government would outline and make public such a policy based on the decision of the Supreme Court in the Hardwood Lumber case. Plainly, the Department of Justice position conflicts with that of the Department of Commerce, which had been seeking to have a Government policy fixed and announced and the statement was made only this week that conferences to this end were under way. It is now a question as to what the effect may be with regard to further co-operation between the Department of Commerce and trade associations which have been supplying it with information. Already this co-operation has been lessened somewhat in consequence of the Hardwood decision.

The Attorney General, however, said that the Hardwood decision is the most far-reaching and helpful on the subject involved that ever had been handed down

by the Supreme Court. While the Government desires to be accommodating to business, it was stated it will not go to the point of defeating the purposes laid down by the decision. It was pointed out that there are a large number of civil cases pending in the courts and that any "concessions" the Government made in attempting to interpret the decision, said to be so clear it cannot be misunderstood, might prejudice many of the cases now under judicial review.

When asked if the plans of Secretary Hoover to co-operate with trade associations will be modified, the Attorney General said that if he discussed this matter it would be with Mr. Hoover only. He said he was sure, however, that Secretary Hoover would pursue nothing but a legitimate policy.

Referring to what he termed the clearness of the Supreme Court decision in the Hardwood case, Mr. Daugherty said: "We are compelled to maintain a position which is so fully justified by the decision of the Supreme Court."

The Attorney General said that the Department of Justice would not ordinarily interfere with the proposal of Secretary Hoover regarding the announcement of a policy, but that he would not state such a policy as coming from the Department of Justice, and it was suggested that any statement coming from any other department might weaken the position of the Government.

Hearings on Pittsburgh Basing Case at Milwaukee

WASHINGTON, Jan. 10.—Announcement was made to-day by the Federal Trade Commission that the date for hearings in the Pittsburgh base case to begin at Milwaukee had been set tentatively on Jan. 30. The examination of witnesses on behalf of the commission will be in charge of Attorney-Examiner K. E. Steinhauer, who will be assisted by Attorney-Examiner E. W. Burr. The procedure outlined calls for the presentation of the commission's side of the case through the examination of its witnesses, to consist of, among others, members of the Western Association of Rolled Steel Consumers, and additional users of steel products upon whose application the commission issued the complaint in the case against the United States Steel Corporation and 11 subsidiary companies. After the commission completes examination of its witnesses, the Steel Corporation then will take up its side of the case, calling an examination of its witnesses. This will be followed by any rebuttal evidence desired by the commission.

The plan is that the commission shall complete its examination of witnesses at each point before Steel Corporation witnesses are called, so that this will probably make it necessary to return to different points where hearings are held, in order that Steel Corporation witnesses may be heard. The itinerary to be covered during the hearings will embrace widely scattered consuming points as well as steel centers.

Warren Plants Merged

The Warren Tool & Forge Co., Warren, Ohio, has purchased the plants of the General Malleable Co. and the American Block & Mfg. Co., both located in Warren, and the three plants will be operated under the name of the purchasing company. The capital stock of the merged company is \$1,800,000. The Warren Tool & Forge Co. is a large manufacturer of contractors' and track tools. The malleable iron foundry of the General Malleable Co. has a capacity of approximately 600 tons of castings per month, a large proportion of which goes to the railroads. The American Block & Mfg. Co.'s plant was built for the manufacture of malleable unions with bronze inserted seats. The Warren Tool & Forge Co. will continue to operate under its old man-

agement. James D. Robertson, Pittsburgh, is president; N. J. Konold, vice-president; George Konold, treasurer and general manager, and George F. Konold, Jr., secretary.

Approves Bond Issue to Purchase Haskell & Barker Car Co.

WASHINGTON, Jan. 10.—The Interstate Commerce Commission to-day granted the application of the Pullman Co. for the issuance of 165,000 shares of capital stock for the purpose of acquiring all of the assets of the Haskell & Barker Car Co., organized under the laws of New York, but having its plant at Michigan City, Ind. The Pullman Co., in its petition, says the net book value of the car manufacturing company is \$16,900,000. The physical value of plant and property, less depreciation up to Jan. 31 next, is listed at \$6,095,000. The total current assets, including securities, cash, and bills receivable, amount to \$12,520,000. Car trust contracts amount to \$1,606,000, and car repair accounts amount to \$1,247,000. Among other receivable items listed is \$4,000,000 in notes, which have since been paid, and the amount reinvested in United States Liberty bonds. There also was listed among the assets miscellaneous accounts, amounting to \$441,000. The car manufacturing company's stock quoted recently on New York Stock Exchange ranged in value from 50½ to 82, while the total outstanding shares of the car manufacturing company's stock on the basis of these quotations ranged in value from \$11,110,000 to \$18,000,000. In the Pullman Co.'s total assets amounting to \$163,000,000 is included \$148,000,000, representing the value of 7,750 cars and equipment.

Federal Policy as to Trade Associations

WASHINGTON, Jan. 10.—Conferences between Attorney General Daugherty, Secretary of Commerce Hoover, and other officials of the Government, regarding a Federal policy as to trade associations, are to be resumed within a few days. At a conference last week, during which the proposed policy was discussed, in the light of the interpretation of the Sherman anti-trust act by the Supreme Court in the decision relating to the Hardwood Lumber Association, the Government officials were unable to reach an agreement.

NON-FERROUS METALS

The Week's Prices

Cents Per Pound for Early Delivery								
	Copper, New York		Straits	Lead		Zinc		
	Lake	Electro-lytic*	Tin New York	New York	St. Louis	New York	St. Louis	
Jan.								
4.....	13.87½	13.62½	32.25	4.70	4.40	5.17½	4.82½	
5.....	13.87½	13.62½	32.25	4.70	4.40	5.17½	4.82½	
6.....	13.87½	13.62½	32.50	4.70	4.40	5.15	4.80	
7.....	13.87½	13.62½		4.70	4.40	5.15	4.80	
9.....	13.87½	13.62½	32.12½	4.70	4.40	5.12½	4.77½	
10.....	13.87½	13.62½	32.12½	4.70	4.40	5.12½	4.77½	

*Refinery quotation.

New York

NEW YORK, Jan. 10.

The markets are all only moderately active with the price tendency firm in some and easy in others. Buying of copper is light and prices are steady. Only a moderate business has been done in tin at slightly lower levels. Demand for lead is better than for most of the metals and the price tendency is strong. Zinc is the weakest of the four major markets and prices are lower.

Copper.—The first week of the new year has witnessed sales of moderate amounts of electrolytic copper and inquiry for the first quarter continues to indicate a good business in the future. Rumors persist that sales of at least moderate amounts can be negotiated at 13.75c., delivered, or 13.50c., refinery, but efforts to locate actual sales by producers or dealers willing to sell at this price have been without result. It is intimated that such quotations have been made as a basis for the purchase of ores and that no actual sales have resulted. In any event, the amount obtainable at this low level is regarded as extremely limited. While some large producers either refuse to quote at all or are willing to quote a minimum of 14c., delivered, most of the remaining sellers will sell at nothing less than 13.87½c., delivered, or 13.62½c., refinery, which we quote as the market, these levels applying to January and first quarter metal. While there has been some inquiry for second quarter there is no inclination to make sales for this position.

Tin.—The principal topic of conversation has been the annual statistics which have shown the largest visible supply of tin in several years. On Dec. 31 this was reported to have been 25,220 tons, as against 19,410 tons on Dec. 31, 1920. This includes principally Straits and some Banca and some Billiton and does not include holdings in the hands of the governments at Singapore nor of the Dutch. Despite this apparently unfavorable report it was not regarded as a reason for any pessimism nor was there any break in the London market on the announcement of the publication of these statistics. The market has been quiet and dull with prices slightly lower than those a week ago. Spot Straits tin was quoted today at 32.12½c., New York, and the London market quotations were £165 5s. for spot standard, £167 for future standard and £166 10s. for spot Straits, or from £3 to £4 per ton less than a week ago. On the New York Metal Exchange on Thursday 25 tons of January-February shipment from the East was sold at 32c., with sales later in the day at 32.50c. by importers, and on Friday on the exchange 50 tons of January shipment was sold at 32.25c. and 25 tons of April shipment at 32.50c., both below the cost of import. Arrivals thus far this month have been 1580 tons with 6200 tons reported afloat.

Lead.—Demand for lead continues very good at prevailing prices, business being divided between the leading interest and independents, at 4.70c., both New York and St. Louis for the former and at 4.40c., St. Louis and 4.75c., Eastern points for the independents. It is understood that one independent producer has sold its entire January output and light sales have been made in one or two cases at 4.75c., delivered, Eastern points.

Zinc.—This market is largely a waiting one, depending upon the developments in the steel market and the demand for galvanized sheets. Thus far actual sales are limited to carload and small lots for immediate needs and, in the absence of any large demand, prices have eased until prime Western for early delivery is quoted at 4.75c. to 4.80c., St. Louis, or 5.10c. to 5.15c., New York, with some business done at 4.77½c., St. Louis, or 5.12½c., New York. It is stated that there are still some prospects for export business in the coming months.

Antimony.—The market is quiet and prices are nominal at 4.50c., New York, duty paid, for wholesale lots for early delivery, and it is admitted that this might be shaded.

Aluminum.—Virgin metal in wholesale lots, 98 to 99 per cent pure, for early delivery, is quoted at 19.10c. f. o. b. plant for 15-ton lots, but the same metal by importers is quoted at 17c to 18c., New York, duty paid.

Old Metals.—Business has been very quiet, but values remain firm, holders being unwilling to accept lower prices than those prevailing during the high mark in December. Dealers' selling prices are as follows:

	Cents Per Lb.
Copper, heavy and crucible.....	13.25
Copper, heavy and wire.....	12.50
Copper, light and bottoms.....	10.00
Heavy machine composition.....	10.25
Brass, heavy.....	8.00
Brass, light.....	6.00
No. 1 red brass or composition turnings.....	8.25
No. 1 yellow rod brass turnings.....	6.25
Lead, heavy.....	4.25
Lead, tea.....	3.25
Zinc.....	3.00

Chicago

JAN. 10.—Buying has diminished to the irreducible minimum and prices are slightly weaker, tin and spelter having declined. Old metal prices remain unchanged. We quote in carload lots: Lake copper, 14c.; tin, 33.50c.; lead, 4.50c.; spelter, 4.85c. to 4.90c.; antimony, 6.50c., in less than carload lots. On old metals we quote: Copper wire, crucible shapes and copper clips, 10.75c.; copper bottoms, 8c.; red brass, 8.25c.; yellow brass, 5.75c.; lead pipe, 3.25c.; zinc, 2.37½c.; pewter, No. 1, 28c.; tin foil, 24c.; block tin, 26c.; all buying prices for less than carload lots.

St. Louis

JAN. 10.—Lead held steady at the 4.40c. level throughout the week, while slab zinc was dull at 4.80c., carlots. On old metals we quote: Light brass, 3.50c.; heavy red brass and light copper, 7c.; heavy yellow brass, 4c.; heavy copper and copper wire, 7.50c.; zinc, 2c.; pewter, 15c.; tin foil, 16c.; tea lead, 2c.; aluminum, 9c.

Will Pass Soldiers' Compensation Act

WASHINGTON, Jan. 10.—It was stated with emphasis at the White House this afternoon that undoubtedly Congress will soon pass some sort of a soldiers' compensation act. The Administration made it known that it is in favor of some measure more or less like the Fordney bill, which provides for raising of the necessary money through a sales tax. The Administration is not in favor of any measure unless it specifically carries a provision for the necessary payment. It therefore is opposed to the suggestion that the Government rely on interest from allied debts owing the United States, because, while it was stated it is not doubted that the debts and interest will be paid, it is not possible to say how long it will be necessary for the soldiers to wait for their money if it must come from interest on the debts.

No. 4 furnace at the New Castle, Pa., works of the Carnegie Steel Co. will be blown in Jan. 14. The other three stacks of this group already are in blast.

Prices Finished Iron and Steel, f.o.b. Pittsburgh

Freight Rates

Freight rates from Pittsburgh on finished iron and steel products, in carload lots, to points named, per 100 lb., are as follows:

Philadelphia, domestic...	\$0.35	Kansas City	\$0.815
Philadelphia, export...	0.265	Kansas City (pipe)...	0.77
Baltimore, domestic...	0.385	St. Paul	0.665
Baltimore, export...	0.255	Omaha	0.815
New York, domestic...	0.38	Omaha (pipe)	0.77
New York, export...	0.285	Denver	1.35
Boston, domestic...	0.415	Denver (wire products)...	1.415
Boston, export	0.285	Pacific Coast	1.665
Buffalo	0.295	Pacific Coast, ship plates	1.335
Cleveland	0.24	Birmingham	0.765
Detroit	0.325	Jacksonville, all rail...	0.555
Cincinnati	0.325	Jacksonville, rail and	
Indianapolis	0.345	water	0.46
Chicago	0.38	New Orleans	0.515
St. Louis	0.475		

The minimum carload to most of the foregoing points is 26,000 lb. To Denver the minimum loading is 40,000 lb., while to the Pacific Coast on all iron and steel products, except structural material, the minimum is 80,000 lb. On the latter item the rate applies to a minimum of 50,000 lb., and there is an extra charge of 9c. per 100 lb. on carloads of a minimum of 40,000 lb. On shipments of wrought iron and steel pipe to Kansas City, St. Paul, Omaha and Denver the minimum carload is 46,000 lb. On iron and steel items not noted above the rates vary somewhat and are given in detail in the regular railroad tariffs.

Rates from Atlantic Coast ports (i.e., New York, Philadelphia and Baltimore) to Pacific Coast ports of call on most steamship lines, via the Panama Canal, are as follows: Pig iron, 55c.; ship plates, 75c.; ingot and muck bars, structural steel, common wire products, including cut or wire nails, spikes and wire hoops, 75c.; sheets and tin plates, 60c. to 75c.; rods, wire rope, cable and strands, \$1; wire fencing, netting and stretcher, 75c.; pipe, not over 8 in. in diameter, 75c.; over 8 in. in diameter, 2 1/4c. per in. or fraction thereof additional. All prices per 100 lb. in carload lots, minimum 40,000 lb.

Structural Material

I-beams, 3 to 15 in.; channels, 3 to 15 in.; angles, 3 to 6 in., on one or both legs, 1/4 in. thick and over, and zeos, structural sizes, 1.50c.

Sheared plates, 1/4 in. and heavier, tank quality, 1.50c.

Wire Products

Wire nails, \$2.50 base per keg; galvanized, 1 in. and longer, including large-head barbed roofing nails, taking an advance over this price of \$1.25 and shorter than 1 in., \$1.75; bright Bessemer and basic wire, \$2.25 per 100 lb.; annealed fence wire, Nos. 6 to 9, \$2.25; galvanized wire, \$2.75; galvanized barbed wire, \$3.15; galvanized fence staples, \$3.15; painted barbed wire, \$2.65; polished fence staples, \$2.65; cement-coated nails, per count keg, \$2.00; these prices being subject to the usual advances for the smaller trade, all f.o.b. Pittsburgh, freight added to point of delivery, terms 60 days, net, less 2 per cent off for cash in 10 days. Discounts on woven-wire fencing are 68 to 70 1/2 per cent off list for carload lots; 67 to 69 1/2 per cent for 1000-rod lots, and 66 to 68 1/2 per cent for small lots, f.o.b. Pittsburgh.

Bolts and Nuts

Machine bolts, small, rolled threads, 70, 10 and 5 to 70, 10 and 7 1/2 per cent off list

Machine bolts, small, cut threads, 70 and 5 to 70 and 10 per cent off list

Machine bolts, larger and longer, 65, 10 and 5 to 70 and 10 per cent off list

Carriage bolts, 1/2 in. x 6 in.: Smaller and shorter rolled threads, 65, 10 and 10 per cent off list

Cut threads 65 and 10 to 70 per cent off list |

Longer and larger sizes 65 and 10 to 70 per cent off list |

Lag bolts 70 and 10 to 70, 10 and 5 per cent off list |

Flow bolts, Nos. 1, 2 and 3 heads 60 and 10 per cent off list |

Other style heads 20 per cent extra |

Machine bolts, c.p.c. and t. nuts, 1/2 in. x 4 in.: Smaller and shorter 65 and 5 per cent off list |

Larger and longer sizes 65 per cent off list |

Hot pressed sq. or hex. blank nuts \$5.50 off list |

Hot pressed nuts, tapped \$5.25 off list |

C.p.c. and t. sq. or hex. blank nuts \$5.25 off list |

C.p.c. and t. sq. or hex. blank nuts, tapped \$5.00 off list |

Semi-finished hex. nuts: 1/2 in. to 3/16 in. inclusive 80, 10 and 10 per cent off list |

Small sizes S. A. E. 80, 10, 10 and 10 per cent off list |

1/2 in. to 1 in. inclusive, U. S. S. and S. A. E. 70, 10, 10 and 10 per cent off list

Stove bolts in packages 80, 10 and 5 per cent off list |

Stove bolts in bulk 80, 10 and 7 1/2 per cent off list |

Tire bolts 65, 10 and 10 per cent off list |

Track bolts, carloads 3c. to 3.25c. base |

Track bolts, less than carloads 4c. to 4.25c. |

Upset Square and Hex. Head Cap Screws

1/2 in. and under 80 and 10 per cent off list |

3/16 in. to 1 in. 80 and 10 per cent off list |

Upset Set Screws

1/2 in. and under 80, 10 and 5 to 85 per cent off list |

3/16 in. to 1 in. 80, 10 and 5 to 85 per cent off list |

Roller Square and Hex. Cap Screws

All sizes 75 and 10 per cent off list |

Roller Set Screws

All sizes 70, 10 and 10 per cent off list |

Rivets

Large structural and ship rivets \$2.25 |

Large boiler rivets 2.36 |

Small rivets 70, 10 and 10 per cent off list |

Wire Rods

No. 5 common basic or Bessemer rods to domestic consumers, \$36 to \$38; chain rods, \$36 to \$38; screw stock rods, \$41 to \$43; rivet and bolt rods and other rods of that character, \$36 to \$38; high carbon rods, \$43 to \$50, depending on carbons.

Railroad Spikes and Track Bolts

Railroad spikes, 9/16-in. and larger, \$2.25 base per 100 lb. in lots of 200 kegs of 200 lb. each or more; spikes, 1/2-in., 3/4-in. and 7/16-in., \$2.35 to \$2.40 base; 5/16-in., \$2.35 to \$2.40 base. Boat and barge spikes, \$2.35 to \$2.40 base per 100 lb. in carload lots of 200 kegs or more, f.o.b. Pittsburgh. Track bolts, 3c. to 3.25c. base per 100 lb. Tie plates, \$2 per 100 lb. Angle bars, \$2.40 per 100 lb.

Terne Plates

Prices of terne plates are as follows: 8-lb. coating, 200 lb., \$9.30 per package; 8-lb. coating, 1 C., \$9.60; 15-lb. coating, 1 C., \$11.80; 20-lb. coating, 1 C., \$13; 25-lb. coating, 1 C., \$14.25; 30-lb. coating, 1 C., \$15.25; 35-lb. coating, 1 C., \$16.25; 40-lb. coating, 1 C., \$17.25 per package, all f.o.b. Pittsburgh, freight added to point of delivery.

Iron and Steel Bars

Steel bars, 1.50c. from mill. Refined bar iron, 2c. to 2.10c.

Welded Pipe

The following discounts are to jobbers for carload lots on the Pittsburgh basing card:

Steel			Iron		
Inches	Black	Galv.	Inches	Black	Galv.
1/4	54 1/2	28	1/4 to 3/4	3 1/2	+23 1/2
3/4 to 1	60	33 1/2	1/2	36 1/2	18 1/2
1 1/4	65	50 1/2	3/4	42 1/2	27 1/2
2	69	56 1/2	1 to 1 1/2	44 1/2	29 1/2
1 to 3	71	58 1/2			

Lap Weld			Butt Weld		
2	64	51 1/2	2	39 1/2	25 1/2
2 1/2 to 6	68	55 1/2	2 1/2 to 6	42 1/2	29 1/2
7 to 8	65	51 1/2	7 to 12	40 1/2	27 1/2
9 to 12	64	50 1/2			

Butt Weld, extra strong, plain ends			Lap Weld, extra strong, plain ends		
1/4	50 1/2	33	1/4 to 3/4	4 1/2	+37 1/2
3/4 to 1	56	38 1/2	1/2	35 1/2	23 1/2
1 1/4	62	50 1/2	3/4	42 1/2	28 1/2
2	67	55 1/2	1 to 1 1/2	44 1/2	30 1/2
1 to 1 1/2	69	57 1/2			
2 to 3	70	58 1/2			

Lap Weld, extra strong, plain ends			Butt Weld, extra strong, plain ends		
2	62	50 1/2	2	40 1/2	27 1/2
2 1/2 to 4	66	54 1/2	2 1/2 to 4	43 1/2	31 1/2
4 1/2 to 6	65	53 1/2	4 1/2 to 6	42 1/2	30 1/2
7 to 8	61	47 1/2	7 to 8	35 1/2	23 1/2
9 to 12	55	41 1/2	9 to 12	30 1/2	18 1/2

To the large jobbing trade the above discounts are increased by one point, with supplementary discounts of 5 and 2 1/2 per cent.

Boiler Tubes

The following are the discounts for carload lots f.o.b. Pittsburgh:

Lap Welded Steel		Charcoal Iron	
1 1/2 in.	26 1/2	1 1/2 in.	5
2 to 2 1/2 in.	41	1 1/2 to 1 1/2 in.	15
2 1/2 to 3 in.	57	2 to 2 1/2 in.	25
3 1/2 to 4 in.	52	2 1/2 to 3 in.	30
		3 1/2 to 4 1/2 in.	32

Standard Commercial Seamless Boiler Tubes

New discounts have been adopted on standard commercial seamless boiler tubes, but manufacturers are not yet ready to announce them for publication, and for that reason we publish no discounts this week.

Sheets

Prices for mill shipments on sheets of standard gage in carloads, f.o.b. Pittsburgh, follow:

Blue Annealed		Cents per Lb.	
No. 8 and heavier	2.20	Nos. 11 and 12	2.30
Nos. 9 and 10 (base)	2.25	Nos. 13 and 14	2.35
		Nos. 15 and 16	2.45

Box Annealed, One Pass Cold Rolled

Cents per Lb.		Cents per Lb.	
Nos. 17 to 21	2.80	No. 28 (base)	3.00
Nos. 22 to 24	2.85	No. 29	3.10
Nos. 25 and 26	2.90	No. 30	3.20
No. 27	2.95		

Galvanized

Cents per Lb.		Cents per Lb.	
Nos. 10 and 11	3.00	Nos. 25 and 26	3.70
Nos. 12 to 14	3.10	No. 27	3.85
Nos. 15 and 16	3.25	No. 28 (base)	4.00
Nos. 17 to 21	3.40	No. 29	4.25
Nos. 22 to 24	3.55	No. 30	4.50

Tin-Mill Black Plate

Cents per Lb.		Cents per Lb.	
Nos. 15 and 16	2.80	No. 28 (base)	3.00
Nos. 17 to 21	2.85	No. 29	3.05
Nos. 22 to 24	2.90	No. 30	3.05
Nos. 25 to 27	3.05	Nos. 30 1/2 and 31	3.10

183

PERSONAL

F. J. Griffiths resigned Jan. 1 as vice-president and works manager of the Central Steel Co., Massillon, Ohio. He has been succeeded as works manager by Benjamin Fairless, who has been plant superintendent. His successor as vice-president has not yet been named.

Herbert F. Topp has withdrawn as a partner from the firm of Crocker Bros., commission merchants in pig iron, coke and alloys, with which firm he has been connected since 1913; all of this time having been in charge of the Cincinnati office. Mr. Topp will continue his connection with the iron and steel industry, having organized the firm of Herbert F. Topp & Co., to carry on a commission business in pig iron, coke and alloys. The offices of the company are located at 1020 First National Bank Building, Cincinnati.

Claude Sauzedde has joined the engineering staff of the Maxwell-Chalmers Motor Car Co., Detroit, as designing engineer. He was the original designing engineer of the Dodge Bros. Co.

A. E. Ackerman, Brattleboro, Vt., plant of the Millers Falls Co., Millers Falls, Mass., small tools, has accepted a position as sales representative for the company in the Middle West.

B. G. Roos, former managing engineer Locomobile Co. of America, Bridgeport, Conn., and more recently auto-engineer Pierce-Arrow Co., has resigned the latter office to return to the Bridgeport company as chief engineer.

John Robson, Waterbury Tool Co., is scheduled to address the Waterbury branch of the American Society of Mechanical Engineers at the Chamber of Commerce Hall, Waterbury, Conn., Jan. 10, on the Waterbury hydraulic variable speed gear.

J. H. Hackenburg, purchasing agent Pressed Steel Car Co., Pittsburgh, has resigned and J. B. Tate has been made assistant purchasing agent, and will have charge of the department pending the appointment of Mr. Hackenburg's successor.

Theodore A. Gessler, for the past 13 years manager of sales of the American Sheet & Tin Plate Co., New York, resigned Jan. 1. Mr. Gessler has been identified with the sheet and tin plate trade since 1898, at which time he became associated with the American Sheet & Tin Plate Co. in its New York office. He is succeeded by E. E. Winckler, who has been assistant manager of sales in New York since 1909. Mr. Winckler has been associated with the American Sheet & Tin Plate Co. since its organization 22 years ago and previously represented the Cambridge Iron & Steel Co., Cambridge, Ohio, in the East, with headquarters in New York.

W. S. Stothoff has been appointed works manager of the Hadfield-Penfield Steel Co., Bucyrus, Ohio. He was at one time associated with the Taylor-Wharton Iron & Steel Co., High Bridge, N. J.

Gregory Brown has resigned his position in the engineering department of the Norton Co., Worcester, to join the sales engineering department of the Bridgeport Brass Co., under the direction of Carl F. Dietz. Mr. Brown has been active in the National Machine Tool Builders' Association as head of the safety code committee and active also in the American Engineering Standards Committee in connection with grinding wheel standards.

Edward Worcester, who retired as vice-president in charge of sales of the National Tube Co., Pittsburgh, on Jan. 1, and who is to make his home in the East and serve the company in an advisory capacity, was tendered a farewell dinner at the William Penn Hotel, Pittsburgh, Thursday evening, Jan. 5, by his former associates in the general offices and by the mill managers. William B. Schiller, president National Tube Co., was toastmaster.

Joseph M. Merrow, president Merrow Machine Co., Hartford, Conn., last week was tendered a dinner at the Hartford Club following his return from a three months' business trip abroad.

Lawrence K. Slaback has been appointed assistant manager of sales of the American Sheet & Tin Plate Co. in Cincinnati. Mr. Slaback has been associated with the company since its organization in 1900.

Vincent Massey has been elected president of the Massey-Harris Co., Toronto, to succeed the late Thomas Findley, and Joseph N. Shennstone, vice-president of the company, was elected to the office of chairman of the board of directors. Thomas Bradshaw, general manager, will act as the company's chief executive officer. The new head of the Massey-Harris Co., who is promoted from the post of secretary and director, is in his thirty-fifth year.

J. J. Bennett has been appointed purchasing agent of the Illinois Central Railroad Co., succeeding W. A. Summerhays, resigned to become lumber and tie agent.

Lloyd Jones, chief engineer United Engineering & Foundry Co., Pittsburgh, has resigned. He has been with that company for about nine years, having become chief engineer when F. C. Biggert was elected president a few years ago. His successor has not yet been named.

W. B. Wachtler, until recently manager of the Chicago district for the industrial bearings division, Hyatt Roller Bearing Co., has been promoted and transferred to the New York headquarters of the division as engineer in charge of general applications.

Norman F. Brown has tendered his resignation as director of public works, City of Pittsburgh, to form an attachment with the Dravo Contracting Co., general contractor, designer and builder of inland waterway-harbor-floating and terminal equipment. Mr. Brown has been elected vice-president and director of the company. Prior to his connection with the City of Pittsburgh, Mr. Brown was assistant to the chief engineer of the Pennsylvania Railroad. During the war he served as major in the American Expeditionary Forces, Transportation Corps, United States Army, under Brigadier W. W. Atterbury.

Edwin C. Bindley was elected president of the Neely Nut & Bolt Co., Pittsburgh, to succeed his father, the late John Bindley, at a meeting of the directors of the company, Jan. 4. Ray A. Lackner was elected vice-president, treasurer and general manager and Albion Bindley, secretary.

Wadsworth Doster, formerly sales manager Sundh Engineering & Machine Co., 1105 Frankford avenue, Philadelphia, manufacturer of finishing machinery for brass, copper and steel strip mills, has been elected vice-president of the company.

Dean R. Wilson has resigned as vice-president and treasurer of the Carbon Steel Co., Pittsburgh.

J. A. Connelly, manager of the Tampico, Mexico, office of the Petroleum Iron Works Co., has been appointed sales manager, with headquarters at Sharon, Pa.

John W. Gage, vice-president General Steel Co., Chicago, has been appointed general manager of the H. G. Saal Co., manufacturer of dies and spring motors, 1810 Montrose Avenue, Chicago. Mr. Gage maintains his connection with the General Steel Co. as vice-president, although he will no longer participate actively in the direction of its affairs.

Stewart Malcolmson has been appointed superintendent of stock and director of production at the Anderson Foundry & Machine Works, Anderson, Ind., succeeding Phillip Rhinehart, resigned to take a position with an Indianapolis company.

John C. Neale, vice-president and general manager of sales of Midvale Steel & Ordnance Co., Philadelphia, will return this week, accompanied by Mrs. Neale, from a European trip.

J. J. Porter, who for a number of years was connected with J. G. White and other interests in the purchase and handling of equipment for public service companies, returned to New York last week after a

six months' tour of European countries. In his investigation of the possibilities of trade with Western and Central Europe and the Near East he represented a group of American manufacturers.

Glenn D. East, formerly connected with the Cleveland Metal Products Co., Cleveland, has been appointed Cleveland district sales manager of the Newton Steel Co., Youngstown, Ohio, succeeding Howard Kenworthy, who has become connected with the Trumbull Steel Co., Warren, Ohio.

W. P. Chinn, who has been assistant general manager of mines of Pickands, Mather & Co., Cleveland, with headquarters at Duluth, has been promoted to the general managership. C. H. Munger, whom Mr. Chinn succeeds, has been both manager of the mines and secretary of the mining companies which his firm controls, and because of his duties as secretary, has been located in Cleveland for the past two years. W. A. Rose, who has been chief mining engineer of the firm, has been promoted to the assistant general managership, succeeding Mr. Chinn.

Park R. Backman has been appointed a district sales manager of the Youngstown Pressed Steel Co., Warren, Ohio, in the territory embracing western Pennsylvania, western New York and West Virginia, assuming his new duties on Jan. 15. His headquarters will be at the home offices of the company, where the plant is located. Mr. Backman has been for a number of years secretary of the Valley Housing Corporation, Sharon, Pa.

Judge Samuel L. Black, Columbus, Ohio, was re-elected president at the annual meeting of the directors of the Pittsburgh Tin Plate & Steel Corporation, in Marietta, Ohio, Jan. 6. A. V. Somers was re-elected vice-president, treasurer and general manager, and O. G. Toner, Eden, Ohio, was named secretary, succeeding A. W. Stump of New York.

OBITUARY

WILLIAM CROCKARD, who retired as superintendent of the Riverside Iron Works, Wheeling, W. Va., in 1907, after a service of 33 years, died at his home in Ashland, Ohio, Jan. 3. He was born in Wheeling 71 years ago. He was the father of Frank H. Crockard, president of Woodward Iron Co., Woodward, Ala.

ROLLIN JESSE PLUMB, aged 68, president Eagle Lock Co., Hartford, Conn., died Jan. 5 at his home in Terryville, Conn. He started with the company as an office boy and became its president in October, 1903. He was a director of the Bristol National Bank, the American Trust Co. of Bristol, the Bristol & Plainville Tramway Co., the South Norwalk Lock Co., and the Graham Mfg. Co., Derby.

ADOLPH TREPTE, president Globe Wire & Iron Works, Milwaukee, Wis., was found dead at his home on Jan. 5. He had been shot above the heart and is believed to have been murdered.

DAVID D. KELLEY, treasurer Homestead Iron Works Co., ornamental iron, Homestead, Pa., died at his home in Sheridan, Pittsburgh, Jan. 1. He was born in Huntingdon County, Pa., 69 years ago, but had been a resident of Pittsburgh for the past 40 years.

EDWIN D. LOWELL, secretary and purchasing agent American Fork & Hoe Co., Cleveland, died Jan. 9 after a week's illness, aged 49 years.

The Interstate Commerce Commission has extended from Jan. 5, to May 5, tariff schedules which proposed increased rates on fire brick and clay articles from stations on the Pennsylvania Railroad, Rofte to Kane, Pa., inclusive, to points on the Lehigh Valley Railroad, taking New York and Philadelphia rates. The proposed tariffs would have increased the rates from the points of origin mentioned from 20¢ to 21¢ per 100 lb., to Philadelphia group points, and from 23 to 24¢ to New York group points.

TARIFF HEARINGS NEAR END

Doubt Whether Schedules Will Be Prepared by Feb. 15—The President's Position

WASHINGTON, Jan. 10.—The hearings on the tariff have nearly ended, and while there have been some prospects that important tariff schedules would be prepared by Feb. 15, this belief is not shared by some prominent members of the Senate. It is generally conceded that preparation of the tariff will require considerable time because of the difference prevailing as to the question regarding the system of valuation. It is a foregone conclusion that, regardless of what plan is adopted, it, as well as the entire bill, will be the object of prolonged argument in the Senate as has been true of all tariff bills.

It is stated that the recent White House conference of the President and Republican leaders did not reach an agreement as to the system of valuation, though it is confidently believed that it will have some relation, if not a direct one, to the American valuation plan. The President is said to have insisted that he be given more authority than is provided in the House bill in the administration and application of a home-value policy. As an instance of what the President has in mind, it is pointed out that the House bill would permit him to raise or lower duties a maximum of 20 per cent from the schedule rates to meet emergencies or as a basis for working out reciprocal agreements with other governments. Among proponents of this system are steel manufacturers, who made representation in behalf of such a reciprocal legislation through the Consolidated Steel Corporation.

President Harding is said to have told the conference that a 50 per cent reduction or increase should be provided to cover all future requirements. He also is said to have repeated recommendations made to Congress regarding the empowering of the Chief Executive with authority to fix flexible duties upon the recommendation of the Tariff Commission.

Despite the failure of the conference to agree on the valuation plan, information obtained by THE IRON AGE as to a current survey of proposals for tariff revision indicates that the recommendations of the Administration, through the Treasury Department, will call for the establishment of the American selling price of imported articles as the basic principle of tariff assessment. It is generally admitted that majority leaders in Congress and leaders of the executive branch of the Government will recommend an American valuation plan in some form, but considerably modified because of the widespread opposition and the difficulties to the Administration which the original plan would involve.

THE IRON AGE is also advised that a way has been found around the question of constitutionality of the proposed flexible tariff plan, which has provoked concern in legislative circles, as it involved the transfer of rate-making power, in part at least, to the executive branch. It is believed that the Treasury will recommend legislation which will give the President power to proclaim assessments at rates based on the American valuation for American-made products whenever it is found, after investigation by the Tariff Commission, or some other body, that American industry does not derive sufficient protection.

There is under consideration a proposal to define the American value of the imported article as the foreign value (cost abroad), plus handling charges and duty, plus the importer's overhead and profit.

Should it be determined, however, that the duties are not sufficient to offset foreign competition, resulting in hardship for domestic producers, the amendments under consideration would authorize the President to require the Tariff Commission to investigate and report to him. If the inquiry showed the need for protection, it would then be in the power of the Chief Executive to proclaim the assessment at the prevailing rates, but with the valuation method changed to the American wholesale selling price of a similar or comparable article of American manufacture.

SHORT TRADE ITEMS

The Placid Petroleum Co., Wichita Falls, Texas, incorporated to manufacture spark plugs, is preparing to have the parts manufactured and is in the market for shells, insulators, electrodes, etc., in limited quantities until it can get in touch with the manufacturers who will assemble the parts for the company.

The Banner Die, Tool & Stamping Co., Columbus, Ohio, organized last month, is a reorganization of the Old Cannon Die, Tool & Machine Co. It is operating in the same location.

Harry P. McCabe and P. Frank Sheeran, both well known in the machinery trade, have organized the McCabe & Sheeran Machinery Corporation and will deal in new and used machine tools, with office in the Singer Building, New York. Both have until recently been associated with the McCabe Lathe & Machinery Corporation, New York, one of the oldest of the machinery sales companies of the East. Harry P. McCabe was associated with his brother, J. J. McCabe, for 25 years prior to the latter's death three years ago, and since that time he has been vice-president of the McCabe company, as well as manager of machine-tool purchases. Mr. Sheeran had been associated with the McCabe company for 23 years, latterly as treasurer and



P. F. SHEERAN

chief of sales and advertising. The new company has acquired a stock of used machine tools, which is now being offered for sale.

The Orton & Steimbrenner Co., Chicago, manufacturer of locomotive cranes, clam shell and orange peel buckets and coal crushers, has made arrangements with Walter Hasendahl, 1213 Fuller Avenue, Los Angeles, Cal., to represent the company.

Brille & Ratner, aluminum, 277 Broadway, New York, have opened a Chicago office at 53 West Jackson Boulevard for the convenience of the trade in Chicago and surrounding territory.

John F. M. Detlefsen, 58 Murray Street, New York, on Jan. 1 opened an office as direct manufacturers' representative to the hardware jobbing and factory supply trade. He will travel for the Westcott Chuck Co., Oneida, N. Y. He was formerly engaged in a similar capacity by the Willis H. Simpson Co.

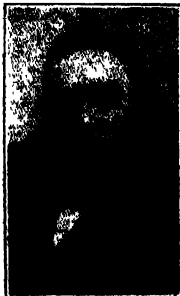
M. Cohn & Co., Inc., has changed its corporate name to Wallstein Industrial Corporation and has opened a new and spacious fireproof factory and plant at Evergreen Avenue and Cook Street, Brooklyn. The office and salesroom will be located in the Victoria Building, 230 Fifth Avenue, New York. The company will continue to manufacture Enduro black boning high grade cast steels and wires, and metal specialties.

The More Handy Truck Co., 100 Rutledge Street, Brooklyn, N. Y., manufactures a handy truck adapted for carrying cans, kegs, barrels, and for general use.

The Headless Bolt Corporation, 414 Munsey Building, Baltimore, Md., does not expect to build for some time, but expects to continue. It has not as yet made contracts with any firm, but will send a sample bolt to any reliable firm which will be interested in the manufacture of bolts.

The Surway Signal Co., 221 Decatur Street, Corning, N. Y., intends to manufacture under contract small hand-held utensils, but expects to set out on a royalty contract for line of automobile signals, as it is not properly equipped to manufacture these signals. The company is anxious to get in touch with a reliable firm to handle its work.

George White & Co., Inc., 1 Exchange Place, Jersey City, N. J., was formed to take over the business of George White, that city, which was established in 1898 for the making of special machinery and tools. The company has purchased a large plant in Paterson containing 40,000 sq. ft. of floor space and is removing the machinery from Mr. White's Jersey City plant. The machinery is now being installed and the company expects to be in operation next month. Much new equipment will be needed, but the company has not yet figured on its requirements. The company will be the designing and building of special machinery for the reduction of labor—the production of fine tools and dies and articles manufactured on a contract basis. The



HARRY P. McCABE

offices of the company are: George White, president; A. R. Duna, formerly with Anderson, Meyer & Co., Ltd., of Chicago, vice-president; J. J. Dux, secretary and general agent; and Edward R. Kresy, formerly general manager William Stearns & Sons, New York, treasurer. The company expects to maintain a district sales office in Jersey City at 171-173 Exchange Place.

The Miller-Jones Corporation, 427 Oneida Street, Syracuse, N. Y., has taken over the manufacturing plant already established and having a large part of its equipment on hand. A little later the company will erect additional buildings and buy additional equipment. The company manufactures sheet metal specialties and has been very busy during the past depression.

The purpose of the recent incorporation of the Southern Metal Works, Shelby, N. C., was to obtain enough capital to enlarge production and to exploit new territory. No additions are contemplated. The company manufactures besides Babbitt metals are solder, parts for certain makes of automobiles and inner tube patches.

W. J. Early & Sons, Ltd., 804-812 Sarah Street, S. E., Pittsburgh, expected to be incorporated by Jan. 1, when its new name would be W. J. Early Sons Foundry Co. No plant changes will be made. John N. Early, chairman of the old company, will be president of the new company; other offices will be filled later. The company makes machinery and rolling mill castings, glass molds, plungers, charcoal chilled semi-steel and other special mixtures.

The American Casting Co., 324 Colt Street, Irvington, N. J., recently purchased the entire foundry equipment of the Aluminum Goods Mfg. Co. and expects to build in January, if the weather permits. The company will not be in the market for machinery for some time.

The Pennsylvania Heater Corporation, Third and Main streets, Irwin, Pa., is contracting for the building of its boilers with the Fisher Mine Equipment Co., West Newton, Pa. The outlook is that the Fisher company will not be able to complete the boilers fast enough, as the demand is great. The boilers are steam and hot water, using gas for fuel.

The Exeter Machine Works, Inc., West Pittston, Pa., has appointed the Allen Engineering Co., Boston sales agent for its rotary pump line. The company has sales offices at 113 Pearl Street, Boston, and specializes in the marketing of pumping and general power plant machinery. E. B. Allen, the head of the company, is a graduate of Harvard University, class of 1908, and has been connected in the past with the engineering department of the Buffalo Forge Co., the International Pump Co. and the Wells-Chalmers Co.

The Pittsburgh district sales office of E. J. Lavino Co., Philadelphia, ferroalloys, Edwin C. Foster, resident manager, is located at 1922 Oliver Building. Associated with Mr. Foster are D. M. Thorp and H. W. Grigsby, formerly attached to the company's general offices in Philadelphia.

R. C. Feltes and E. L. Beisel have organized the Chicago Grinding Machinery Co., Machinery Hall, Clinton Street and West Washington Boulevard, Chicago, to deal in grinding machinery and accessories, including ball bearing race grinders; bench grinders; center, centerless, chatter, bucking, cutter and reamer, cylindrical dia. disk, drill, electric tool post, face, gage, gear, internal, portable, radial, ring wheel, snagging, surface, swing wheel, universal, and valve grinders. Mr. Feltes will also continue to act as the Chicago representative of the United States Electric Tool Co.

On Jan. 12, the J. W. Faxon Co. will occupy new buildings at Nicetown Avenue and D Street, Philadelphia, where, with increased facilities, it will continue to manufacture foundry machinery, supplies and facings. Faxon's distribution it has increased capacity for shipment by canal, truck or carload.

Gibbons Bros., Ltd., Dudley, Worcester, England, has been appointed representative of the W. S. Russell Co., furnace engineer and contractor, 50 Church Street, New York, for the British Isles.

The F. P. Lyons Iron Works, Inc., Manchester, N. H., structural and ornamental work, has opened a Boston office at 6 Beacon Street. G. S. Walls and J. E. Carpenter represent the company.

The general offices of the City Brothers Mfg. Corporation, maker of electricity reliable lamps are now located in larger quarters at 415 First National Bank Building, 35 South Dearborn Street, Chicago. Thomas E. City, president of the company, is at present in the East, personally directing the sales policy in that territory.

The American Metal Works, Inc., has been formed by E. J. Lavino, Philadelphia, and J. C. Burroughs, Toledo, Ohio, to manufacture and sell the purpose of locating a chain of service stations for the location of gear parts, and other machinery and tools and equipment for use in the automobile industry with all interested manufacturers and dealers.

THE YEAR IN CANADA

Industrial Conditions Much Like Those in the United States Prevailed

Throughout the greater part of the year 1921 the tide of Canada's industrial activity was at its lowest ebb in several years and the movement of raw and finished iron and steel materials was at a minimum. As a matter of fact, it appears that the iron and steel industry bore the greater part of the brunt of the depression which was felt in varying degrees by all producing and selling concerns of the Dominion. The first three quarters of the year were exceptionally quiet, both with regard to productive operations and building enterprises. Companies did very little in the way of building plant additions or installing machinery and equipment to increase production, and although a number of concerns were contemplating building plants in the Dominion, only a very small percentage of these undertook the work during the year. Steel plants and foundries had many difficulties to contend with, among which was the almost entire falling off in demand for the commodities they produced. The steady decline in prices of iron and steel material likewise had its effect on producing companies, many of which had contracted for their raw materials at the high prices prevailing in 1920 and as a consequence with each slump in price in the finished material producers found it necessary to take the inevitable loss in order to meet outside competition.

Many Idle Furnaces

Early in the year 1921, steel plants experienced a decided slump in demand for all lines of finished iron and steel and at the same time they had few orders on their books and as a consequence the curtailment of operations was necessary on a fairly large scale. Foundries and other concerns using products from the mills were up against the same proposition and they in their turn cut down activities to a very small percentage of normal operations; in fact, a number of the larger firms were forced to close down their plants entirely. Blast furnaces were dealt a rather severe blow by the cutting down of the demand for iron and around the first of last May all pig iron producers had large

stocks of foundry and malleable iron in stock piles and as a consequence blew out their furnaces and from May until November, out of 20 furnaces in Canada only five were actively engaged in the making of pig iron. These were turning out basic iron for the use of the companies producing.

The cessation in demand for iron and steel during the early months of the year not only had the effect of forcing producers to curtail productive operations but was also reflected in prices of material. Price cutting which was first started in the United States rapidly made its way to the Canadian side of the border and to meet American competition, Canadian producers found it necessary also to meet the prices and as a consequence each cut in price made by United States mills was met with a corresponding revision by the Canadian producing interests. Labor difficulties slowly became of a minor character in the life of the iron and steel business and despite the fact that wages were reduced from time to time there was but little outcry from those affected by the reduction. The cutting down of plant operations was reflected in a rather serious unemployment situation which is now being alleviated to some extent through the railways of Canada placing orders for steel rails and car repair work.

Outlook More Encouraging

Notwithstanding that the greater part of the year reflected a very backward state of affairs in general business conditions, the last two months brought forth a decided change for the better and at the close of the year the outlook was said to be fairly bright. Several large orders were recently placed by the Canadian Pacific Railway, the Temiskaming & Northern Ontario Railway, the Grand Trunk and the Canadian National Railways for steel rails, this business going to the Algoma Steel Corporation, Sault Ste. Marie, Ont., and to the Dominion Steel Corporation, Sydney, N. S. The rail orders will be sufficient to enable the two concerns mentioned above to keep their rail mills in operation throughout the greater part of the winter. Although Canadian railways are not placing contracts for new rolling stock, some good-sized orders were placed for car repairs, which were of sufficient volume to enable car plants at Fort William, Ont., Montreal, Que., and Amherst, N. S., to resume operations at their plants on something like a normal scale.

AUSTRIAN MARKET ACTIVE

Situation Now Resembles Recent German Activity—About 80 Per Cent of Machinery Exported

(Special Correspondence)

VIENNA, AUSTRIA, Dec. 12.—The improvement in the Austrian market which began in October has grown Conditions, especially in export business, have improved considerably. The situation shows all the features of the German boom: enormous demand with prices climbing rapidly, scarcity of material; and a revival of exports. The price for bar iron, which was raised from 5000 to 6400 kronen toward the end of October, was increased to 8100 kr. on Nov. 1, when heavy sheets advanced from 5000 to 6800 kr. Dec. 1 brought a further rise, the new prices being 11,600 kr. for bar iron, 11,400 kr. for beams, and 11,600 kr. for heavy sheets, all per 100 kg. Merchants and jobbers are offering German bars at 12,000 to 14,000 kr. per 100 kg. Freight rates were increased 200 per cent on Dec. 1, and as other production costs are rising, a further advance of prices is expected.

As domestic producers are unable to fill orders, German materials, chiefly semi-finished and special material, are imported. On the other hand, German customers are known to have placed orders with Austrian rolling mills. Supplies from Czecho-Slovakia might relieve the pressure to a certain extent but the high exchange value of the Czecho-Slovakian crown is a stumbling block. Shipments are now restricted to special products not produced domestically or unobtainable in Germany. As shipments by the latter are on a

modest scale, there is a notable shortage of material in the domestic market as a large percentage of the output is being exported. Terms of delivery are five months and frequently longer. Some of the special steel works are stated to be sold out for the second quarter of 1922.

Attempts to Lengthen Work-Day

The 1921 output of pig iron is estimated at about 50 per cent of the pre-war figure. The Alpine Montan company has now three of its seven blast furnaces in operation and a fourth will probably be blown in next month. Production is on the increase, but a substantial increase of production seems out of the question until the housing problem is solved. The company is preparing an extensive housing plan, estimated to cost 4,000,000,000 kr. to be completed by the end of 1923, when it will be possible to add one-third to the present force of 16,500. The only other alternative to increase production is to extend the 8-hr. day. In this connection Hugo Stinnes, at a recent visit to the works, suggested at a meeting of works councils delegates and shop stewards that a liberal supply of foodstuffs would be guaranteed if the men would work a 9-hr. day. The men are on the whole inclined to accept the Stinnes proposition but the unions are less inclined to forego voluntarily the long fought-for 8-hr. day.

A feature of the present position of the manufacturing industry is the lively tone of the export market. There is a noteworthy demand for sheets and plates, especially by Rumania which is also in the market for other commodities. The iron ware industry has secured substantial orders from Poland, Jugo-Slavia, and the Balkan countries. The growing export of agricul-

tural implements and tools to Russia deserves mention. Holland, too, has lately been placing some fair-sized orders. Domestic sales are slightly less active, as merchants are still well stocked with material, particularly tools, cutlery and small hardware. Other commodities, such as screws, rivets, bolts, nuts, etc., have met with improved demand, attributed to greater activity in building and the engineering industry.

The locomotive, rolling stock, bicycle, motor and agricultural machinery builders report satisfactory employment and large profits. The rolling stock makers were awarded a large car contract by Bulgaria some time ago. Less satisfactory conditions prevail in the automobile industry where a recent slump in orders has reduced employment. It is safe to assume that about 80 per cent of the production of the engineering and machinery industries is being exported.

The Veitscher Magnesite Works in its annual report comments upon the slump in export shipments, which amounted to 48,000 tons compared with 112,000 tons before the war. Shipments to the United States in particular show a marked decline with 3600 tons against the pre-war figures of 50,000 to 60,000 tons. The proposed American duty of \$15 per ton would effectively bar further imports of Austrian magnesite and even a reduction to \$10 or \$5, it is stated, would render the Austrian product only competitive.

Ireland's First Steel Plant an Electric Steel Foundry

Ireland has recently put in operation its first steel foundry. Sutherland, Ltd., Sydenham Road, Belfast, has installed a 1½-ton Electro-Metals electric furnace which was started up on Dec. 3, 1921, when steel was made for the first time in Ireland, according to the *London Iron and Coal Trades Review*. The new foundry is located adjacent to the company's shipyards. The main steel foundry building has a floor space of about 14,000 sq. ft.

The new furnace is of the type known as Greaves-Etchells in the United States, is basic lined and has two 8-in. graphite electrodes, equipped with economizers. The furnace is connected to transformers having a total capacity of 800 k.v.a., which are designed for 3-phase, 50-cycle, 6500-volt current on the primary side, while the secondary delivers 2-phase current to the furnace at 90 or 70 volts.

It is believed that the establishing of this plant in Belfast will be of advantage to the engineering industry of Ireland as all steel castings have heretofore come from Great Britain or the United States.

Novel Export Plan for German Wire Ropes

An export organization of a novel kind is proposed by the Economic Association of German Wire Rope Works, Düsseldorf, for the purpose of promoting the export trade and thereby enabling Germany to obtain foreign currency to pay her indemnity with, says the *London Iron and Coal Trades Review*. The scheme proposes in the first place that German works obtaining an order from abroad shall receive a commission of 5 per cent on the order in the currency of the country for which it has been booked. In addition to this, the works in question is to be allowed to book one-fourth of the order without this quantity being deducted from its allocation in the association, and, of course, also one-fourth of the amount of the invoice. The remaining three-quarters of the order is to be divided among the constituents in such a way that 75 per cent of the three-quarters is distributed among all the constituents of the association in proportion to the number of workmen employed by the various concerns at the end of 1919, while the remainder of 25 per cent is to be divided among all the works in equal shares irrespective of the size of the different plants. It is claimed that this scheme would render it possible for 70 per cent of the amount of the bills of exchange obtained through foreign orders to be placed at the disposal of the Government, and mutual underselling of the various concerns abroad would be stopped.

It is explained that the situation of the German

wire rope industry has been such that, owing to the ruthless price undercutting in the markets abroad, the obtaining of orders at rates in foreign currency has been largely prevented, and as a rule export prices were consequently forced down to the level of inland prices. Under the pressure of the competition of German non-associated firms, the members of the association, who until then had faithfully observed the rule to sell only in foreign currency for export, were compelled to drop their allegiance to the association since last March, and to invoice their goods in marks. Under the proposed scheme, however, as almost all the makers of wire ropes have now joined the association, it is calculated it will be possible to sell in foreign currency in every case and obtain substantially higher prices abroad.

Russian Soviet Government's Plan of Leasing Steel Plants to Capitalists

More details are now to hand of the Soviet Government's scheme of leasing iron and steel plants to foreign capitalists, says the *Metal Bulletin*, London. The original plan was for 6-year leases, but the period has now been extended to 20 years, although this is also generally considered to be too short. Only second class works were included at first, but now first class plants are offered. Up to the present, however, foreign capital has not been attracted to any important extent. The following works are offered on lease:

Blanks Co.—Pig iron, steel, rails, sheets, wire, etc., structural iron, foundry and railroad material.
Donetz Iron & Steel Co.—Iron and steel works, wire and sheet rolling mill.
Donetz-Yurlevski Co.—Pig iron, sheets and wire.
Nikopol-Mariupol Co.—Blast furnaces, steel and rolling mills. Controls rich manganese ore fields.
South Russian Dnieprovsk Metallurgical Co.—Pig iron, bar iron, railroad material and pipes.
Kramatorski Metallurgical Co.—Pig iron and ferromanganese. Owns large machine-shops.
New Russia Co., Hughesovka.—Pig iron and steel works. Specializes in bridgework.
Krivoi-Rog Iron Co.—Pig iron.

Various machine-shops, municipal tramways and electrical undertakings are also offered. The conditions of lease are as follows:

1. The concessionaires undertake to raise output to a previously fixed level.
2. Output to be divided as follows: 60 per cent reserved for home market, 20 per cent acquired through the commissary for export trade, 10 per cent bought by the State to furnish stocks for home trade, 5 per cent reserved for the Soviet as landlord, and 5 per cent distributed as premium.
3. The government's portion of the net profits to range from 20 to 50 per cent, according to the importance of the industry.
4. Concessionaires to be granted every relief necessary for the safety of the industry, while on their side they are responsible for the food supply of their employees.
5. Preference to be given to the old owners of the works or, failing these, to their employees.

Belgian Industrial Revival

WASHINGTON, Jan. 10.—The Belgian industrial revival is being maintained in spite of the usual slackening of business due to annual stock taking and a somewhat smaller holiday trade than is usual at this season, says the Department of Commerce in a survey of that country's business conditions. Unemployment shows a considerable decrease, particularly in the metal industries.

An encouraging decrease in unemployment has proceeded steadily since October. Conditions in the metal industries are generally favorable, and iron and steel production has shown a considerable increase as a result of the relighting of a number of blast furnaces and the resumption of activities at the Ougree-Marihayne plant, which has been practically closed for some time due to a strike among the employees. On account of increased rolling mill production, prices of finished steel, which advanced during November, are now stationary. Pig iron advanced 5 francs per ton, and finished iron about 10 francs per ton during December. Semi-manufactured products also show an upward tendency. Bessemer 5 mm. sheets advanced 250 francs,

and open-hearth 5 ¹/₂ inch sheets 3.20 francs during the month. Orders are difficult to place for delivery under three months.

The arms industry is not sharing the prosperity of other mechanical lines, but the largest Belgian plant,

the Fabrique Nationale, has received a Japanese order for arms and ammunition which will probably supply work for additional equipment. Automobile manufacturers producing 10 to 15 hp. cars have reported an increased business.

German Machinery Trades Generally Quite Active

Machine Tool Industry Has Enjoyed Good Business, Though at Low Prices, and Other Lines, Including Locomotives, Are Active

(Special Correspondence)

BERLIN, GERMANY, Dec. 16, 1921.—The position of the German machine industry has undergone a further improvement during the past two months and the recent notable appreciation of the German currency has not had any apparent effects upon business as yet. Export orders, though substantial, are by no means as extraordinary as might seem to be the case, while domestic business, on the other hand, has markedly improved and is forming a feature of some branches. This applies especially to textile machinery, the strong demand for which finds an explanation in the present unprecedented demand for all kinds of textiles.

Satisfactory buying is also noticeable in the agricultural machinery and implement market, where domestic and foreign orders are in even proportion. Manufacturers of agricultural machinery and implements interested in the export business have combined into an export association for the principal purpose of working the South American market. Domestic buying is the more remarkable in that fall and winter are generally considered the dead seasons and requirements are by no means urgent but are primarily representing surplus capital investments. Export business centers chiefly on Rumania, Switzerland and Holland.

Machine Tool Prices Unsatisfactory

Regarding the machine-tool industry, unsatisfactory prices have been the chief cause of complaint during the past months, but a betterment in this respect is now being reported and attributed to the increased demand. England and the Scandinavian countries have lately been in the market and are stated to have bought fair quantities; 29,725 tons of machine tools valued at 512,592,000 m. crossed the frontiers during the May-September period of 1921, and nearly 20 per cent found their way to Belgium, while 982 tons were taken by South America. Other important buyers were France and Italy. An important works of this branch, the Reinecker Aktien Gesellschaft, at Chemnitz, manufacturers of milling machinery, taps, etc., states that present orders are without parallel in the history of the works.

Large Locomotive Contracts Closed

The locomotive industry has been awarded contracts by the Balkan countries and a short while ago the Rumanian Government ordered 30 locomotives valued at 130,000,000 m. with the Henschel & Sohn concern, Cassel. Some interesting particulars have lately been announced in regard to the Russian locomotive orders by the Karlsruhe Engineering Works. The total number of engines ordered by the Soviet Government with the German industry is given at 700, distributed among 19 companies. Eighteen engines each were placed with the Krauss & Co. works, Munich, the Karlsruhe Engineering Works, and the J. A. Maffai works, Munich. The Esslingen Engineering Works booked 16 engines and the Henschel & Sohn were given the largest order with 137 engines, the total orders thus placed with works in the fifth district amounting to 207 engines. With 8448 tons out of a total of 18,633 tons shipped abroad, the Balkan countries have a clear lead in this department. The total value of locomotives exported during the period under consideration is given at 484,422,000 m.

One of the branches operating to the limit of ca-

capacity is that devoted to rolling stock, which has lately been awarded several Dutch orders and an Argentine order, the latter comprising 70 cars valued at 230,300 pes. and booked by the Linke-Hofmann Works. Belgium imported the bulk of exports with 7832 tons followed by Holland with 5842 tons, out of a total of 28,141 tons, the latter valued at 295,351,000 m. The comparatively large export to southeastern Asia (i. e., British India, Malacca, Ceylon, French, Dutch and Portuguese Indies, Philippines, Siam), viz., 4360 tons, deserves attention. Broadly speaking, the car works are booked up to fall of 1922.

Bicycle Industry Shows Gains

Another industry where conditions are prosperous is the bicycle industry. According to a statement by the Triumph company, Nuremberg, all departments "are flooded with orders." Holland and the Scandinavian countries are still the best customers, the former having imported 2024 tons and the latter 598 tons, of a total of 4527 tons, valued at 259,375,000 m. (not including motorbicycles). Brisk activity prevails in the automobile industry, which is well stocked with orders as a result of the success of the last exhibition and races. Exports during May-September fluctuated around 600 cars per month, the total shipped amounting to 3172 cars equal in weight to 6119 tons and valued at 284,264,000 m. These figures include finished cars, chassis with motors, as well as flying machines and airships (dirigibles) though the latter two groups may be disregarded for all practical purposes. Holland imported 944 tons, Spain 492 tons, Sweden 416 tons. American imports were as follows: United States 353 tons, South America 168 tons, and the rest of America 112 tons; 291 tons were shipped to southeastern Asia.

Exports from Germany Decline

WASHINGTON, Jan. 10.—Exports from Germany for the month of November showed a slight decrease, as compared with the previous month, according to a cable message to the Department of Commerce from Commercial Attaché C. E. Herring, dated Berlin, Dec. 30. The decrease in imports was more noticeable, with the result that November showed a greatly diminished trade balance by volume. Iron and steel exports showed a decline of 4.8 per cent; coal, coke and other mineral fuels, except oil, 2.8 per cent; and zinc and zinc products, 12 per cent. Machinery exports showed an increase of 5 per cent.

The total exports during November amounted to 19,079,000 double centners, valued at 11,912,000,000 paper marks, whereas in October they amounted to 19,700,000 double centners, valued at 9,700,000,000 marks. During November, German imports totaled 25,380,000 double centners with a value of 12,278,000,000 paper marks, compared with an October import of 30,000,000 double centners, valued at 13,900,000,000 marks.

The decrease in the adverse trade balance by volume which is shown in the figures given above for October and November was due in part to the abnormal imports of raw material during the former month, caused by the anticipation of further decline in the value of the mark as well as to the expected increase of import duty. Higher export prices are also an im-

portant factor in considering the trade balance as the value of practically all exports increased even where the volume declined. The total gold value of German exports for the month of November was much less than in October, it must be remembered, on account of the fall in exchange.

SWEDISH PRICES LOWER

New Quotations Lower—Production Declines— Ore Exports Increase

STOCKHOLM, SWEDEN, Dec. 10.—The new Swedish iron prices show a decline compared with quotations toward the end of October. Prices given are per metric ton, f.o.b. Swedish port, and converted into dollars at 4.28 kr. to the dollar.

Export pig iron	\$37.98
Billets	\$39.02 to \$100.89
Wire	100.89 to 112.76
Bars, open-hearth	53.11 to 58.16
Bars, Lancashire iron	74.78

Swedish iron and steel production from January to October, 1921, shows a steady decline. Output of pig iron during that period was 274,000 tons as compared with 376,000 tons in the corresponding period of 1920, while the respective figures for rolled products were 95,000 tons against 256,000 tons. Of the 134 blast furnaces in Sweden, only 21 have been active. Export shipments of iron have decreased about 50 per cent. During the first ten months of 1921, 117,000 tons were shipped against 230,000 tons in 1920. Exports of iron ore have increased, amounting to 3,750,000 tons compared with 3,260,000 tons in 1920.

Cold Rolled Strip Rolls of Narrow Face

The United Engineering & Foundry Co., Pittsburgh, recently produced on two orders for cold strip equipment nine stands of 8-in. mills, one calling for 12-in. face and the other for 10-in. face of rolls. These are the smallest the company has manufactured to date, having previously built only 12-in., 16-in. and 20-in. mills. The smaller mills follow the general design of the larger sizes. One of the 8-in. mill orders was built with a two-to-one variable speed motor and a roll speed of 97 to 194 ft. per min., and the other with a three-to-one motor and a roll speed of 62 to 186 ft. per min. Where they are used as single stands, constant speed motor may be used, but when used as tandem mills, variable speed motors are required to prevent pulling or excessive sagging of the material between the stands.

The mill housings of the new mills are of cast iron and the mill fillings are steel castings lined with nickel bronze bearings for 6½-in. necks. Fillings are of the outside clamp type, making roll changing easy. The screws are of high carbon steel forgings with fine threads of small pitch and the screw boxes are of bronze.

A separate pipe and sight feed lubricator is provided for each bearing and pair of gears. These pipes lead from a reservoir mounted on the pinion housing and are kept supplied with oil by a circulating pump driven from an extension of the motor pinion shaft. The use of cut double helical teeth together with the elimination of the extra set of reduction gears is found to insure freedom from vibration and consequent marking of the strip being rolled.

Rates on Chrome Ore Suspended

WASHINGTON, Jan. 10.—In line with its policy of suspending the operation of tariffs reducing rates on iron, manganese and chrome ore, the Interstate Commerce Commission has entered an order suspending from Jan. 16 to May 16, schedules of the Bessemer & Lake Erie Railroad calling for reductions in rates on chrome ore. The rates were to apply on shipments from Bessemer, Pa., and other points, to Gary, Ind., South Chicago, Ill., Youngstown, Ohio, and Farrell and Sharon, Pa.

GERMAN CREDITS TO RUSSIA

Purchases Financed by Joint Banking Enterprise —Soviet Purchases Total 200,000,000 Marks

(Special Correspondence)

BERLIN, GERMANY, Dec. 15.—A credit agreement has been entered into between the Russian Soviet Government, represented by its Berlin commercial mission, and a German banking institute, the Deutsch-Osteuropäische Kreditbank Aktien Gesellschaft, at Elberfeld. The bank will change its name to Deutsch-Osteuropäische Wirtschaftsbank Aktien Gesellschaft and increase its present small share capital of 400,000 m. to 5,000,000 m. Members of this joint banking enterprise primarily recruit from the so-called Bergische iron and metal manufacturing industry, the principal centers of which are at Remscheid (tools), Solingen (cutlery), Velbert (locks and builders fittings), Hagen (small iron ware), Lüdenscheid (metal ware), etc.

The Soviet Government through its Berlin mission is placing orders with German firms to the value of 200,000,000 m. for a start. The financing of these purchases will be as follows: The mission will pay a certain percentage of the invoice amount in German marks against shipping documents and is credited with the rest by the bank, the latter receiving bills payable within 12 months at the latest. Simultaneously with the bills, the bank will be handed Russian treasury notes, equivalent in amount to the bills, to be deposited as securities only. The Reichsbank is reported to have expressed its readiness to discount such bills under certain conditions and one industrial concern is stated to be willing to guarantee payments. Further credit agreements of this kind with German financial circles are pending.

Higher Prices for Silica Brick

PITTSBURGH, Jan. 9.—Although demands for refractories are not particularly heavy, recent prices were resulting in such large losses on the low rate of plant operations that there has been quite a general movement on the part of makers to advance prices. The effort has not yet crystallized in fire clay brick, but has resulted in the establishment of a price of \$30 for Pennsylvania silica brick as compared with \$28, and even \$27, the basis of some business done in December. Magnesite brick after dipping to \$50 and in a few cases lower, now are not quoted at less than \$53 and there are intimations that fire clay brick prices soon will be marked up. Chrome brick are weak and \$5 per ton lower.

Manufacturers say that the higher prices on silica brick do not yield a profit unless they are able to operate their plants more fully than they did during most of 1921. If the advance stifles business, it is their contention that the plants might as well be entirely down as to be operated at such a low point as to make production costs high and profits impossible. Stocks of all kinds of brick in consumers' hands are said to be light and makers are figuring that this is going to mean a good business this year provided business in iron and steel makes the recovery it is expected to from the 1921 depression.

We quote per 1000 f.o.b. works:

Fire Clay	High Duty	Moderate Duty
Pennsylvania	\$30.00 to \$35.00	\$28.00 to \$30.00
Ohio	30.00 to 35.00	28.00 to 30.00
Kentucky	32.00 to 35.00	30.00 to 32.00
Illinois	32.00 to 35.00	30.00 to 32.00
Missouri	32.00 to 35.00	28.00 to 32.00
Silica Brick:		
Pennsylvania		30.00
Chicago		35.00 to 37.00
Birmingham		40.00
Magnesite Brick:		
Standard size, per net ton		53.00 to 55.00
Chrome Brick:		
Standard size, per net ton		41.00 to 44.00

Standard drop forged wedges, finished in nickel plate, are being distributed to railroad officials by the Pollak Steel Co. The miniature wedges were drop forged in the company's South Chicago works and are intended to serve as paper weights.

Machinery Markets and News of the Works

NEW YEAR IMPROVEMENT

Orders and Inquiries More Numerous in Some Selling Centers

New York School Board Buys 35 Lathes and Other Tools—A Few Railroad Orders

The New York City Board of Education last week placed orders for about \$200,000 worth of machine tools and supplies. The largest single order was for 35 Pratt & Whitney lathes. Another order covered about 20 woodworking machines. The bulk of the items, of which there were 3000, were small tools and supplies. The equipment is for vocational training schools.

The new year has brought some improvement in certain market centers. In Chicago, for example, dealers report that both orders and inquiries in the first week of January were "far more numerous" than in December. Cincinnati and Cleveland both report improvement. In the East there has been no marked change.

Railroad business continues to occupy first position in order and prospects. The Delaware, Lackawanna & Western Railroad is understood to have decided on the equipment it will buy against its recent inquiry

for about 40 tools. Formal orders are expected shortly. The Delaware & Hudson has taken no action on its recent small list. The Chesapeake & Ohio has bought several tools and is inquiring for a few special machines. The Louisville & Nashville has placed orders for a number of tools with Cincinnati builders. The Santa Fe has bought several tools at Chicago. The Illinois Central is in the market for a driving-wheel lathe and a timber sizer. The Pittsburgh & West Virginia Railroad has bought a Putnam car-wheel borer at Pittsburgh.

Industrial companies are not active buyers, but there are some prospects of business within the near future. The Johns-Manville Co. has received quotations on a list for its Waukegan, Ill., plant, and the bids have been forwarded to the general offices in New York, where final action will be taken, it is expected, within two or three weeks. The Phoenix Horse Shoe Co. has bought four tools at Chicago recently and is inquiring for a few more. The Streets Co., Chicago, which has specialized in the repair of wood cars, will equip a shop for repairing steel cars and has issued a list of 36 tools, mostly fabricating machines, and overhead cranes. The National Cash Register Co., Dayton, Ohio, is asking bids on a number of small machines. Several tools are wanted for schools at Ada, Ohio.

New York

NEW YORK, Jan. 10.

Formal orders have not yet been sent out by the Delaware, Lackawanna & Western Railroad against its inquiry of two or three months ago covering about 40 machines. It is expected that the orders will be issued shortly as tentative reservations of certain machines have been made. No action has been taken by the Delaware & Hudson Railroad against its recent small inquiry. The Chesapeake & Ohio Railroad has bought several tools and is inquiring for a few special machines.

The New York City Board of Education last week bought a large list of tools for vocational training schools, the largest single order being for 35 Pratt & Whitney lathes. Another order covered about 20 wood-working machines.

The Johns-Manville Co. has issued from its New York office an inquiry for the following machines, which is said to be a duplicate of the list recently inquired for in Chicago: Two sensitive drills, two emery grinders, two 20-in. upright drills, one No. 1 universal grinder, one 60-in. knife grinder, one 20-in. shaper, one pipe machine, one 30-in. open-side planer, one 9-in. hack saw, all motor driven.

The first week of the new year has not brought any material change in the local machine-tool situation. Inquiries are no more numerous and a relatively small amount of business is being booked. In some lines of tools an improvement started in December, which it is expected this month will maintain, but there is no marked change for the better.

The J. N. K. Machine Corporation, Jamestown, N. Y., of which Edward H. Johnson is president, has its new factory building well under way and will start operations about March 1. The company will engage in general contract machine work, also die and tool work, and is in the market for the following tools: One 36-in. x 10-ft. planer, one 20-in. shaper, one 20-in. drill, square base, one 20-in. x 10-ft. lathe.

The crane market shows no change the first week of the year. A few new inquiries for electric cranes have appeared and a number of small handpower cranes are pending. The four 5-ton electric cranes, 22 to 27-ft. span, for the Textile Finishing Machine Co., Providence, R. I., were placed with the Shaw Electric Crane Co. The New Jersey Foundry & Machine Co. is reported to have received the three 1-ton hand-power cranes.

The award of gantry cranes for the Stapleton, S. I., piers by the city of New York to the Wellman-Seaver-Morgan Co. was on item A of the specifications. This item calls for 26 2½- to 5-ton semi-portal gantry type electric cranes at about \$8,261 each and eight 1½- to 2½-ton combination or Hamburg type cranes, with hinged auxiliary boom, at about \$13,702 each. The total price on the thirty-four cranes of this item is \$324,500. Delivery specified in 360 days, in which time cranes are to be erected and in operation. Delivery will probably begin about June. The McMylor Interstate Co. was the low bidder on a 2-ton roof crane for the barge canal at Rochester, N. Y., bids on which were opened in Albany.

Among recent sales were: Industrial Works, a 30-ton, 40-ft. boom locomotive crane to the Great Northern Railroad, St. Paul, Minn.; Shepard Electric Crane & Hoist Co., two 1-ton, 25-ft. span, floor control, transfer cranes to M. E. Conran & Co., pipes and fittings, Brooklyn, N. Y.; three 1½-ton cranes to the York Mfg. Co., York, Pa., and a 10-ton, 40-ft. span overhead travelling crane with 3-ton auxiliary to the Atlas Powder Co., Wilmington, Del.

The Frederick Osann Co., 245 Seventh Avenue, New York, manufacturer of industrial sewing machines and parts, occupying two floors of the twelve-story building, has acquired the entire structure and will expand its facilities as soon as present leases expire in other parts of the building.

A vocational department will be installed in the new two-story and basement high school to be erected at Fulton, N. Y., and estimated to cost about \$415,000. Wilson Potter, 22 East Seventeenth Street, New York, is architect.

The Erie Railroad Co., 50 Church Street, New York, has awarded a contract to the Austin Co., 217 Broadway, for the erection of a one-story machine shop, engine house and boiler plant on Pavonia Avenue, Jersey City, N. J., estimated to cost about \$75,000. It will replace the former works recently destroyed by fire.

The Mutual Lamp Mfg. Co., Houston and Crosby streets, New York, manufacturer of electric lamps, occupying a portion of the building at the location noted, has purchased the entire seven-story structure, 65 x 120 ft. About 10,000 sq. ft. will be added to the present manufacturing department.

Burns Brothers, 50 Church Street, New York, will build a one-story coal pocket at 1032-42 Avenue A, 50 x 100 ft., estimated to cost about \$50,000, with equipment. Plans have been completed.

The Wilson Welder & Metals Co., Brooklyn, has removed its plant from 253 Thirty-sixth Street to a larger building at 132 King Street, for increased capacity.

The Boyertown Casket Co., 671 Eighth Avenue, New York, with plant at Boyertown, Pa., has broken ground for a six-story and basement branch works, 48 x 65 ft., at Lafayette Avenue and St. Felix Place, Brooklyn, estimated to cost about \$150,000. The H. P. Wright Co., 207 East Forty-third Street, New York, is contractor.

The National Power & Light Co., New York, has been organized under New Jersey laws by officials of the Electric Bond & Share Co., 71 Broadway, and the American Cities Co., New Orleans, to take over and operate properties of the latter organization, including the Birmingham Railway, Light & Power Co., Birmingham; Houston Lighting & Power Co., Houston, Tex.; Knoxville Railway & Light Co., Knoxville, Tenn.; Little Rock Railway & Electric Co., Little Rock, Ark.; and the New Orleans Railway & Light Co., New Orleans, La. A bond issue will be arranged at an early date and a portion of the proceeds used for extensions and improvements, including power plants, etc.

The Cunard Garage Corporation, New York, recently organized, has leased the three-story building, 25 x 200 ft., at 533 West Twenty-seventh Street, for an automobile repair and service works.

The Gulf Refining Co., 21 State Street, New York, has had plans prepared for a one-story machine shop, 100 x 232 ft., at its works, Doremus Avenue, Newark, N. J., estimated to cost about \$70,000.

A vocational department will be installed in the two-story and basement high school to be erected at Palmyra, N. J., contract for which has been let to George W. Shraner & Son, Palmyra. It will be 62 x 80 ft., and is estimated to cost \$150,000. James T. Weart is president of the board.

The New Jersey Refrigerating Co., 178-82 Ninth Street, Jersey City, N. J., will make extensions and improvements in its refrigerating plant to cost about \$25,000.

Motors and other electrical and mechanical equipment will be installed in the new printing plant to be erected by the American Book Co., 100 Washington Square, East, New York, on property recently acquired at Bloomfield, N. J., 220 x 500 ft. Plans will be prepared at an early date.

The Florence Pipe Foundry & Machine Co., Front Street, Florence, N. J., has broken ground for a one-story machine shop, 60 x 250 ft. C. L. Reeves is superintendent.

In connection with the plans for expansion, the Standard Underground Cable Co., 26 Washington Street, Perth Amboy, N. J., is considering the erection of a three-story machine shop, with wood-working department, about 150 ft. long. It is proposed to commence work early in the spring. Chauncey C. Baldwin is general manager at the plant.

The Haritan Copper Works, Perth Amboy, N. J., is perfecting plans for the manufacture of copper gutters, leaders, shingles and kindred specialties, and will soon commence the installation of machinery for this department. A. Clayton Clark is superintendent.

The Board of Education, Summit, N. J., has awarded contract to Gustave De Kimpe, 141 Summit Avenue, West Hoboken, N. J., for a two-story and basement high school, 146 x 260 ft., to include a vocational department, estimated to cost about \$500,000. Guilbert & Betelle, 546 Broad Street, Newark, are architects.

The Board of School Estimate, County Vocational Schools, Court House, Newark, has approved an appropriation of \$500,000 for the construction of a new vocational school for boys at Bloomfield, N. J. It will be brick and steel, with main unit 36 x 184 ft., and two wings, each 40 x 120 ft., all three stories. Machine shops, electrical shops, tool rooms, wood-working shop and other departments will be provided. Plans will be drawn at an early date and ground broken in the spring. R. Arthur Heller is president of the Board of Education of Vocational Schools, and R. O. Beebe, secretary.

The L. E. Waterman Co., 140 Thomas Street, Newark, has filed plans for a one-story shop, 50 x 100 ft.

Following the resumption of operations at the Bayway Refinery of the Standard Oil Co., 26 Broadway, New York, at Elizabeth, N. J., tentative plans are under consideration for extensions and improvements for which an appropriation of \$1,000,000, as recently voted, is available. The refinery is now giving employment to more than 500.

Fire, Dec. 26, destroyed a building containing machinery and tools used for engine repair work at the yards of the Pennsylvania Railroad Co., Waldo Avenue, Jersey City, N. J., with loss estimated at about \$15,000, for the most part in equipment.

The Asbestos Materials Co., Millington, N. J., has taken possession of the local plant of Bateman & Co., Inc., recently

acquired and heretofore devoted to the manufacture of agricultural implements. A number of extensions and improvements will be made by the new owner, including the erection of an addition to the main factory on Central Avenue. Machinery and equipment will be installed at an early date.

Catalogs Wanted

Tolnai Vilaglapja, Budapest, Hungary VII, Dohany-Utca 12, desires American manufacturers of steel mill machinery to send catalogs.

Philadelphia

PHILADELPHIA, Jan. 9.

The Cutter Electrical & Mfg. Co., Nineteenth and Hamilton streets, Philadelphia, manufacturer of electric switches, circuit breakers, etc., has awarded contract to John N. Gill & Co., 112 South Sixteenth Street, for a four-story addition, 25 x 47 ft.

The DeLong Hook & Eye Co., Twenty-first and Clearfield streets, Philadelphia, manufacturer of metal specialties, has acquired the plant and business of the E. Kramer Machine Co., Carlstadt, N. J., manufacturer of kindred products, which will be operated as a branch. The company has increased its capital to \$1,000,000 to provide for the purchase and expansion.

The Sobel Multiplying Bookkeeping Machine Co., 880 North Forty-eighth Street, Philadelphia, will install a number of new tools at its plant, including shaper, lathe, surface grinder, power hack saw, etc.

The office of the constructing quartermaster, Frankford Arsenal, Philadelphia, will receive bids until Feb. 8 for the erection of a power plant at the Arsenal, including the installation of equipment.

Motors and other electrical and mechanical equipment will be installed in the new three-story printing plant to be erected by the Public Ledger Co., Independence Square, Philadelphia, at Seventh and Sansom streets, 150 x 200 ft. F. C. Roberts & Co., Real Estate Trust Building, are architects and engineers.

The Philadelphia Electric Co., Tenth and Chestnut streets, Philadelphia, has acquired property at Main Street and Green Lane, Manayunk, 142 x 169 ft., for about \$10,000, and will use the site for a new distributing plant. Plans will be prepared at an early date.

Foundation is under way for a new 30-room high school at Albany and Atlantic avenues, Atlantic City, N. J., to include a vocational department. It will cost close to \$1,000,000. The Board of Education, South Ohio Avenue, is in charge. Harry Y. Young is secretary.

The board of directors, Danville State Hospital, Danville, Pa., William F. Shay, Watsonstown, Pa., president, is completing plans for a one-story power house, 50 x 250 ft., with cooling plant of 3500 tons capacity. F. Arthur Rianhard, Masonic Temple Building, Williamsport, Pa., is architect.

Fire, Jan. 2, destroyed a portion of the plant of the Boll Brothers Mfg. Co., Fourteenth and Howard streets, Harrisburg, Pa., manufacturer of brass and other metal beds and springs, with loss estimated at about \$30,000, mostly to machinery and tools. Property of the Capital City Bedding Co., occupying space in the building, sustained a loss of \$25,000. The adjoining property of the Oliver Chilled Plow Works, also, was damaged, with loss reported at \$20,000.

A vocational department will be installed in the three-story high school to be erected by the Haverford Township School District, 6635 Lansdowne Avenue, Oakmont, Pa., estimated to cost about \$300,000. Bids will be asked early in February. Boyd, Abel & Gugert, 112 South Sixteenth Street, Philadelphia, are architects.

Electric generating machinery, motors, paper-mill machinery and other equipment will be installed by the P. H. Hatfelter Co., Spring Grove, Pa., operating a paper mill, in connection with additions to increase the capacity. Preliminary work has begun.

The Lower Paxton Township School Board, Lower Paxton Township, Pa., John Swartz, president, will break ground at once for a one and two-story vocational school, 85 x 90 ft., near Lithgowtown, Pa., estimated to cost about \$55,000. Frank Sausman, Paxton, Pa., is contractor. Frank G. Fahnstock, Jr., Patriot Building, Harrisburg, Pa., is architect.

William H. Strauss, Waynesboro, Pa., and associates, have acquired the plant and property of the Cashman Tool Co., for about \$23,000. The new owners plan to organize a company and operate the works for the manufacture of metal products.

Superstructure work has commenced for the new three-story and basement junior high school, 180 x 230 ft., at

Grant and Lehigh streets, Wilkes-Barre, Pa., to include a vocational department, estimated to cost close to \$1,000,000. The Wilkes-Barre School District, 81 North Washington Street, Wilkes-Barre, is in charge. Boyd Dodson is president.

W. E. Nagle & Son, Selinsgrove, Pa., manufacturer of steel tools, etc., are arranging to triple the output at their new plant, recently occupied.

The Warren Foundry & Machine Co., 183 Sitgreaves Street, Phillipsburg, N. J., has plans under way for the erection of a new two-story building, 60 x 100 ft.

A vocational department will be installed in the three-story and basement junior high school, 250 x 260 ft., to be erected at Altoona, Pa., estimated to cost about \$300,000. Julian Millard, Hutchinson Building, is architect.

Plans have been completed for a one-story power house, 50 x 50 ft., at the plant of the Phillips-Jones Corporation, Pottsville, Pa.

The York City School Board, West King Street, York, Pa., is having plans prepared for a new four-story industrial high school, 235 x 245 ft., at Beaver Street and College Avenue, and will soon call for bids. Hamme & Witman, City Bank Building, York, are architects.

The Hutchinson Mfg. Co., Inc., Norristown, Pa., manufacturer of woodworking machinery, will soon commence the erection of a new factory of structural steel, 60 x 160 ft. The company is now taking bids on materials.

F. J. Ryan & Co., Wesley Building, Philadelphia, will install for the Bath Iron Works, Bath, Me., the Mires system of fuel oil burning on bar and plate furnaces; for the Prison Labor Bureau of Pennsylvania, at Huntingdon, Pa., three electric oven equipments for use in baking automobile tags, and for the Philadelphia Spring Works, Philadelphia, an oil fired spring fitting furnace and an oil fired drawing furnace.

Buffalo

BUFFALO, Jan. 9.

Edwin Miller, 1199 Main Street, Buffalo, has purchased the John S. Dunlop & Sons Building, St. Joseph's Avenue, and will remodel it to manufacture muing machinery.

The Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., has awarded a contract to John Schaaf, 159 Miller Avenue, Buffalo, for the erection of a new one-story building, 125 x 128 ft., on Milton Street, near the line of the New York Central Railroad Co., Buffalo, to cost about \$20,000.

A power plant will be constructed at the new plant of the National Blacut Co., 217 Ellicott Street, Buffalo, foundation work for which has been commenced. A machine shop and automobile service building for company trucks will also be erected. The entire works will cost approximately \$1,000,000. Headquarters of the company are at Tenth Avenue and Fifteenth Street, New York.

The Twin-Plex Reversible Window Co., Toledo, Ohio, manufacturer of galvanized steel, reversible windows and kindred specialties, is considering the erection of a new plant at Buffalo, where manufacturing operations will be concentrated. The company is controlled by Buffalo interests, including Robert E. Williams, 37 Church Street, and George H. Drake, 218 Lexington Avenue. Local sales offices are in the Builders' Exchange Building.

A one-story ice-manufacturing and cold storage plant, 38 x 75 ft., with daily capacity of about 50 tons will be constructed by the Erie Brewing Co., Erie, Pa. Plans have been completed.

The International Paper Co., Nlagara Falls, N. Y., has awarded contract to the Electric Furnace Construction Co., 908 Chestnut Street, Philadelphia, for the installation of a 6000-kw. electric-steam generator. Other improvements will also be made at the mills.

A new power house will be constructed by the Board of Directors of the Crouse-Ingving Hospital, 720 South Crouse Avenue, Syracuse, N. Y.

The Johnson City Motor Car Co., Johnson City, N. Y., is taking bids for a one-story automobile repair and service building, 72 x 115 ft. Charles A. Conrad, Phelps Building, Binghamton, is architect.

Fire, Dec. 21, destroyed a portion of the one-story building of the Hall Motor Co., Brayton and West Utica Streets, Buffalo, with loss, including equipment, estimated at \$50,000.

A vocational department will be installed in the new high school to be erected at Lyons, N. Y., estimated to cost about \$350,000. Plans are being completed. R. Ralph Stein is clerk.

The McDermott Steel Co., 123 Ryan Street, Buffalo, has plans under way for a new building, 300 x 350 ft., on Thompson Street, North Tonawanda, N. Y., estimated to cost about \$250,000.

New England

Boston, Jan. 9.

Buyers of machine tools in this section who anticipated lower prices on or about Jan. 1, are disappointed. No changes in quotations have been received and the undertone of the market, with one exception, that of planing mills, apparently is steady. A few recent inquiries for planing mills brought out concessions by both manufacturers and dealers with stock on hand. Of the general situation, a majority of local houses report a better outlook, with improvement in the character of inquiries. A large amount of prospective business probably will be closed this month, but details are lacking, chiefly because buyers are dealing with individual machine-tool houses rather than with the trade generally. The business includes miscellaneous equipment to cost about \$20,000, based on present quotations, for a company about to secure manufacturing quarters in eastern Massachusetts. It also includes a small list of tools wanted by western Massachusetts interests about to engage in manufacture. Although small this list includes two or three heavy and expensive tools.

A large percentage of prospective business concerns lathes ranging from large sizes for a nearby manufacturer to a 9-in. x 4-ft. portable machine wanted by a Portland, Me., interest. A Massachusetts maker of pumps is in the market for a four-spindle vertical boring machine. Most of the repair shops of New England railroads have reopened, having closed prior to Christmas. New England carriers are not expected to do much in the way of machine tool purchases before February or possibly March.

Sales, which dropped almost to the vanishing point the last week of the year, show considerable improvement, although the majority reported the past week were of single tools. The business closed includes a 27-in. used planer to a Lynn manufacturer; 36-in. used machine to a South Boston machinist; and a used 26-in. to a Brockton manufacturer of rubber molds. The Brockton interest had a small list out but purchased nothing but the planer. A Portland, Me., firm bought a power press, filing machine and a Greenfield grinder, while a Lynn, Mass., manufacturer took two used No. 2 Waterbury Farrel presses. A Dexter, Me., maker of brass goods closed on a Springfield pattern makers' lathe; a Worcester textile machinery maker on saw cutting equipment for making steel combs, and a Rhode Island cotton mill on a No. 2 Milwaukee B universal milling machine.

The Rhode Island textile machinery maker's inquiry for four 5-ton shop cranes has been filled, as well as the hand cranes. A Massachusetts maker of brass goods has closed on one 3-ton crane having three motors. Two small cranes for eastern Massachusetts interests show signs of developing into business. Otherwise the crane market is quiet.

A Massachusetts maker of wire products has purchased approximately \$3,000 worth of gears for replacements. The Fairbanks Co. was low bidder at \$1,825.40 on the concrete mixer wanted by the Supply Department, Boston.

Contract will shortly be awarded by the Thomas Laughlin Co., 133 Fore Street, Portland, Me., ship hardware, for a one-story, 60 x 60 ft. forge department.

The Eastern Metal & Refining Co., 121 Beverly Street, Boston, has awarded a contract for a foundry and storage department, recently destroyed by fire.

A permit has been granted to Walter W. Field, 39 Hayward Street, Cambridge, Mass., for a machine shop to cost approximately \$8,000.

The Amlioid Co., Inc., a new organization to manufacture automobile tops, etc., has leased a group of buildings from the Rogers & Hubbard Co., Portland, Conn. O. H. Chase will be in charge of production and A. C. Rader will be associated with him.

Attachments for textile machinery will be manufactured by the Lowell Textile Associates, Inc., which will soon start operations in a portion of the plant of the Lowell Paper Tube Corporation. Thomas Bentley, Dracut, Mass., is president; Capt. William Porter White, treasurer, and W. T. S. Bartlett, clerk.

Owing to a printer's mistake, it was erroneously stated in these columns last week that the Gilbert & Barker Mfg. Co. plans the erection of a one-story factory, 140 x 160 ft., to cost approximately \$100,000. The name of the company should have been the Seamless Rubber Co., Inc., New Haven, Conn.

The London Steam Turbine Co., Springfield, Mass., is planning the erection of a concrete and steel manufacturing building.

The Stafford Co., 1713 Hyde Park Avenue, Boston, manufacturer of textile machinery, has preliminary plans under way for a one-story foundry.

The Builders' Iron & Steel Co., Bridge Street, Cambridge, Mass., has commenced the construction of a new one-story

plant at Everett, Mass., 70 x 250 ft., estimated to cost \$65,000. Howard P. Farmer is president.

A vocational department will be installed in the three-story and basement high school addition, 207 x 257 ft., to be erected at Lawrence, Mass., at a cost of \$750,000. Work will commence at an early date. James E. Allen, Lawrence, is architect.

The Uniop Specialty Co., 138 Hurd Avenue, Bridgeport, Conn., manufacturer of metal products, has awarded contract to W. M. Bennett, 121 Morehouse Street, for a two-story factory, 50 x 125 ft., estimated to cost \$50,000.

Freeman & Moody, Pawtucket, R. I., recently organized as a partnership, will operate a plant in the Chamber of Commerce building to manufacture metal specialties. A department will be maintained for engine-turning and similar operations. G. C. Freeman and R. J. Moody are heads.

Hollander Brothers, 360 George Street, Bridgeport, Conn., manufacturer of metal products, have plans under way for a new three-story factory, 50 x 100 ft., at Stratford, Conn. A one-story power house, 20 x 35 ft., will also be erected. Davis & Dane, Bridgeport, are architects.

A. W. Flint & Co., 711 Elm Street, New Haven, Conn., manufacturer of ladders, etc., have acquired property at Hamden, near New Haven, as a site for a new one-story factory, 50 x 175 ft. It will remove its present plant on Winthrop Avenue later.

The Shawmut Machine Works, Inc., 81-83 Elmwood Street, Boston, have taken out a permit for a one-story machine shop at 81 Linden Park Street.

The American Steel & Wire Co., Worcester, Mass., has completed plans for the erection of its first new unit in connection with an expansion program, estimated to cost about \$275,000. It will be one story, 60 x 100 ft., equipped as an electric galvanizing department and will adjoin the present galvanizing works on Cemetery Street. Plans for the other additions are being drawn. Charles E. Goodrich is engineer.

The Peck, Stow, Wilcox Co., Southington, Conn., manufacturer of hardware specialties, has rejected all bids recently received for a number of additions to its plant and will call for new bids later. The work will include a two-story grinding building, 56 x 156 ft.; one-story hardening department, 65 x 180 ft., and one-story forge shop, 60 x 100 ft., estimated to cost close to \$200,000, including equipment.

J. W. Dearborn, Ansonia, Conn., has purchased the automatic screw machine equipment of the Ansonia Novelty Co., Ansonia, Conn., and is equipping a factory for the manufacture of screw machine products.

Detroit

DETROIT, Jan. 9.

The Autobody Co., Lansing, Mich., which is producing thirty motor car bodies daily, plans to increase production early in the spring to 100.

Fire recently destroyed the Rogers plant of the Consumers Power Co., near Stanwood, Mich. It was one of the large units for developing power in western Michigan.

The Arnold Grinding Attachment Co., Flint, Mich., has been organized to manufacture automobile micrometer gages. It is financed by J. M. Harringer, R. T. Perry and Carl W. Bonbright. Production will start as soon as manufacturing space can be found and equipment installed.

The Citizens Light & Power Co., Adrian, Mich., plans to install a 2000-kw. turbo-generator and condenser, to be ready for service in the summer.

The Michigan Chandelier Co., Detroit, will soon start construction on a three-story addition, to cost about \$70,000.

The Petoskey Kitchen Cabinet Co., Petoskey, Mich., will soon start work on a plant to manufacture kitchen cabinets and dish washing machines. It is a new company capitalized at \$15,000 and is headed by Albert Rasmussen, Petoskey.

The Story & Clarke Piano Co., Grand Haven, Mich., is having plans prepared for a new one-story power house.

The Michigan Stamping Co., Detroit, will erect a two-story addition, 40 x 60 ft.

The General Forging Corporation, Detroit, will erect a factory building and foundry at Ecorse, Mich., in the spring.

The equipment of the Hess Marine Motor Co., Detroit, has been taken over by the Algonac Machine & Boat Works, Algonac, Mich., which will manufacture Hess motors in Algonac. The new enterprise, though owned by the Algonac Machine & Boat Works, will be operated separately.

The Chief Motors Co., Port Huron, Mich., will install several new machines to bring its production up to 100 tractors daily. It was recently amalgamated with a Cleveland motor company and a concern in Sandusky, Ohio, under the name of the Whitney Tractor Co. All products will be

shipped to Sandusky where the other parts will be made and the tractors assembled.

Several business men in Charlotte, Mich., have taken a lease on a 22-acre site with a view toward establishing a factory for the manufacture of Augustine rotary motors. They are interested in the Augustine Motors Co. and negotiations are under way to obtain the manufacturing rights and establish the main plant in Charlotte, with a capitalization of from \$1,000,000 to \$5,000,000.

The C. R. Wilson Body Co., Detroit, has purchased the Henry E. Hund Co.'s trimming and painting plant which will enable the company to furnish automobile bodies complete. Henry E. Hund will remain in charge.

Former officials of several body companies have organized the Automotive Body Corporation, to build custom bodies and special four-door sedan bodies for Ford cars. It will also do body engineering and build cabs and bodies for commercial cars. Davis Baker, formerly with the Wilson Body Co., is president; Paul Block, formerly with the Racine Mfg. Co., is vice-president; and C. M. Mulholland, secretary and treasurer. A plant will be established in Detroit.

The Sanitary Mfg. Co., of Kalamazoo, Mich., will build an addition, 112 x 400 ft. at a cost of about \$200,000. It will be completed by summer and will necessitate the addition of 125 to 150 men to the working force.

The Nickle Engineering Works, Saginaw, Mich., manufacturer of agitator equipment for chemical tanks, has leased a portion of the Schemm Brewing Co.'s plant at 920 North Hamilton Street, for machine shop purposes.

H. L. Vanderhorst, Kalamazoo, has been awarded the contract to erect the new power plant for the MacSimBar Paper Co., Otsego, Mich. The building and equipment will cost \$350,000.

The Wright Storage Battery Co., Flint, Mich., is considering plans for a two-story addition. R. R. Williams is president.

The Hanson Motor Car Co., Atlanta, Ga., is arranging for the purchase of a site at Detroit for the erection of a new plant to manufacture a six-cylinder automobile, to be marketed at about \$1,000. It is proposed to maintain the works at Atlanta, as heretofore. Arrangements will be made, also, for parts supply, to include the erection of a new plant at Detroit for this purpose, or the purchase of an existing works. The company proposes to increase its capital from \$25,000,000 to \$50,000,000. George W. Hanson is president.

The Auto Specialty Mfg. Co., St. Joseph, Mich., is having plans prepared for two one-story buildings, 80 x 325 ft., and 80 x 162 ft., estimated to cost about \$100,000, with machinery. Davidson & Weiss, 53 West Jackson Boulevard, Chicago, are architects.

The Stearns Lighting & Power Co., Shelby, Mich., will make extensions and improvements in its power plants to cost in excess of \$100,000.

The Board of Education, Saginaw, Mich., has awarded contract to the Realty Construction Co., Flint, Mich., for a new junior high school and vocational building at Waddock and Park avenues, estimated to cost about \$1,300,000, including equipment. Henry Witters, 406 Court Street, is president of the Board.

The Shaw Furniture Co., Ionia and McConnell streets, Grand Rapids, Mich., has awarded contract to Barnes Brothers, 402 Ionia Street, for a four-story addition, 60 x 85 ft., estimated to cost \$100,000, with equipment.

Chicago

CHICAGO, Jan. 9.

Local dealers report that inquiries are far more numerous than during the closing weeks of 1921. While much of this business has not yet progressed beyond the point of submitting quotations, a good share of it is expected to be placed. The Streets Co., Chicago, which has heretofore confined itself largely to the construction and repair of wooden freight cars, is considering adding equipment for the manufacture and repair of steel cars. It has issued a list of 36 tools, largely fabricating machines, including two axle lathes, a bending brake, bolt cutters, punches and shears, a hydraulic wheel press, a plain hydraulic forming press, and a number of electric overhead traveling cranes. Quotations on the Johns-Manville Co. list for Waukegan, Ill., have been forwarded to the New York office of the company and orders are expected to be placed in two or three weeks. The railroads have not yet taken action on their principal outstanding lists, but the Santa Fe has closed for a few machines for various points, including a 6-ft. radial drill, a heavy motor-driven floor grinder, two upright drills, and a number of small engine lathes. The Illinois Central is in the market for a driving wheel lathe and a timber sizer. The Phoenix Horse Shoe Co., Joliet, Ill., has purchased two keyseating machines, one for its Joliet plant and one for Poughkeepsie,

N. Y., in addition to the engine lathes and the shaper it purchased, about two weeks ago. It is also considering the purchase of a 26-in. shaper and a boring mill.

The price situation remains substantially the same as heretofore, the only changes reported being a 10 per cent cut by the Blanchard Machine Co., Cambridge, Mass., on its line of grinding machines, and a reduction on disk grinding machines by Chas. H. Bealy & Co., Chicago.

The Ohmer Fare Register Co., Dayton, Ohio, has offered for sale about \$1,000,000 worth of surplus shop equipment, practically all of which consists of standard type machine tools.

The firm of Pollard Brothers, recently organized to manufacture manual training benches, welded steel bench legs, miscellaneous shop equipment and automotive accessories, has opened a shop and office at 4034 North Tripp Avenue, Chicago. Henry Pollard, formerly superintendent, Benjamin Electric Mfg. Co., Chicago, and A. R. Pollard formerly with the Stocker-Rumely-Wachs Co., are the partners. The former is in charge of manufacturing and designing and the latter handles sales.

Salvat & Neumeister, Inc., 5322 Harper Avenue, Chicago, has let contracts for a one-story garage, 100 x 180 ft., at the northwest corner of Cottage Grove Avenue and Fifth Street, to cost \$90,000.

George Hadsall, one of the owners of the General Machine Shop, Windsor Court, Kewanee, Ill., has sold his interest in the business and in the future E. A. DeWitt and J. W. Connery will be the proprietors.

The W. K. Young Machine Co., 509 West State Street, Rockford, Ill., has been incorporated with \$25,000 capital stock to manufacture automobile parts. For some time W. K. Young, head of the company, has been working on a patent for a light weight piston for automobiles. The purpose of the piston is to prevent the oil in the engine of an automobile from overflowing into the spark plug. A patent has been secured on the piston and its manufacture will be conducted at the address given. Mr. Young was formerly connected with the Barber-Colman Co.

The Wyman-Gordon Co., manufacturer of forgings, Harvey, Ill., contemplates the construction of a power plant to cost \$100,000. Preliminary plans are now being drawn but the project is not likely to materialize until the spring of 1923.

The Osterholm Automatic Machine Co., 409 South Green Street, Chicago, has been incorporated with \$20,000 capital stock to manufacture machine tools, particularly the Osterholm automatic surface grinding machine, described in THE IRON AGE of July 28, 1921. For the present its manufacturing will be done by contract.

The Atwell Printing & Binding Co., Sherman and Polk streets, Chicago, has purchased property, 170 - 178 ft., at the southwest corner of Prairie Avenue and Twentieth Street, upon which it will construct a six-story plant to cost \$600,000.

The Paragon Foundries, Oregon, Ill., is building a large addition.

The Pollak Steel Co., South Chicago, Ill., has taken bids on a new plant to replace its present structures.

The Maximotor Co., Muskegon, Mich., recently organized to manufacture an inclosed gas engine, has contracted with the Campbell, Wyant & Cannon Foundry Co. to make the castings for the motor. A machine shop and assembling plant are being laid out.

The Durand Steel Locker Co., Fifteenth and Arnold streets, Chicago Heights, Chicago, has awarded a contract to the Arnold Co., 105 South La Salle Street, for a one-story addition.

A vocational department will be installed in the new high school to be erected by the County School Board, Imperial, Neb., plans for which have been prepared by A. T. Simmons, Bloomington, Ill., architect. Bids will be received until Feb. 1. Alonso Cunningham is county clerk.

The L. D. Sisson Co., 712 Builders' Exchange, Minneapolis, Minn., manufacturers of ornamental iron specialties, wire goods, etc., has awarded contract to Thor Knutsen, 1101 Plymouth Building, for a new one-story and basement plant, 36 x 100 ft., on Minnehaha Avenue. L. D. Sisson is president.

The Duluth-Globe Iron Works, First Street and Hughill Avenue, Superior, Wis., has plans under way for a one-story foundry and machine shop, 140 x 150 ft., on Michigan Street, Duluth, Minn. German & Jensen, American Exchange Building, Duluth, are architects.

A vocational department will be installed in the new two-story and basement high school to be erected at International Falls, Minn., F. E. Patterson, secretary, estimated to cost about \$290,000. Tyrie & Chapman, 1200 Second Avenue, Minneapolis, Minn., are architects.

The Board of Education, St. Paul, Minn., L. R. S. Ferguson, commissioner, has awarded contract to the Gauger-

Koramo Construction Co., 301 Endicott Building, for a new vocational school on Fourteenth Street, estimated to cost about \$800,000, including equipment. C. A. Hausler, City Hall, is architect.

The Park Tunnel Co., Aspen, Colo., will build a new trainway system to reach to the mines of the Silver Mines Co., near Aspen, for ore transportation.

The Railways Ice Co., 309 South La Salle Street, Chicago, will break ground at once for its two-story ice-manufacturing plant at Clearing, Ill., to be 150 x 300 ft., and estimated to cost about \$200,000, including machinery. E. W. Sproul, 2001 West Thirty-ninth Street, Chicago, is building contractor.

Baltimore

BALTIMORE, Jan. 9.

The Curran Motor Radiator Co., 401 Calvert Building, Baltimore, has acquired property on Hanover Street as a site for a new plant, 40 x 180 ft. The initial unit will cost about \$30,000.

The Empire State Ice Co., 76 West Monroe Street, Chicago, has perfected plans for a new factory at Cumberland, Md., two stories, 100 x 400 ft., with car dock, estimated to cost about \$200,000. Work will commence soon.

A one-story automobile service and repair building, 70 x 110 ft., to cost about \$30,000, for company trucks, will be erected by the American Sugar Refining Co., Baltimore, at its new plant. Plans have been filed.

The Common Council, Millshore, Del., has completed plans and will commence the immediate erection of a municipal electric light and power plant.

The Standard Oil Co., First and Fourteenth streets, Baltimore, is planning for extensions and is said to have plans in preparation for the construction of five new steel storage tanks, varying from 140 to 170 ft. in diameter, and from 40 to 90 ft. high, estimated to cost about \$300,000. E. A. Rudiger is local manager.

A complete machine and repair shop will be installed in the new automobile service building, 100 x 150 ft., to be erected by the South Cumberland Sales & Service Station, Inc., Virginia Avenue and Fifth Street, Cumberland, Md., recently organized with a capital of \$100,000. Plans for the structure are being drawn by T. W. Biddle, Jr., Cumberland, architect. Bids for machine shop equipment will be asked late in the spring. C. L. Adams is president, and F. E. Pahst, manager.

A vocational department will be installed in the two-story high school at Turboro, N. C., preliminary plans for which are under way. C. C. Hook, 207 Trust Building, Charlotte, N. C., is architect.

The Common Council, Louisville, Ga., has tentative plans for a new municipal electric light and power plant, to replace that recently destroyed by fire.

Sherwood Brothers, Inc., Garrett Building, Baltimore, has plans under way for an addition to its oil manufacturing plant in the Canton section. Property extending from Seventh to Tenth streets has been acquired and the site will be used for new buildings, as well as additional steel storage tanks. Considerable machinery will be installed. The company was recently incorporated with a capital of \$1,000,000.

The American Ice Co., Westory Building, Washington, has awarded contract to the Turner Construction Co., 1713 Sansom Street, Philadelphia, for a new two-story ice-manufacturing plant to cost \$80,000. S. A. Kimberly is local manager in charge.

The Board of Education, Richmond, Va., will break ground at once for a new four-story junior high school, 130 x 168 ft., to include a vocational department, estimated to cost about \$340,000. C. P. Walford is superintendent. Charles M. Robinson, Times-Dispatch Building, is architect.

The Oconee Brick & Tile Co., Millidgeville, Ga., has acquired the plant of the American Fireproofing Co. and contemplates enlargements. New equipment will be installed for the manufacture of brick and kindred products.

The board of directors, State Hospital, Raleigh, N. C., is having plans prepared for a new one and two-story ice and refrigerating plant. H. A. Underwood, Raleigh, is engineer. Dr. Albert Anderson is superintendent.

The New Williams Mill Co., North Wilkesboro, N. C., is making inquiries for dies and machines to manufacture wire shapes.

Fire, Dec. 30, destroyed the automobile body and wagon plant of the Hackney Brothers' Co., Wilson, N. C., with loss estimated at close to \$350,000, including equipment and stock.

The Common Council, Lansing, N. C., is planning for the

installation of a new municipal electric light and power plant. E. V. Ballou is in charge.

The T. R. Watkins Co., Henderson, N. C., manufacturer of metal reels, has awarded a contract to Thomas Nelson, Henderson, for a new plant, 24 x 40 ft., with extension, 16 x 21 ft. T. R. Watkins is head.

Cincinnati

(CINCINNATI, Jan. 9.)

The first week in the new year showed a slight improvement over the closing weeks of December. The C. & O. Railroad closed on several tools inquired for some time ago and several local manufacturers received part of the order. The Louisville & Nashville Railroad has also purchased a number of tools, a local dealer receiving an order for five miscellaneous machines. Manufacturers also report scattered orders, mostly single machines. There are few new inquiries before the trade, the only one of consequence being from the National Cash Register Co., Dayton, Ohio, for a number of small tools.

The Lanken Window Co., Cherry Street, Cincinnati, has let the general contract for an addition, to be used for the manufacture of metal windows. It will be of reinforced concrete, 68 x 100 ft., two stories.

The Studebaker-Wulff Rubber Co., Columbus, Ohio, has purchased the factory of the Marion Rubber Co., Marion, Ohio, and plans to begin operations at once for the manufacture of tires.

The Banner Die, Tool & Stamping Co., 86 West Lynn Street, Columbus, Ohio, recently purchased all the equipment of the Cannon Die, Tool & Machine Co., and will operate the plant for the manufacture of dies, tools, jigs, etc., besides doing a general machine shop business. J. E. O'Brien is treasurer and general manager of the new company, which has been incorporated with a capitalization of \$20,000.

The Star Wire Hanger Co., Detroit, has purchased property in Reading, Ohio, as a site for a branch plant and has commissioned Samuel Hannaford & Sons, architects, Cincinnati, to prepare plans for a factory, two stories, 53 x 103 ft. It manufactures coat hangers and expects to begin operations with twenty-five employees.

The Gem City Machine Co., Dayton, Ohio, which recently increased its capitalization from \$25,000 to \$225,000 will be merged with the Steel Products Engineering Co., Springfield, Ohio. The Gem company specializes in the manufacture of dies and small tools, while the Steel Products company manufactures various production tools, having recently purchased the rights of the Averbek Shaper Co., Covington, Ky. J. A. McAdams, Dayton, Ohio, is president of both companies.

Pittsburgh

(PITTSBURGH, Jan. 9.)

Dullness of the closing week of 1921 in the machinery market has not been appreciably relieved the first week of the new year. One dealer reports the sale of a United States 3-hp. floor grinder. Manning, Maxwell & Moore, Inc., has been awarded a 48-in. Putnam carwheel borer by the Pittsburgh & West Virginia Railroad, and also has secured from the Westinghouse Machine Co. the order for a 4000-lb. Chambersburg steam drop hammer, and a railroad equipment company has placed three Knowles broaching machines. Bids have gone out against a number of other projects, and now that inventories are nearing completion there are strong hopes of awards before the end of the month. Prices are favorable to buyers, as competition for business still is sharp.

The Standard Underground Cable Co. has placed the order for two cranes for its new St. Louis plant with the Euclid Crane & Hoist Co., Euclid, Ohio, and this company is expected to be awarded the two cranes to be installed at the Pittsburgh works of the cable company. As indicated in this column last week, the Elliott Co. has closed for a Niles 50-ton crane with 10-ton auxiliary. Live prospects include a 15-ton mill crane for the Christy Park works, National Tube Co., McKeesport; a 15-ton, with 5-ton auxiliary, for the Frank-Kneeland works, United Engineering & Foundry Co., Pittsburgh; 15-ton crane for the Ellwood City Forge Co., Ellwood City, Pa., and a 5-ton overhead for the Elliott Co., Jeanette, Pa.

The Bronx Equipment Co., Concord Avenue and 148d Street, New York, has broken ground for its new two-story and basement plant, 52 x 120 ft., at Thirty-second Street and Sasafraus Alley, Pittsburgh, to manufacture automobile bodies. It will cost about \$185,000. C. B. Comstock, 110 West Fortieth Street, New York, is architect.

Fire, Jan. 1, destroyed a portion of the main building at the plant of the Pittsburgh Steel Tube Co., Beaver, Pa., manu-

facturer of seamless steel tubing and conduits, with loss estimated at about \$25,000. The fire, for the most part, was confined to the machine shop and tube-drawing department.

The Bessemer Gas Engine Co., Grove City, Pa., has commenced the erection of an addition to its plant. Contract has been let to H. C. Frew, Grove City.

The Duquesne Light Co., Pittsburgh, has plans under way for the second unit at its new power plant at Colfax, Pa., to include the installation of a 60,000-kw. generator with auxiliary operating machinery. Three additional power houses will also be erected in the Pittsburgh district. Dwight P. Robinson & Co., 125 East Forty-sixth Street, New York, are engineers.

J. F. McCreary & Son, Seventeenth Street, Beaver Falls, Pa., have awarded contract to the Cook-Anderson Co., Water Street, for a two-story automobile service and repair works, 50 x 95 ft., estimated to cost \$50,000. Work will commence at once.

Vocational equipment will be installed in the addition to the Technical High School, McKeesport, Pa., estimated to cost \$300,000. Plans are being prepared by T. B. and L. Wolfe, architects, Century Building, Pittsburgh.

The Stone Cliff Collieries Co., Charleston, W. Va., recently organized with a capital of \$50,000, is planning for the installation of electrical and other machinery at its properties. C. A. Brockman is president and manager; E. H. McNeill is secretary.

The Wheeling Mold Foundry Co., Peninsula Street, Wheeling, W. Va., has awarded a contract to R. R. Kitchen, National Bank of West Virginia Building, for the construction of a one-story roll shop, 60 x 287 ft., estimated to cost \$55,000.

The Mountain State Motor Car Co., Charleston, W. Va., has plans under way for the erection of a new two-story service and repair works, to total about 16,000 sq. ft.

The Diamond Ice & Coal Co., Charleston, W. Va., has plans under way for the mechanical installation at its two-story ice-manufacturing plant, 100 x 100 ft., estimated to cost \$55,000. A. C. Bishop, 427 Guardian Building, Cleveland, is architect and engineer.

Milwaukee

(MILWAUKEE, Jan. 9.)

Metal working industries are getting back into production after the usual holiday interruption. While some shops resumed active work a week ago, general operations were on a small scale. This week has as a feature the reopening of a number of large shops which have been operating on a minimum scale for some time. The present schedules are light, but the outlook is regarded favorably. The machine tool trade the past week was quiet, although some fair inquiry was received and prospects appear brighter even than in December, when an appreciable pick-up in demand developed. Machine tool production remains very light.

The H. C. Prange Co., Sheboygan, Wis., has engaged W. C. Weeks, local architect, to design a central heat and power plant, 40 x 60 ft., with a 120-ft. stack and three floors above the main unit to serve as warehouse. Two new boilers, coal and ash conveyors, automatic stokers and other equipment will be purchased. The work is estimated to cost \$75,000.

The Badger Cabinet Co., Plymouth, Wis., sustained an estimated loss of \$60,000 by fire Jan. 1 which gutted the building and destroyed most of the machinery and equipment, including power plant machinery. It is the intention to build a fireproof factory early in the spring, but details have not been fixed. George Brickbauer is president.

The Racine Tool & Machinery Co., 1439 Junction Avenue, Racine, Wis., is making repairs and buying a small list of new and used equipment for replacement made necessary by fire on Dec. 27, which caused an estimated loss of \$12,000. Operations have been interrupted for about three weeks. J. Moores Jones is general manager.

The Board of Education, Chippewa Falls, Wis., will take bids after Feb. 1, for the construction and equipment of a junior high and vocational training school, 75 x 125 ft., two stories and basement, estimated to cost \$175,000. The architect is E. J. Hancock, Eau Claire, Wis. E. J. Farrell is secretary of the board.

The Clean Easy Milker Co., Madison, Wis., has been incorporated with a capital stock of \$30,000 to manufacture automatic milking machines and other farm appliances. An assembling shop will be operated at the start. The principals are B. H. Andersen, C. Hansen and L. H. Sloan, all of Madison.

The F. Rosenberg Elevator Co., 176-174 Reed Street, Milwaukee, expects to take occupancy of its new plant on a three and one-half acre site at Richard Street and the Chicago, Milwaukee & St. Paul Railroad tracks, about March 1.

and is closing on additional equipment. The building is of brick and steel, affording 35,000 sq. ft., designed for the manufacture of electric and hydraulic freight and passenger elevators, hoists, etc. Edwin C. Rosenberg is chief engineer.

The Nelson Machinery Exchange, Green Bay, Wis., has filed articles of incorporation with a capital stock of \$100,000. It was established four years ago. It is completing an addition to its shop and warehouse, display rooms and office, and is doubling the construction and repair department. The principals are H. J., D. J., Herman and Charles Nelson.

The Sterling Metal Products Co., Racine, Wis., incorporated recently by William Perry and H. F. Teshnow to manufacture mechanical appliances, automobile accessories, etc., has acquired the property of the Splitex Radiator & Mfg. Co., Racine, which recently made an assignment. The Sterling company takes over the Splitex plant and will undertake the manufacture of automobile, truck and tractor radiators, in addition to its accessory lines.

The Raymond Mfg. Co., Milwaukee, has been organized with \$30,000 capital stock to manufacture machinery, mechanical appliances and metal products, especially automotive equipment. The principals, Charles S. Raymond and Frank L. Martinek, are represented by William M. Schmahl, attorney, 76-78 Cawker Building, Milwaukee.

The Northern Refrigerator Car Co., Milwaukee, has been incorporated with a capital stock of \$425,000 to manufacture refrigerator cars and other rolling stock. The incorporators are Michael F. Cudahy, C. P. J. Kroeck and Charles O'Hare, attorney. The principals are the executive officers of Cudahy Brothers Co., meat packer, Cudahy, where a car service and repair shop will be established at once and later developed into a car construction shop.

The Cramer Mfg. Co., 387-389 Tenth Street, Milwaukee, manufacturer of pumps and other automotive equipment, has increased its capital stock from \$25,000 to \$50,000 preparatory to enlarging its plant and business. Robert Cramer is vice-president and manager.

The Milwaukee Radiator Mfg. Co., Milwaukee, has been formed with \$50,000 capital stock by local interests represented by Reginald I. Kenney, attorney, 840 Wells Building. It is understood the company will take over the plant of an existing concern, but definite details are withheld for the present.

The Board of Education, Sheboygan, Wis., has let the general contract to the L. M. Hansen Co., 113 West Walnut Street, Green Bay, Wis., for the construction of the initial unit of a proposed new \$1,250,000 high school and vocational training institute, designed by Childs & Smith, architects, 64 East Van Buren Street, Chicago.

Cleveland

CLEVELAND, JAN. 9.

The machinery market has shown some improvement since the first of the year, both orders and inquiries being more numerous and there is a somewhat better sentiment in the trade. However, buying is still confined almost wholly to single machines with the business coming from small shops. The brass industry continues to be a source of a few orders for screw machines. Some managers are lining up equipment that they figure on buying as soon as operating conditions in their plants warrant. It is reported that several machines will be purchased shortly for a school in Ada, Ohio. With this exception no new prospects developed the past week involving more than one or two machines.

The Canton Forge & Axle Co., Canton, Ohio, has been organized to operate the former Canton drop forge plant of the Standard Parts Co. which was recently sold to men associated with the new company. The officers are F. C. Moore, president; H. C. Holloway, secretary; and Thomas F. DuPuy, general manager. It will do general commercial drop forge work.

The Adkins Mfg. Co., Canton, Ohio, has been organized and has taken over the assets of the Adkins Sales & Mfg. Co. to manufacture a high pressure lubricating system. R. G. Witters is president; L. J. Noaker, vice-president; N. J. Cummings, treasurer, and W. F. Johnston, secretary.

The Burch Power Works, Crestline, Ohio, has taken over the International Mfg. Co., of that city; maker of grain, seed and bean cleaners.

The sale of the plant of A. J. Miller & Co., Bellefontaine, Ohio, hearse manufacturer, to a newly organized company, the A. J. Miller Co., has been authorized by an order of court. Albert Riggs, receiver, will become president of the new company which will manufacture funeral cars.

The W. R. Roberts Machine Co., Lima, Ohio, has been incorporated with a capital stock of \$40,000 by W. R. Roberts and others and will operate a plant at 2223 South Main Street.

The Safety Switch Distributing Co., Canton, Ohio, has

been incorporated by John I. Bahl and others to manufacture a railroad safety switch.

The Lewis Electric Mfg. Co., Minerva, Ohio, is having plans prepared for a two-story factory, 60 x 400 ft.

Seattle

SEATTLE, JAN. 2.

The Northwestern Electric Co., Seattle, Wash., is planning the immediate rebuilding of its power house at Camas, Wash., recently destroyed by fire with loss of about \$75,000. S. E. Carlton is manager.

The Menasha Woodenware Co., North Bend, Ore., has preliminary plans under way for the erection of a new one-story plant.

The Three Lakes Lumber Co., Three Lakes, Wash., has preliminary plans under way for rebuilding the portion of its mill recently destroyed by fire, with loss estimated at \$75,000, including equipment.

The Goodyear Rubber Co., Seattle, Wash., has arranged for a lease of the two-story factory, 50 x 110 ft., to be constructed by the Great Northern Construction Co., New York Building, at Harrison Street and Terry Avenue, for the establishment of a local plant. Ground will be broken at an early date. Beezer Brothers, Seaboard Building, are architects.

The Murtaugh Irrigation District, Murtaugh, Idaho, has made application for permission to utilize waters of the Snake River for the construction of a new hydroelectric generating plant and electrically-operated pumping plant for irrigation service, estimated to cost close to \$500,000.

A vocational department will be installed in the new high school to be erected by the Board of Education, Rochester, Wash.

The Central South

ST. LOUIS, JAN. 9.

The American Foundry & Mfg. Co., 2027 Brooklyn Avenue, Kansas City, Mo., has awarded a contract to William R. Jewell, Jr., 227 Rialto Building, for the first unit of its new plant, to be one-story, 90 x 135 ft., and estimated to cost about \$35,000. Two additional units, approximately the same size, are being considered, to cost about \$65,000. Henry H. Akers is head.

A vocational department will be installed in the new high school to be erected by the Consolidated School District No. 1, King City, Mo. Work will commence at an early date. William F. Schrage, 809 Huntington Road, Kansas City, Mo., is architect.

The Common Council, Woodward, Okla., has commissioned Black & Veatch, architects, Mutual Building, Kansas City, Mo., to prepare plans for its municipal electric light and power plant, estimated to cost about \$100,000. R. O. Renfrew is mayor.

The Stafford Motor Works, Twenty-second and Campbell streets, Kansas City, Mo., has completed plans for a one and two-story machine shop at Twenty-seventh and Holmes streets, 65 x 130 ft., estimated to cost about \$27,000.

A vocational department will be installed in the new high school to be erected at Goodman, Kan., by the Shawnee Mission Rural High School District, Meriam, Kan., A. M. Meyers, chairman, estimated to cost about \$150,000. Keene & Simpson, 400 Reliance Building, Kansas City, Mo., are architects.

Fire, Dec. 30, destroyed the machine shop and other portions of the plant of the Clarksdale Machinery Co., Clarksdale, Miss., with losses estimated at about \$25,000.

The Hydro-United Tire Co., Pottstown, Pa., manufacturer of automobile tires and tubes, has acquired a controlling interest in the A. J. Stephens Rubber Co., Kansas City, Mo., manufacturer of kindred products. Tentative plans are being considered for enlargements. J. H. Phillips is president of the Hydro-United company.

An ice and refrigerating plant with initial capacity of about 75 tons a day will be constructed by the LaFollette Cream & Produce Co., LaFollette, Tenn., recently organized. Plans are being prepared. W. S. and D. A. Harkness, Jellico, Tenn., head the company. W. A. Yeager is local manager.

The Pine Bluff Spoke Co., Pine Bluff, Ark., has plans under way for the immediate rebuilding of the portion of its plant recently destroyed by fire with loss of about \$50,000.

A vocational department will be installed in the two-story and basement high school to be erected by the Board of Education, Haviland, Kan., estimated to cost about \$90,000. Mann & Gerow, Hutchinson, Kan., are architects.

The Standard Sanitary Mfg. Co., Bessemer Building, Pitts-

burgh, has awarded contract to the George Rommell Co., 956 Logan Street, Louisville, for a one-story addition to its Louisville plant, 56 x 175 ft., estimated to cost about \$75,000.

The Southern Refrigeration Co., Johnson City, Tenn., has preliminary plans under way for a new ice and cold storage plant.

A bond issue of \$150,000 for the construction of a municipal electric light and power plant has been approved at a special election at Altus, Okla. The Common Council is in charge. Plans will be prepared at an early date.

Henry Madler and M. J. Towle, Louisville, are having plans prepared by D. X. Murphy & Brother, architects, Louisville Trust Building, for a four-story and basement automobile service and repair works, estimated to cost about \$250,000.

The LaFollette Coal & Iron Co., LaFollette, Tenn., is planning for the construction of a new coal carbonizing plant, estimated to cost in excess of \$50,000, including equipment. Parker & Wilder, Cincinnati, are engineers.

A vocational department will be installed in the new two- and three-story high school to be erected by the Board of Education, Shaw, Miss., 150 x 225 ft., estimated to cost about \$250,000. M. W. Overstreet, Jackson, Miss., is architect.

Indiana

INDIANAPOLIS, Jan. 9.

The Interstate Car Co., Massachusetts Avenue and Sherman Drive, Indianapolis, is planning for the erection of a one-story foundry for the production of iron castings, estimated to cost about \$25,000.

The Bloomington Brick & Tile Co., Bloomington, Ind., is considering the erection of a new plant estimated to cost about \$200,000, including machinery.

The Commonwealth Edison Co., 27 West Adams Street, Chicago, has preliminary plans under way for its new electric power plant in the vicinity of Hammond, Ind., estimated to cost in excess of \$15,000,000, including machinery and transmission system.

The Citizens' Gas Co., South Pennsylvania Street, Indianapolis, is planning the erection of a new coke screening plant at its works on Prospect Street, estimated to cost about \$40,000, including equipment.

The F. W. Cook Brewing Co., Evansville, Ind., has completed plans for remodeling a portion of its plant for manufacturing ice. Machinery and equipment will be installed to provide an initial capacity of about 300 tons per day. The work is estimated to cost about \$300,000.

A one-story power plant will be erected in connection with the addition to be constructed at the plant of the Showers Brothers Co., Bloomington, Ind., manufacturer of furniture, estimated to cost about \$1,000,000. The H. K. Ferguson Co., Vickers Building, Cleveland, is architect and engineer. Charles A. Sears is superintendent.

The mill and engine room at the plant of the National Handle Co., Frankfort, Ind., were destroyed by fire Jan. 2 with an estimated loss of \$30,000. The company is a subsidiary of the American Fork & Hoe Co.

The South Bend Brewing Association, South Bend, Ind., announces that it will convert its plant for the manufacture of ice, at an estimated cost of \$75,000.

The Gulf States

BIRMINGHAM, Jan. 9.

The Missouri, Kansas & Texas Railway Co., St. Louis, is planning for extensions and improvements at Denison, Tex., to cost in excess of \$2,000,000. The work will include a new engine house, machine and repair shops, power plant and other structures.

Fire, Dec. 31, destroyed the sugar refinery of the Ingleside Sugar Refining Co., Lakeland, near Baton Rouge, La., with loss estimated at about \$300,000, including machinery.

The White Star Cement & Coal Co., Birmingham, recently organized with a capital of \$3,000,000, is planning for new cement works in the vicinity of Village Springs, Ala., with annual capacity of close to 1,000,000 bbl. Richard K. Meade & Co., 11 East Fayette Street, Baltimore, are engineers.

The Public Service Co., San Antonio, Tex., operating local electric light, power, and railroad utilities, is planning for extensions and improvements in its power plants and system during 1922 to cost about \$1,500,000. Plans for certain parts of the work are being prepared. El H. Kifer is vice-president and general manager. The company has arranged for a bond issue of \$2,800,000.

The Thomas Gravel Co., Alexandria, La., recently organized with a capital of \$500,000, is planning for the establish-

ment of a gravel washing and screening plant on property recently leased in this section. I. L. Thomas is president and general manager.

The City Council, Bastrop, La., is planning for extensions and improvements in its municipal electric light and power plant, including the installation of new equipment, estimated to cost about \$450,000. Plans will be prepared and work placed under way at an early date.

The Louisiana Celotex Co., New Orleans, manufacturer of building board and kindred products, is planning for enlargements to double, approximately, the present capacity. A bond issue of \$500,000 has been arranged for new buildings and equipment.

The Humphreys Pure Oil Refineries Corporation, Mexia, Tex., recently organized with a capital of \$50,000,000, has selected Port Neches, Tex., as the terminus of its proposed pipe line from the Mexia fields, and plans the establishment of a refinery at this location. Col. E. A. Humphreys is head.

The Medina Valley Irrigation Co., San Antonio, Tex., is planning for the construction of a hydroelectric generating plant on the Guadalupe River, estimated to cost in excess of \$5,000,000 complete.

The Arkansas Compress Co., Corpus Christi, Tex., is arranging for extensions and improvements in its plant to cost about \$60,000. J. K. Cain is secretary and treasurer.

A vocational department will be installed in the new two-story high school to be erected by the Board of Education, Bryan, Tex. Plans have been prepared.

The Florida Nu-Tex Brick Co., 109 Water Street, Tampa, Fla., W. B. Coarsey, president, is planning for the erection of branch factories in different parts of the State to manufacture cement brick and affiliated products.

A vocational department will be installed in the two-story and basement high school to be erected by the Board of Education, Texline, Tex., estimated to cost about \$110,000. Eads & McClure, Chickasha, Okla., are architects.

H. K. Johnson, Hibernia Bank Building, New Orleans, is planning for the construction of a new electric light and power plant for service in certain sections of the city.

California

SAN FRANCISCO, Jan. 2.

The Automatic Electrical Machine Co., Oakland, Cal., has awarded contract to S. I. Lundberg, 3434 Elmwood Street, for a new one-story plant on High Street.

The Bethlehem Shipbuilding Co., San Francisco, has acquired the plant of the Southwestern Shipbuilding Co., Los Angeles, for a branch yard. Plans are under way for a new drydock capable of handling vessels of 12,000-ton rating. A portion of the property will be used as a steel fabricating plant. Francis B. Smith, at one time connected with the Government drydock at Honolulu, will be in charge.

Harry W. Fawke, San Francisco, for the past 12 years superintendent of hull construction at the plant of the Moore Shipbuilding Co., and Edward McKarley, Stockton, Cal., have organized the Terminal Iron Works Co. and have acquired the plant and property of the Stockton Iron Works, Stockton, to manufacture steel and iron products. Preliminary plans are being considered for a branch plant for ship repair work, to be operated in conjunction with the structural department.

The California Gypsum Co., Los Angeles, has applied for a lease of property at National City, Cal., as a site for a new plant, estimated to cost \$350,000, including machinery.

The Pacific Sanitary Mfg. Co., Fifth and Hensley streets, Richmond, Cal., manufacturer of sanitary ware, will commence the immediate erection of an addition, estimated to cost about \$60,000.

The Red Seal Refining Co., 248 East Ocean Boulevard, Long Beach, Cal., recently organized with a capital of \$1,500,000, is planning the erection of a new oil refinery in the West Anaheim Boulevard industrial district, estimated to cost about \$600,000, including machinery. Charles H. Gifford is president.

The Los Angeles Automotive Co., Los Angeles, has had plans prepared by the Moran Co., 511 Central Building, for a one-story plant, 70 x 250 ft., at 1020 Towne Avenue, to manufacture automobile specialties and parts. Bids have been asked and work will begin at an early date.

A vocational department will be installed in the new high school to be erected at Tustin, Cal., estimated to cost about \$250,000. Matt M. Marston, I. W. Hoffman Building, Los Angeles, is architect.

The Union Ice Co., Napa, Cal., has plans nearing completion for the erection of the first unit of a new ice manufacturing plant, estimated to cost approximately \$50,000. Additional units will be erected soon, increasing the output to about 80 tons per day.

Canada

TORONTO, Jan. 9.

The demand for machine tools is still limited. Inquiries are coming forward more freely and sales of one or two tools are being made, but on the whole the market is comparatively quiet. Industrial interests in Great Britain and the United States continue to make known their intentions of establishing plants in Canada, and while several have already started, others have building programs under way which are expected to mature in the early future. The Canadian railroads have made no announcements of their intention to buy new rolling stock, but are having their equipment put in good order and many hundreds of cars have been turned in for rebuilding and repairs. This repair work has stimulated business among car shops, and although there has only been limited buying of equipment from this source for several months, dealers are of the opinion that the railroads and other car building concerns will shortly be in the market for new tools and general equipment.

Plans are being prepared for an addition to the plant of the Welland Machine & Foundry Co., Welland, Ont.

The Beeby Range Co., Ltd., recently incorporated with a capital stock of \$50,000, has leased a portion of the plant of the Machinery & Foundries, Ltd., Brockville, Ont., to manufacture cooking appliances. The directors include A. A. Dion, general manager Ottawa Gas Co., Ottawa; Joseph E. Grovelle, president Fortin & Grovelle, Ottawa; A. A. Major, vice-president S. J. Major Co., Ottawa; John H. Beeby, stove manufacturer and efficiency engineer, Ottawa, Ont.

The Oak Tire & Rubber Co., Toronto, Ont., will build an addition, construction to start in the near future.

The factory owned by the McCarter Shingle Co., Rock Bay Avenue, Victoria, B. C., was damaged by fire with loss to building and machinery of \$60,000.

The Moncton Tramway Gas & Electric Co., Moncton, N. B., has awarded the general contract for a power plant to cost \$35,000.

R. Patterson, 770 Third Avenue East, Owen Sound, Ont., is interested in a company which proposes to erect a cement-making plant there with a daily capacity of 4000 bbl.

Leslie & Harding, Georgetown, Ont., are in the market for machinery for making skates.

The Woodstock Powdered Milk Co., Woodstock, Ont., is asking for machinery and equipment to manufacture milk powder, including evaporators, separators, etc.

Short Trade Items

The Eastern Fuel Co., Frick Building, Pittsburgh, has taken over the exclusive sales agency of the Robinson Coal Co., New Superior Coal & Coke Co., Lambert Run Coal Co., Delmar Coal Co., Hughes Coal Co., East Side Utility Co., Fairmont Fuel Co., all in the Fairmont, W. Va., field and which have a combined shipping capacity of 150 cars daily.

On Jan. 1, the name of the Reading Machinery Exchange was changed to Reading Machine & Tool Co., 437 Washington Street, Reading, Pa. Some time ago the company discontinued handling used machinery, and since then has been devoting all efforts to the sale of new metal and wood-working machinery and tools, electric motors and industrial furnaces.

Joseph N. Bethel, sales engineer; Sidney Player, production manager; Richard S. Staples, metallurgist; Herbert S. Indge, engineer; and Alfred E. Box, factory superintendent, Taft-Pierce Mfg. Co., Woonsocket, R. I., have resigned, having acquired a financial interest in the Warren F. Fraser Co., Westboro, Mass., grinding machinery, which has been reorganized. Mr. Bethel is vice-president and sales manager of the reorganized concern; Mr. Player, vice-president and general manager; Mr. Staples, assistant treasurer and metallurgist; Mr. Indge, consulting engineer; and Mr. Box, plant superintendent. Other officers of the Fraser Co. include Frank A. McClaskey, Boston, vice-president; and Maurice J. Cashman, Boston, treasurer.

The Hendee Mfg. Co., Springfield, Mass., motorcycles, has sold to a syndicate of New York and Philadelphia its interest in the Harley Co., Springfield, foundry and drop forgings, on a basis of part cash and part mortgage, the total sale amounting to \$825,000. In addition to a foundry, the property consists of several one-story modern drop forging plants, a full line of equipment and miscellaneous stock on hand. The plant has been closed many months. Negotiations for its purchase have been carried on with various parties in the meantime. While the identity of the new owners is not disclosed, it is understood they are indirectly interested in the Pennsylvania Railroad and that a special line of railroad accessories used by the Pennsylvania lines will be manufactured. Heretofore officers of the Hendee Mfg. Co. owned a substantial stock interest in the Harley Co., but recently purchased the minority holdings to protect their investment.

IRON AND INDUSTRIAL STOCKS

Little Has Developed Since Last Reports to Encourage Investment Buying

In the Middle West the purchasing power of the farmer has not increased, and the banking situation is not as clear as it might be. Money rates naturally rule higher, and unemployment is increasing. No better illustration of general industrial conditions in the East can be had than the fact that call money went begging the past week in New York at 3 1/4 per cent. It is still difficult to secure credit in the South except at high interest rates, especially in the cotton states. With such conflicting conditions existing, the recent setback in iron and industrial stocks is understandable. Steel stocks have held relatively better than most industrials on buying fostered by merger reports. Little enthusiasm in steel shares is disclosed in investment circles, however, because of the uncertainty of forthcoming earnings reports. Further reductions in prices by automobile builders lessen the chances of dividends being earned unless consumption materially increases. The railroads are not coming forward with equipment purchases as readily as anticipated because earnings are not showing up as well as expected following drastic curtailment in operating expenses. Oil shares presumably are passing through a stage of liquidation due to falling prices for the crude fuel. The consumption of copper is on the increase, but has not reached proportions to attract heavy investment in copper securities.

The range of prices on active iron and industrial stocks from Monday of last week to Monday of this week was as follows:

Allis-Chal., com.	37 1/4 - 39 1/4	Lackawanna St.	44 1/4 - 47 1/4
Allis-Chal., pf.	86 1/2 - 87	Midvale Steel	27 1/4 - 30 1/4
Am. Can., com.	32 1/4 - 34 1/4	Nat. Fl. & St., c.	33 1/2 - 36 1/2
Am. Can., pf.	93 1/4 - 94 1/4	Nat. Fl. & St., pf.	91
Am. C. & F., com.	142 - 145	N. Y. Air Brake	58 - 62 1/2
Am. C. & F., pf.	115 1/2 - 116	Nov. Scotia Steel	22 1/4 - 23
Am. Loco., com.	102 - 108 1/2	Pressed St., com.	63 1/4 - 65 1/4
Am. Loco., pf.	113	Pressed St., pf.	91 1/4 - 92 1/4
Am. Rad., com.	85 - 86	Ry. St. Sp., com.	94 1/4 - 99 1/4
Am. St. Fd., com.	31 1/2 - 33	Replogie Steel	27 1/4 - 27 1/2
Am. St. Fd., pf.	95 - 96 1/4	Republic, com.	50 1/2 - 54 1/2
Bald. Loco., com.	93 1/2 - 98 1/2	Republic, pf.	85 - 86
Bald. Loco., pf.	104	Sloss, com.	36 - 38 1/4
Beth. Steel, com.	52 - 52 1/2	Sloss, pf.	69 1/2 - 72
Beth. St. Cl. B.	55 1/2 - 57 1/2	Superior Steel	26 - 27 1/2
Beth. St., 8% pf.	104 - 104 1/2	Transue-Wms.	33
Colo. Fuel	24 1/4 - 26	Un. Alloy Steel	25 - 25 1/2
Crucible St., com.	63 1/2 - 67 1/4	U. S. Pipe, com.	17
Crucible St., pf.	82 - 85 1/2	U. S. Steel, com.	82 - 84 1/4
Gen. Electric	137 - 140 1/4	U. S. Steel, pf.	114 1/4 - 115
Gt. No. Oro Cert.	31 1/4 - 31 1/2	Vanadium Steel	30 1/2 - 32 1/2
Gulf Steel	45 - 47 1/2	Va. I. C. & Coke	85 - 87
Int. Har., com.	79 1/2 - 82	Westinghouse El.	49 1/4 - 50 1/4
Int. Har., pf.	105 1/2 - 106		

Industrial Finances

Directors of the Truscon Steel Co., Youngstown, Ohio, have declared the regular quarterly dividend of \$1.75 on preferred stock, payable Jan. 16 to holders of record Jan. 5.

The Ohio Iron & Steel Co., Youngstown, Ohio, has authorized a yearly dividend of 6 per cent in 1922 on its outstanding capital. The company is no longer engaged in steel production, but is a holding company only.

P. Leroy Harwood, New London, Conn., has been appointed trustee of the Groton Iron Works, Norwich, Conn., by Referee in Bankruptcy Thomas M. Shields.

A creditors' committee recently appointed to operate the plant of the American Motors Corporation, Plainfield, N. J., is negotiating for the sale of the property as a going business. It is said that arrangements will be consummated and production resumed at an early date. The committee is headed by R. H. Ison of the American Motor Body Co., 30 Church Street, New York.

Directors of the Falcon Steel Co., Niles, Ohio, have authorized the regular dividend of \$1.75 on the preferred stock, and a dividend of \$1 per share on common, both payable Jan. 2 to holders of record Dec. 20. The company instituted its common stock payment on Oct. 1 last.

At a special meeting Dec. 18, stockholders of the Bessemer Limestone & Cement Co., Youngstown, Ohio approved recommendation of directors for an issue of \$750,000 8 per cent sinking fund convertible gold notes. Shareholders will have until Dec. 26 to exercise their subscription rights. Proceeds of the notes, issued under date of Jan. 1, will be employed to defray new construction expenses and to provide some additional working capital. Accumulating against Spring buying, the company is operating its cement plant at Bessemer, Pa., well toward normal. It has capacity for storing 500,000 bbl. of semi-finished material.

Current Metal Prices

On Small Lots, Delivered from Merchants' Stocks, New York City

The following quotations are made by New York City warehouses

As there are many consumers whose requirements are not sufficiently heavy to warrant their placing orders with manufacturers for shipment in carload lots from mills, these prices are given for their convenience.

On a number of articles the base price only is given, it being impossible to name every size.

The wholesale prices at which large lots are sold by manufacturers for direct shipment from mills are given in the market reports appearing in a preceding part of THE IRON AGE under the general heading of "Iron and Steel Markets" and "Non-ferrous Metals."

Iron and Soft Steel Bars and Shapes

Bars:	Per Lb
Refined bars, base price	2.53c.
Swedish bars, base price.....	10.00c.
Soft steel bars, base price ..	2.53c.
Hoops, base price ..	3.38c.
Rails, base price ..	3.13c.
Beams and channels, angles and tees	
3 in. x 1/4 in. and larger, base.....	2.63c.
Channels, angles and tees under 3 in. x	
1/4 in., base	2.53c.

Merchant Steel

	Per Lb
Tire, 1 1/2 x 1/2 in. and larger	2.50c.
(Smooth finish, 1 to 2 1/2 x 1/4 in. and larger) ..	2.70c.
Toe calk, 1/2 x 1/2 in. and larger.....	3.20c.
Cold-rolled strip, soft and quarter hard..	6.25c. to 7.25c.
Open-hearth spring steel	3.55c. to 6c.
Shafting and Screw Stock:	
Rounds	3.45c.
Squares, flats and hex.	3.95c.
Standard cast steel, base price.....	12.00c.
Extra cast steel	17.00c.
Special cast steel	22.00c.

Tank Plates—Steel

1/4 in. and heavier	2.63c.
---------------------------	--------

Sheets

Blue Annealed

	Per Lb
No. 10	3.28c. to 3.53c.
No. 12	3.33c. to 3.58c.
No. 14	3.38c. to 3.63c.
No. 16	3.48c. to 3.73c.

Box Annealed—Black

	Soft Steel C R, One Pass Per Lb.	Blued Stove Pipe Sheet, Per Lb.
Nos. 18 to 20	3.80c.	.....
Nos. 22 and 24	3.85c.	4.10c.
No. 26	3.90c.	4.15c.
No. 28	4.00c.	4.25c.
No. 30	4.25c.	.....
No. 28 and lighter, 36 in. wide, 10c. higher.		

Galvanized

	Per Lb
No. 14	3.95c. to 4.10c.
No. 16	4.10c. to 4.25c.
Nos. 18 and 20	4.25c. to 4.40c.
Nos. 22 and 24	4.40c. to 4.55c.
No. 26	4.55c. to 4.70c.
No. 27	4.70c. to 4.85c.
No. 28	4.85c. to 5.00c.
No. 30	5.35c. to 5.50c.
No. 28 and lighter, 36 in. wide, 20c. higher.*	

Welded Pipe

Standard Steel

	Black	Galv		Black	Galv
1/2 in. Butt... ..	—56	—40	1/2-in. Butt... ..	—30	—13
3/4 in. Butt... ..	—61	—47	1 1/2-in. Butt... ..	—32	—15
1-3 in. Butt... ..	—63	—49	2-in. Lap... ..	—27	—10
3 1/2 in. Lap... ..	—60	—46	2 1/2-8-in. Lap... ..	—30	—15
7-8 in. Lap... ..	—56	—34	7-12-in. Lap... ..	—23	—7
9-12 in. Lap... ..	—55	—33			

Wrought Iron

Steel Wire

BASED PRICE* ON NO. 3 GAGE AND COARSE

	Per Lb.
Bright basic	3.75c.
Annealed soft	3.75c.
Galvanized annealed	4.00c.
Coppered basic	4.25c.
Tinned soft Bessemer	5.75c.

*Regular extras for lighter gage.

Brass Sheet, Rod, Tube and Wire

BASE PRICE

High brass sheet	17 1/2 c. to 17 3/4 c.
High brass wire	17 1/2 c. to 17 3/4 c.
Brass rod	14 1/2 c. to 15 c.
Brass tube, brazed	26 c. to 27 1/2 c.
Brass tube, seamless	18 1/2 c. to 19 c.
Copper tube, seamless	21 1/2 c.

Copper Sheets

Sheet copper, hot rolled, 24 oz., 21 1/2 c. per lb. base.
Cold rolled, 14 oz. and heavier, 2c. per lb. advance over hot rolled

Tin Plates

Bright Tin	Grade	Grade	Coke—14-20	Primes	Wasters
	"AAA"	"A"			
	Charcoal	Charcoal			
	14x20	14x20			
IC..	\$10.00	\$8.50	80 lb...	\$6.05	\$5.80
IX..	11.25	10.00	90 lb...	6.15	5.90
IXX..	13.00	11.50	100 lb...	6.25	6.00
IXXX..	14.75	13.25	IC...	6.40	6.15
IXXXX..	16.25	15.00	IX...	7.40	7.15
			IXX...	8.40	8.15
			IXXX...	9.40	9.15
			IXXXX...	10.40	10.15

Terne Plates

8-lb. Coating 14 x 20

100 lb.	\$7.00
IC	7.25
IX	7.50
Fire door stock	10.00

Tin

Straits, pig	35c.
Bar	40c. to 45c.

Copper

Lake ingot	16 c.
Electrolytic	15 1/2 c.
Casting	15 1/4 c.

Spelter and Sheet Zinc

Western spelter	6 1/2 c. to 7c.
Sheet zinc, No. 9 base, casks	10 1/2 c. open 11c.

Lead and Solder*

American pig lead.....	5 1/2 c. to 6 1/4 c.
Bar lead	6 1/2 c. to 7 c.
Solder, 1/2 and 1/2 guaranteed	27c.
No. 1 solder	25c.
Refined solder	21c.

*Prices of solder indicated by private brand vary according to composition.

Babbitt Metal

Best grade, per lb.	30c.
Commercial grade, per lb.....	40c.
Grade D, per lb.....	55c.

Antimony

Asiatic	6 1/2 c. to 6 3/4 c.
---------------	----------------------

Aluminum

No. 1 aluminum (guaranteed over 99 per cent pure), in ingots for remelting, per lb....	27c. to 29c.
--	--------------

Old Metals

Prices are generally unchanged, although business is very quiet. Dealers' buying prices are nominally as follows:

	Cents Per Lb.
Copper, heavy crucible.....	11.25
Copper, heavy wire	10.75
Copper, light and bottom	8.25
Brass, heavy	5.50
Brass, light	4.50
Heavy machine composition.....	5.00
No. 1 yellow brass turnings	6.50
No. 1 red brass or composition turnings	7.25
Lead, heavy	2.75
Lead, tea	2.50
Zinc	2.50

THE IRON AGE

New York, January 19, 1922 *

ESTABLISHED 1888

VOL. 109, No. 3

Crucible and Electric Tool Steel

Some Aspects of Choice in Their Manufacture—Electric Furnace
a Sealed Crucible—Operating Conditions
Compared in Detail

BY W. J. AND S. STUART GREEN*

PROBABLY one of the questions most frequently propounded has been—"is electric steel really as good as crucible"? Our answer has been in some cases yes and others probably no. Electric steel, using certain materials and melting practice, may be no better than open-hearth or Bessemer steel and, on the other hand, using other materials and melting practice, it may easily be the equal of the finest steel made.

Be this as it may, the basic electric furnace has established itself as a formidable competitor of the time-honored crucible wherever tool steel is made, and it seems opportune to review in a brief some thoughts gathered in a rather long crucible, though a necessarily shorter, electric experience. This experience covers the manufacture of almost every variety of alloy tool steels by both processes, including a large tonnage of high-speed steel made in 3- and 6-ton heats in the electric furnace and, last but not least, a large tonnage of straight carbon tool steel, which for the purpose of this paper is probably the most important; for it is in the manufacture of this steel, unclouded by alloys, that a true comparison can best be made.

The motive for writing the paper is a disinterested one, for we have no furnace to sell nor have we one to recommend. The choice of a melting medium for the manufacture of tool steels is now confronting some manufacturers of this commodity and, if these notes assist in the proper selection, the purpose of this paper will be fully served. To those who already have made a selection or are not, for other reasons, confronted by such a choice but are tool steel makers, this article may be of interest merely as a presentation of conclusions drawn from an intimate contact with both furnaces in contrast to the more or less inspired claims of furnace builders.

The Crucible for Steel Castings

The subject, tool steel manufacture, probably does not rightly include steel castings. This branch has, however, some small bearing on the purpose of the paper and therefore the following brief mention is made.

It has fallen to the lot of both of the writers to have had experience with the delivery of crucible steel for castings, and the passing therefore of the crucible in this branch of the steel trade seems something of a personal loss. That it is passing there can be no longer reasonable doubt; the following figures clearly show the trend and demonstrate also that the electric furnace, while not necessarily the more efficient of the two, is capable of producing as good a product as the crucible.

In the United States only 1786 tons of crucible steel cast-

ings were made in 1920 as against 20,550 tons of crucible steel castings in 1912 a falling off of almost 92 per cent. Indeed in 1919 the situation was even worse when only 1004 tons of crucible steel castings was made, a falling off of something like 95 per cent, which of course means approximate extinction. In 1920 the electric furnace made in the United States 155,196 tons of steel castings thereby surpassing the largest crucible tonnage ever made.

These figures are taken from the statistics of the American Iron and Steel Institute and were published by the writers in graphic form in an article appearing in THE IRON AGE, Oct. 27, 1921. They would seem to furnish reliable indication of the rejection in America, in no uncertain fashion, of the crucible for the manufacture of steel castings. We regret our inability to secure accurate figures covering the production of steel castings in Great Britain, but those we have seem to indicate a similar, though by no means so drastic a, condition.

It appears therefore that in the manufacture of steel castings the crucible has already very largely given way to the electric furnace, which latter has incidentally secured additional tonnage elsewhere. There can be no question in face of these figures, representing as they do so strong an adoption of the electric furnace, of the satisfactory quality of electric steel for this purpose. Indeed, the writers can see one or two possible advantages in favor of the electric steel, totally aside from the strong economic reasons, which latter undoubtedly have played so large a part in its adoption. These reasons will be more fully touched in connection with tool steel production.

The Crucible and Tool Steel

The very much weakened position of the crucible in the steel casting industry is not exactly the condition to-day existing in the tool steel branch, in which the crucible still retains much of its old time dominance, particularly in Sheffield. The reasons for this are possibly to be found in the following. The steel casting industry, by reason of smaller commercial outlay requirements, became very much more competitive than the tool steel branch, with its necessarily costly hammers, rolling mills, etc. Competition suggested cheaper steel-making methods and these were tried. The converter and the open-hearth secured a portion of the cheaper work but did not succeed to the high grade end in spite of the somewhat easier quality requirements of castings as against tool steel. The electric furnace, however, could produce cheaper steel than the crucible by virtue of its greater efficiency and its quality proved to be fully satisfactory, as has been shown before. A deluge of work was diverted to the electric furnace and

III.—Inherent differences imposed by the furnace employed, crucible or electric.

Having narrowed the question to the three points enumerated above, the subject can be carefully looked into with a degree of accuracy and the deductions checked against known facts where required.

The three subjects, for more careful discussion, are not arranged with any idea of order of importance, as any one of them could be vital to the success of either process. It will be seen also that no great attempt is made to investigate "mysterious virtues," sometimes even in this day, advanced in favor of the crucible, for it seems to us that while such things might well have passed muster a century ago, it is extremely questionable to-day, for the mysterious is very frequently illusionary.

I. Selection of Melting Stock

The selection of melting stock, or raw materials, is a very serious responsibility, and it is noteworthy that from the early history of the crucible its melters used great discrimination, amounting to almost a fetish in such selection. The crucible held out no glamor of chemical refining, no illusionary manufacture of silk from the proverbial sow's ear, and they were therefore not distracted from the straight and narrow path. Only what is put in the "weigh-pan" will be found in the steel was the dominating thought and guided them safely in the direction of the best steel-making Swedish irons, blister bar, Swedish white irons and, of course, its own tool scrap. The fact that this industry was enjoying a most complete monopoly largely assisted in such a choice, admitting the free use of somewhat expensive materials, having no keen competition to fight, nor a possibility of being supplanted by any less costly method, since it was the only steel-making process in existence.

Raw Material Costs

The crucible therefore started out with the slogan, "it takes quality to make quality." This slogan we have suggested was possibly inspired by its complete monopoly of the entire industry, and to the fact that no "red herring" in the shape of refining possibilities had to be drawn across its track. It used the best possible materials for its first quality product (we are concerned in this paper with no other) and, to a large degree, has to-day retained with remarkable fidelity this foundation of quality. Chemical guidance at the inception of this industry was entirely non-existent and its absence created brands of steel-making irons, some attaining wonderful reputations.

Many fine old brands come to our minds of the Dannemora type and, it might be said here, that soon two distinct qualities of Swedish irons were to be bought, Lancash and Walloon. These two irons, though chemically substantially identical, varied very much in price. Looking over some old records, we find Walloon iron costing as much as 28s. per hundred weight, while Lancash was as low as 9s. 6d. per hundred weight. Cost of manufacture appears to be largely responsible for this, the Walloon process being much more expensive in so far as fuel was concerned, the fuel being, of course, charcoal. Typical of quality, brought to bear on the production of first quality crucible steel, the Walloon iron, in spite of the chemical similarity of Lancash and in the face of its very much higher price, was very freely used in the manufacture of "warranted best cast steel" by the Sheffield crucible steel makers. Swedish white carburizing irons held sway over gray irons, and so, all through the selection.

The costly nature of these melting materials is emphasized by the necessity of reducing to possible by hammer, mill and shear, all this material, but, for the excellent reason before stated, the trade was then well able to bear this further great expenditure. The situa-

tion is now changed by the arrival of its competitor, which does not require such an expenditure, in fact prefers larger stock for its reduced surface advantage. The fine brands of steel-making irons became standards from which no departures were made; materials were blended into private mixtures and these surrounded with a certain amount of secrecy, which very probably offers full explanation for such intangible claims of "mysterious virtues." These private brands certainly did much, however, to build up individual reputations, which have been very jealously guarded, in some cases for more than a century.

It will be seen that, in so far as the selection of raw materials was concerned, the crucible used only the best obtainable without regard to price. It faithfully and consistently maintained high standards and, with a few notable exceptions, does so to-day. On such a foundation, with 180 years of connection and 120 years absolute monopoly, it is not hard to see some reason for the tenacity of its hold on the tool steel business. It is well indeed to turn on the light of inquiry and see how far these things hold to-day.

Raw Materials for the Electric Furnace

Turning to the electric furnace, it is at once apparent that exact duplication of the melting stocks of the crucible is easily possible by the simple expedient of charging exactly the same materials. It is evident therefore that the electric furnace need take no second place in the question of native purity and natural body of melting stock.

It must be admitted, however, that in the early days of the electric furnace this duplication was not attempted, it not being born with a silver spoon in its mouth as was its venerable competitor. It was not born and raised under the kindly wing of monopoly, as was its rival, neither did it hold the powerful connection such as is carried by any institution almost 200 years old. What was worse, it had from its inception doubtful claims of remarkable refining properties, making possible the manufacture of the finest tool steel from any old kind of scrap, so long as it was steel. These claims, inspired no doubt by the spur of keen competition and the apparent necessity of finding some striking advantage to recommend its adoption and the consequent scrapping of the crucible, did incalculable harm at the outset. No particular attention was deemed necessary, or given to the selection of melting stock, the idea being, charge the furnace and then turn on the refining tap. Never, indeed, could the electric furnace seriously compete with the crucible while shoddy was its charge or such an outlook held sway.

This situation, happily, has now been largely rectified; elaborate refining, clever chemical manipulations, etc., now find no place in the manufacture of first grade tool steel. "Only what is in the weigh-pan will be in the finished steel" is now as largely recognized in the new industry as it is in the crucible. Considering the furnace as but 10 years old commercially it will probably be admitted that not much time has been lost in tuning up to crucible pitch.

The writers carefully outlined three standard grades of electric tool steel qualities, both as to selection of melting stock and melting practice, in an article published in THE IRON AGE Sept. 15, 1921, of which just a brief quotation as to melting stock of first quality steel is taken:

Charge to consist of all heavy melting stock insuring little oxidation. Well under manganese and phosphorus of final specification. American Swedish, rolling mill iron, ingot iron or similar stock being desirable, except as hereinafter provided. Charge shall contain not less than 10 per cent of washed metal or Swedish carbonizing iron. and not less than 20 per cent but up to 40 per cent of heavy electric furnace tool scrap. replacing to amount used, stock described above.

There can be no question that where such melting

stock is used the crucible has not the slightest lead, and such materials are used and have been used for some time. Fuller details as to mixture standardization and designing can be obtained from the article, as can an outline of the cheaper grades. The standard mixtures and qualities of the crucible, which have done so much to build up its reputation, are to be found in just as complete a form in the tool steel electric furnace. Continuity of product and standard quality grades are no longer the monopoly of the crucible, but are shared possibly to an equal degree by its youthful competitor.

It is agreed, therefore, that a full equality in the selection of melting stock is already shared in some quarters by the electric furnace and where not, can be, by the simple duplication of crucible charges. The exception to this is in favor of the electric furnace, which does not require its stock reduced to pot size; indeed, prefers larger material, and so secures a valuable commercial and possibly some slight metallurgical advantage.

II. Melting Practice

The whole purpose of the crucible process, in so far as melting practice is concerned, is to bring by melting fusion the whole contents of the weigh-pan into one perfect blend of finished steel. Once this fusion is complete and clearly melted, the contents of the pot are killed by what is known as a killing fire, the correct casting temperature attained; then the melting process is complete. No manipulation of slags and no refining is possible and the process is thereby saved this complication, possessed by other melting mediums.

The blend is made in the weigh-pan and substantially no other change can be made thereafter. The melter's concern is largely correct melting and killing, correct casting temperatures and, lastly, due care of his furnace and his pots. He has also the executive control of his crews and also the care of his molds and their correct setting up, but this only indirectly, as of course the molders are directly responsible. He is only rarely called upon to design mixtures though in some cases he is required to act as "weigh-up," in which case he personally weighs his own melting stock, according to mixtures supplied him.

The process is carried out in a sealed crucible with the flame not in contact with the metal of which more will be said later. The conditions in the pot are mildly oxidizing at the start, as can be gathered from the drop in carbon experienced in the Sheffield white pot, and gradually change to mildly reducing as the heat progresses. While this early, mildly oxidizing condition also occurs when using graphite pots, it is not so apparent, for in the later stages this pot throws considerable carbon which is absorbed by the steel and therefore obscures any early loss. Incidentally the amount of carbon thrown in this fashion is not always under perfect control.

Simplicity of the Crucible Process

Summarizing the foregoing, it will be seen that simplicity characterizes the melting practice of the crucible in so far as chemical reactions and manipulations are concerned, which is significantly one of the strengths of the process. It holds no rewards for ingenious operation, offers no attractive short cuts and tolerates no detours. This has safeguarded the process to quite an extent and, in these days when its monopoly has vanished, is valuable indeed in assisting it to continue to hold on the tool steel business.

The electric furnace from the first held out wonderful refining abilities; the furnace was compared with the chemist's casserole, and these were mistakenly recognized as great advantages over the crucible. Shoddy could be refined and made tool steel. This mistaken idea led to a very complete development of refining methods, slags and manipulations, but these all

right in their place, such as in third grade qualities, competing with the watered stock of the crucible third grades, will not do in the manufacture of first grade tool steel.

The electric furnace of to-day, however, recognizes this to quite a large degree and is operated in the manufacture of tool steel exactly as a large and efficient crucible. Its melting practice is most remarkably like that of the crucible. To briefly quote from our article of Sept. 15, 1921, regarding first quality electric tool steel melting practice:

"Positively no ore additions, mill scale or bolting of any kind tolerated . . . no slag shall be taken off (exposing the bare metal to oxidation). Every attempt should be made to duplicate crucible conditions . . . in melting practice."

Electric a Repetition of the Crucible

It will be seen therefore that the modern thought on electric tool steel production, in so far as melting practice is concerned, represents an almost exact repetition of crucible practice. The heat is not boiled, slags are not taken off, the quality is in the charge, which has been selected with the same care as the crucible. Chemically the conditions are also most remarkably synonymous.

The electric furnace, when following the lines outlined, is in the initial stages like the crucible, mildly oxidizing. It is oxidizing to about the same degree as the Sheffield crucible, as can be noted by the similar three to five point drop in carbon in melting down. Again, like the crucible, the conditions change to reducing; a slag is formed covering the metal and forming a liquid seal, very much as Huntsman used himself in his early manufacture of crucible steel. This seal is ably supported by tight furnace doors and the strongly reducing atmosphere of the furnace. This is the only steel-making process that does not require oxygen to burn its fuel, and it must be seen therefore that the crucible can make no claims for virtues accruing from a sealed crucible which are not fully shared by the electric furnace. The electric furnace, when run along tool steel lines, can in effect be nothing other than a large efficient, sealed crucible, and its melting practice is readily and successfully amenable to duplication, with the possible advantage in favor of the electric furnace of stronger reducing conditions. The case for equality of electric melting practice seems to be strong, representing as it does so faithful a duplication of the crucible.

III. Inherent Differences of the Two Furnaces

As to inherent differences resulting from the variation of the types of furnaces employed, crucible or electric, this has necessarily been touched in the foregoing, from which deductions might be taken. We must confess that we can see no difference except in size and efficiency.

Probably the strongest and most important claim ever made for the crucible is the fact that the steel is melted in a sealed crucible and is therefore untouched by flame. How far the electric furnaces duplicate this has already necessarily been suggested, but the following thought analyzes the position somewhat more fully. The Bessemer, open-hearth and crucible processes all require the mechanical delivery of air in large quantities to the hearth of the furnace, in order to make possible fuel consumption. In the Bessemer, the fuel being silicon, and that being found only in the very composition of the metal, it is apparent that no protection can be afforded the steel against the ravages of oxidation.

The open-hearth also requires large quantities of air throughout the process, so that in fuel, oil or gas as the case may be, an attempt is made to protect the metal from this strongly oxidizing flame, or more safely by carrying a slag at the later stages of the operation.

How inefficient this is against so consistent and strong an oxidizing flame is apparent by a glance at the appalling alloy loss when present in the scrap or added in the furnace and the extremely oxidized condition of the slag. When one considers the enormous volume of air necessarily introduced into the very hearth of the furnace, the failure to provide any complete protection is not surprising.

The crucible furnace also requires a large and steady volume of air to burn its fuel, whether it be coke, gas or oil; and this has also to be introduced right in the hearth of the furnace. Its flame is an oxidizing one and would do much damage to the steel if no protection could be offered. Protection is, however, supplied to a very satisfying degree. The steel is inclosed in a crucible and the top of the steel is at the later stages covered with a flux inside the pot and the crucible mouth is closed by a lid or cap. It will be seen that the protection against flame is almost complete; is, in fact, complete were it not that several times during the melting process the lid must needs be opened and the condition of the steel investigated by the introduction of a potter and also for the purpose of adding certain alloys or medicine. The degree of oxidation resulting from this is very slight, but that it does exist can be seen from the slight loss of easily oxidized alloys experienced when such are added. It is certain, however, that its protection far exceeds that of the Bessemer or open-hearth, and this, together with its careful melting stock selection, etc., easily explains its dominating position as a tool steel producing unit heretofore.

Comparison of the Fuels

The electric furnace, which now contends for a share of the honors of the tool steel business, is very fortunately placed in this respect, for it does not require air or oxygen to burn its fuel. Its fuel possesses the striking advantage of being capable of employment in a strongly reducing atmosphere, or for that matter any atmosphere. Vast quantities of air have not to be artificially supplied to the furnace; in fact, none at all is required, therefore the protection problem is almost naturally solved. No crucible need be furnished, though as a matter of fact, a furnace having the major characteristics of a crucible is supplied, and those leaks, by virtue of taking the lid off, in this case opening the doors, and also such as occur from a furnace that is not tight, are taken care of in a very complete fashion. A strongly reducing atmosphere is maintained from very early in the operation, right away to tapping, a liquid seal of a controllable viscosity is furnished and this seal or slag is itself strongly reduced, carrying an excess of carbon available and ready for any stray oxygen that may perhaps come along. This is quite unlike the open-hearth and some idea of its effectiveness can be gathered from the almost complete recovery of a fraction of one per cent of vanadium in the scrap that has been charged. In the direct addition of alloys, excepting, of course, losses due to the volatile nature of the alloys, the loss is almost negligible, and speaking conservatively, certainly not any more than the crucible.

From the foregoing the electric furnace is indeed for all practical purposes a large sealed crucible, and where any differences are to be found, they are in the direction of even greater protection in the case of the electric furnace. It is difficult to find, therefore, any inherent differences that would to any measurable degree affect the quality of the steel, providing the electric furnace is run along the lines suggested. We have therefore but to assume that the case was covered by the two preceding points.

Conclusions

The case has been outlined and the various points dealt with as they appear to the authors. If what we have said is correct, the electric furnace bids fair to

supplant the crucible to a greater degree than heretofore, though it is possible, never completely. A strong case seems to have been made for the electric furnace, which argues the full ability of that furnace to readily and successfully duplicate in quality—"warranted best crucible steel." The case has been dealt with on the premises of three major deciding factors, the investigation of none of which seems unfavorable to the electric furnace. Though these represent the frank opinions of the writers, it is, of course, possible that their findings are not justifiable; of this, however, the reader must be the judge.

If the case is admitted, it seems certain that the electric furnace must assume the dominating position in the industry, by virtue of its powerful economic advantages, which possess so attractive a commercial value. The passing of the crucible seems analogous to the passing of the dreadnought. Whatever the future holds, however, that grand old pioneer, the crucible, has left high standards and marks on the sands of time that will not be effaced.

American Pig Iron Association Addressed by Colonel Richards

Retiring officers of the American Pig Iron Association were re-elected at the annual meeting held at the William Penn Hotel, Pittsburgh, Jan. 12. Theodore Friend, Clinton Iron & Steel Co., Pittsburgh, continues as president of the association; John A. Penton, Penton Publishing Co., Cleveland, secretary; and Col. F. B. Richards, M. A. Hanna & Co., Cleveland, treasurer.

An interesting talk on the European financial situation by Colonel Richards was a feature of the meeting. It was the speaker's idea that if the war debt of Europe to this country is ever to be paid, it would be necessary for this country to cut down the bill materially and to fund the remainder by long-time bonds. Europe insisted, the speaker said, that it spent most of the money borrowed in the United States in this country, and that, as it paid war-time prices, it was entitled to some rebate. Colonel Richards thought that by remitting or writing off a part of our claims upon European nations, which had borrowed from us, with a corresponding remission by those nations in their claims upon others, including Germany, the situation in Europe would mend more rapidly than would be possible by insistence upon full payments.

There was discussion of freight rates which resulted in a motion empowering the president to appoint a committee of one or two to go to Washington to present the claims of the association that freight charges on pig iron from all centers of production to consuming points are so high as to hamper business.

German Hardware in Damascus

WASHINGTON, Jan. 17.—Practically all the hardware and tools being sold in Damascus are of German manufacture, the low exchange value of the German mark favoring the introduction of German goods in spite of the fact that the reappraisal system now being practised by the Syrian customs authorities has the effect of increasing the duty on some kinds of German goods to as much as 50 per cent ad valorem while the legal duty is only 11 per cent ad valorem. This control by Germany of the market in Damascus is set forth in a report on "Metals and Hardware" received by the Bureau of Foreign and Domestic Commerce from Consul Charles E. Allen, dated Dec. 3, 1921.

There is a brisk demand for all kinds of small hardware, the report states, the machine-made foreign product, on account of its greater symmetry, attractiveness and, latterly, cheapness, having begun to force the ill-formed, though durable, local hand-made product out of use. The making of tools, nails and all kinds of small hardware by hand is still an important local industry, but it is daily becoming increasingly difficult to compete with the foreign industry. In fact, the report points out, it can only do so because time has not yet come to have any value in Damascus.

PATENT BILL PASSED

House Approves Measure Which Will Be Urged in the Senate

WASHINGTON, Jan. 17.—The Lampert patent bill, which has the strong support of engineering societies and industrial interests of the country, passed the House Thursday by a vote of 198 to 36, and efforts are now being made to get it through the Senate. The bill is now before the Senate Committee on Patents and it is hoped it will be put through and enacted into law at an early date.

While it was supported by a large majority in the House, the measure also was the source of considerable opposition at the hands of such members as Majority Leader Mondell and Representative Madden, chairman of the Committee on Appropriations. The general attitude of those opposing the measure was based on the ground of the necessity for so-called economy, and the contention that the legislation provided should be taken care of in the Lehlbach classification bill providing for salary adjustments throughout the Government service, but carrying less increases for Patent Office employees than allowed by the Lampert bill.

The Lampert bill provides for increases in personnel as follows: One law examiner; 26 assistant examiners and 21 clerks, aggregating 48 additional employees. Increases in salaries are made as follows: Commissioner of Patents, from \$5,000 to \$6,000; first assistant, from \$4,500 to \$5,500; second assistant, from \$3,500 to \$5,000; examiner-in-chief, from \$3,500 to \$5,000; solicitor, from \$2,750 to \$5,000; chief clerk, from \$3,000 to \$4,000; law examiner, from \$2,750 to \$4,000; principal examiners, from \$2,700 to \$3,900; first assistants, from \$2,400 to \$2,900, \$3,100 and \$3,300; and second assistants, from \$2,100 to \$2,500 and \$2,800.

In order to cover the additional cost of conducting the Patent Office by reason of increased salaries, the bill provides an increase in the fees. Practically all of

the work on a patent is done when the application is first made, and the initial fee is \$15. The necessary fee upon the granting of the patent, under the present law, is \$20. The Lampert bill raises the first fee from \$15 to \$20, and it is estimated that it will bring into the Treasury over \$500,000 annually. It is declared to be the only piece of legislation in the way of wage increase that not alone pays for itself but will bring revenue into the Treasury. It was this feature of the bill that played an important part in destroying the argument of those who opposed it on the grounds of economy. The measure also gained strength because it omitted the Federal Trade Commission rider.

The extreme importance of the legislation has been repeatedly pointed out by its proponents in industry and engineering societies and was emphasized by Representative Lampert and others. He repeated figures heretofore given regarding the large number of resignations owing to the low salary scale and showed that during the calendar year 1919 the number of patent applications filed arose to over 76,000, exceeding by 19,000 the number in 1918, while 1920 exceeded 1918 by 24,000 patent applications, and 1921 exceeded 1918 by 30,000. Increase of work was also shown in the cash receipts of the Patent Office, which in 1918 amounted to \$1,977,000; in 1919, \$2,417,000; 1920, \$2,680,000; and 1921, to \$2,775,000, an increase of \$800,000, or 40 per cent over 1918. Mr. Lampert said that the increase in work is overwhelming and that the Patent Office is hopelessly in arrears. There are now 59,000 patent applications and 6000 trade-mark cases awaiting action, and with more than one-half of the force composed of untrained men, it was declared that the Patent Office cannot escape going further in arrears.

"Even with the relief afforded by the present bill," said Mr. Lampert, "it will take several years to build up the present force, with so many inexperienced men, into a stable, competent examining corps, able to make any material impression upon the arrears of work already piled up."

AUTOMOBILE PRODUCTION IN 1921

More Than One Million Tons of Steel Used—Considerably Less Than in 1920

Estimating the average weight of iron and steel per passenger automobile at 1500 lb. and the average weight per truck at 2250 lb., the total amount of iron and steel used in automobile construction during the year was apparently about 1,175,000 gross tons. This is approximately 9 per cent of the year's output of rolled and forged steel. The figure is based on a total production amounting to 1,680,000 cars and trucks, of which 145,000 or 8.63 per cent were trucks, and the remainder passenger and other light cars, according to the National Automobile Chamber of Commerce. The total figure is a reduction of 24 per cent from the 1920 output.

Passengers to the number of 6,000,000,000 are said to be carried annually by motor cars. This compares with 1,100,000,000 carried by the railroads of the United States annually, and with 1,418,000,000 carried by the rapid transit (elevated and subway) lines of New York, in the year ending June 30, 1921. Freight annually handled by motor truck is given as 1,200,000,000 tons, which compares with 2,290,000,000 tons of freight carried by the railroads, this being the average of 1917 and 1918.

It is stated that the wholesale value of the cars and trucks produced in 1921 was \$1,222,350,000, a reduction of 45 per cent from 1920. The value of automobiles was stated at \$1,088,100,000, or \$702 per car, a reduction of 21½ per cent from the \$897 average of 1920. The wholesale value of motor trucks produced is given as \$134,250,000, an average of \$968 per truck, or a reduction of 24 per cent from the \$1,273 average of 1920. Tire casings amounting to 19,379,000 were produced, together with inner tubes to the extent of 24,157,000 and solid tires numbering 377,000.

The figures given show an approximate total of 10,000,000 automobiles registered in the United States, of which 9,000,000 are cars and 1,000,000 are trucks.

Of the total, 3,000,000 or 30 per cent are reported owned by farmers, the farmer ownership of trucks being 150,000, or 15 per cent of the total trucks, and of cars 2,850,000, or 31.7 per cent of the total cars.

Electric Melting and Heat Treating Furnaces Designed by Students

Four types of electric furnaces, designed and constructed largely by students, are being built for use of the department of chemical engineering, college of engineering, University of Wisconsin, Madison, in the course of electric furnace practice.

A special resistor electric muffle furnace which will stand a temperature up to 3600 deg. Fahr., now under construction, is unique in that it combines all of the advantages of a gas furnace with the higher temperature and temperature control possible in an electric furnace. This stove is fitted for investigation of refractory materials and heat treatment of metals over the highest temperature range. As it will operate continuously at or over 2000 deg. Fahr., with only 4 kw., at a cost of but 6c. per hr., or one-fifth as much as it costs to operate a gas furnace under similar conditions, this furnace is regarded as having exceptional economic qualities.

Another furnace under construction is an electric arc furnace. No lining is used, the shell being kept from melting or oxidizing by a constant spray of cold water from a perforated pipe which surrounds the furnace. It has a melting temperature of 4000 deg. Fahr., and will be used for smelting various ores.

An Arsenic vacuum furnace has recently been rebuilt. All air is pumped out to prevent combustion by oxidation. Temperatures up to 5000 deg. Fahr. may be obtained by passing an electric current through a spiral graphite tube.

The fourth type of furnace is an electric carbon resistance type for determining the load carrying capacities of firebrick and other refractory ware.

Applications of Continuous Die Rolling¹

**Especially Adapted for Making Forging Blanks—
Macrographs and Micrographs Show
Smooth and Uniform Metal Flow**

BY G. R. NORTON

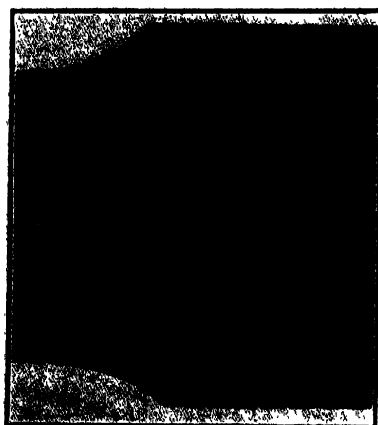
CONTINUOUS die rolling is the process of producing bars in which the form of cross-section is varied according to impressions sunk in the pair of rolls between which the final pass is made. At each revolution of the rolls the design cut in their surfaces is repeated on the bar passing between them, and the number of these repetitions is limited only by the length of the bar.

Wagon-box straps and axle-clip sections have been produced in this manner for years. In these bars, a round alternates with a half-oval or bevel-edged flat and the change in section is accomplished by passing a round bar between the rolls, allowing the bar to pass for a certain distance without change, after which it is flattened and spread for the desired length of this part. The number of round and flat sections produced at each revolution will, of course, depend on their lengths and the diameters of the rolls.

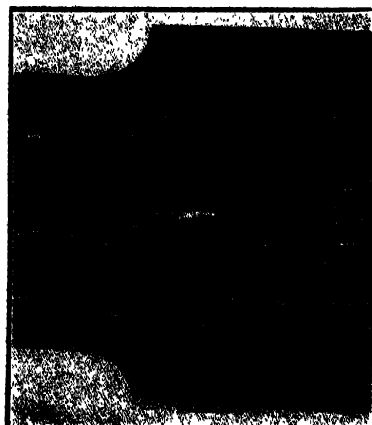
In rolling sections of this character it is not neces-

roll, and provides for easy and inexpensive dressings, repairs or changes. Wear on these rolls can be compensated for in various ways and the length of any impression held constant.

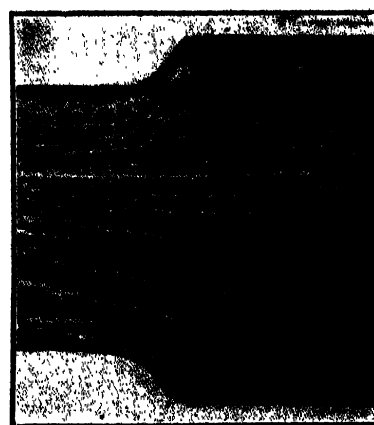
To produce sections symmetrical about their longitudinal axes, followed by other sections that may be offset, it is necessary to provide for the exact matching of the opposing rolls. This is done by mounting pinions on the rolls opposite the driven side. As only one roll is driven from the roll train and always in the same direction, these pinions are used to match the rolls exactly and are provided with adjusting devices for this purpose. Once the rolls are properly matched, there is no variation in the alinement of the impressions. It can be seen easily that, to handle this class of work economically, considerably more equipment than one finishing stand of rolls is necessary. The leader or bar, on which the forming pass is made, cannot in all cases be a predetermined shape and must



A Rolled Shaft (Two diameters)



A Forged Shaft (Two diameters)



An Upset Shaft (Two diameters)

sary that impressions be formed in both rolls, because the round has been produced by straight rolling and it is only necessary to change its shape; so one roll can have a plain surface, the impression being cut in its mate. This usually results in a slight flattening of the round, which would be objectionable if great accuracy of size were required. The bars become oversized as the rolls wear in service and, if dressing is done by turning off the surfaces of the rolls and recutting the impressions, a loss in circumferential length results which changes the lengths of the impressions.

Continuous die rolling as developed by the Witherow Steel Co. has as its basis the production of more complicated sections with greater accuracy. This is accomplished by building up the active surfaces of the rolls, instead of sinking impressions in the ordinary roll casting. Cast or forged rings, of material suitable to the character of the section to be rolled, are cut into segments, in the outer surfaces of which complete impressions or parts of impressions are sunk. The rings are assembled on mandrels to which they are locked. This segmental construction, or building up the groove, involves but little material as compared with a solid

be found by trial. Frequently leaders are made that do not conform to any standard commercial shapes and would, therefore, be difficult and costly to obtain. The heating, handling and rolling of single bars would operate against good production and increase costs. It is necessary, therefore, to work from billets that are roughed down and rolled to the desired form of leader, according to usual rolling practice, and finished in the same heat. This method has a considerable advantage metallurgically, because the billets are brought slowly from atmospheric to rolling temperature in continuous furnaces and can be timed to take the last pass at the proper finishing temperatures. The metal is worked uniformly and completely in one direction and its flow, as exhibited by studies of the macrostructure, is more uniform than in forging.

It should be understood clearly that continuous die rolling bears no relation to the forming of variable-section bars on forging or eccentric rolls, where the stock is cut to the desired weight and each piece is handled individually, a large number of passes being made and the stock rotated 90 deg. at each pass.

Generally, it is held that hammering has a refining effect on steel and is a much superior method to rolling. Charpy showed by experiment and tests that certain physical properties are varied according to the amount of work done, independently of the method. By the amount of work done is meant the reduction of area

¹Paper substantially in full as presented at the annual meeting of the Society of Automotive Engineers, Jan. 10, 11, 12 and 13. The author is steel works manager of the Witherow Steel Co., Pittsburgh. An exclusive article by Mr. Norton appeared in *The Iron Age* of Jan. 9, 1921, on "Rolling of Variable Section Steel Bars."

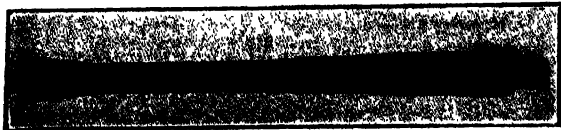
from the original to the finished section, and the ratio of the original area to the worked area is called the coefficient of work.

To demonstrate the relative values of different processes, the amount of work done being the same, a 2-in. round billet, of 0.45 per cent carbon open-hearth steel, was rolled into a rear-axle drive-shaft having maximum diameters of 1-9/16 in. at the wheel and spline ends and a minimum diameter of 1-3/16 in. at the end of the long taper next to the spline end. From the same billet, duplicates of this shaft were forged and a bar was rolled

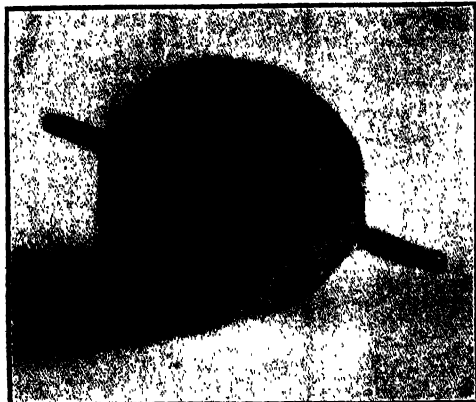
forming must be accomplished in one pass. When very great reductions of area are necessary, some flash or overfill will occur. The bar will be extruded between the rolls to a considerable extent but, at some point, depending upon the character of the section, the volume displacement cannot be carried further in the impressions and the rolls spring apart, relieving the grooves and allowing a portion of the metal to spread between the faces of the rolls. This flash can be controlled to some extent and may vary in thickness from 1/32 to 1/4 in. As the bar does not rotate in the pass, any flash produced is straight and can be removed easily by trimming.

It has been found that the sectional forms into which bars are changed materially affect the amount of flash and extrusion that takes place, and no rule has been found to govern all cases. However, because the rolling is in effect reducing or drawing with but little spreading action, the flash will always be considerably less than would be produced on the same piece under a hammer and, consequently, the wastage of stock is less.

Many forgings require preliminary operations, such as upsetting or drawing, before the stock is in such form as to be struck easily in finishing impressions without excessive waste and wear on dies. Frequently, so much work of this character is involved that two tools are necessary to complete the forging and, as the



Continuous Die Rolling Produces a Flash



A Cross Section of a Rear-Axle Shaft Showing the Flash

1-3/16 in. in diameter on which upsets, 1-9/16 in. in diameter were made, the lengths of the upset being the same as those of the rolled and forged shafts. The reduction of area from the billet to the smallest diameter of the shaft was 64.75 per cent, or a coefficient of work of 2.84.

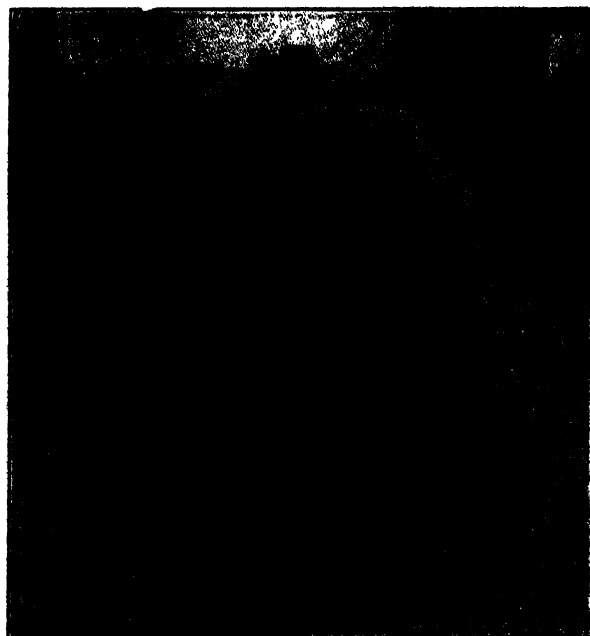
Charpy impact tests were taken on the axes of the shafts at the point of junction between the long taper and the spline end and an examination made of the microstructure and macrostructure. A second set of shafts duplicating the first was heated to 840 deg. cent. (1544 deg. Fahr.), held 15 min., quenched in oil and the impact tests and microscopic examinations repeated. The accompanying table shows the result of these tests and indicates that the method of working is a factor

Charpy Impact-Tests			
Tested Melted on	Energy Absorbed, Ft.-Lb.	Strength, Per Cent	Increase by Treatment, Per Cent
Rolled shaft, untreated.....	13.59	100.0	....
Forged shaft, untreated.....	6.32	48.5	....
Upset shaft, untreated.....	4.85	35.7	....
Rolled shaft, treated.....	18.06	100.0	32.9
Forged shaft, treated.....	14.08	77.8	123.0
Upset shaft, treated.....	10.83	60.0	123.2

to be considered seriously in connection with the physical properties of steel.

The accompanying macrographs and micrographs show a smoother and more uniform flow of metal in the rolled specimens than in the others and a better refinement of grain-size before treatment. This is due to the fact that continuous die rolling is a continuous process of working rather than discontinuous, as in forging, upsetting or eccentric rolling.

In continuous die rolling, it is not possible to make successive forming passes because of the difficulty in entering a partially formed bar at exactly the right point in the impressions in the rolls; so the entire



Tie Rods After Delivery from the Continuous Die Rolls

preliminary and finishing operations are not balanced exactly, and in many cases cannot be completed in one heat, time is lost and much expense is incurred. Continuous die rolling provides a means of supplying blanks for forging that can be struck directly in the finishing impressions in the dies, or struck after one or two edging blows, if offsets or bends are required to be made. A properly designed blank can be reproduced with great accuracy, eliminating the forging scrap caused by blanks made improperly under the hammer.

Front-axle I-beam blanks that can be finished under one hammer for either the Elliott or reversed-Elliott type of axle, can be rolled. Blanks for camshafts, ready to strike for finishing, can be rolled, thus eliminating the blocking or upsetting operations and the rolling in dies immediately preceding forging. Spring-clips can be rolled with the offsets for bending exactly as forged. A small amount of flash is produced, which requires cold-trimming before the clips are bent. Rear-axle drive-shafts can be rolled and, after trimming, are ready for hardening and machining.

The product of continuous die rolling is received from the mill in the form of long bars, the lengths of which are multiples of the lengths of the individual pieces. The length of these bars will depend upon the weight

of billet used. After cooling, they are cut into ordinary mill lengths or into single pieces. After this, trimming or any finishing operations can be performed.

Quantity is obviously essential to the economy of operation, because the expense of cutting rolls and setting up a mill could not well be carried by a few pieces. The cost of this type of conversion naturally must be



This Illustrates the Possibilities of Continuous Die Rolling Where Round, Square and Hexagonal Cross-Sections Alternate

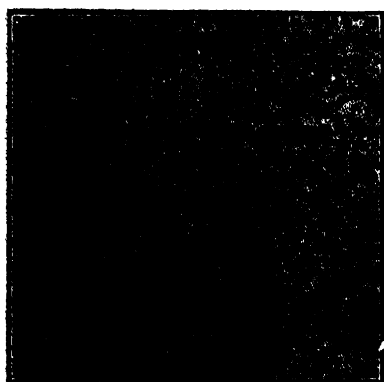
greater than ordinary conversion from billets to bars, for this work is necessary as a preliminary to the final die forming; also, to the bar-conversion cost must be added the costs of the die rolls and their maintenance, special forms of guides for delivery and adjusting gears

quantity-production requirements and the large number of forgings used.

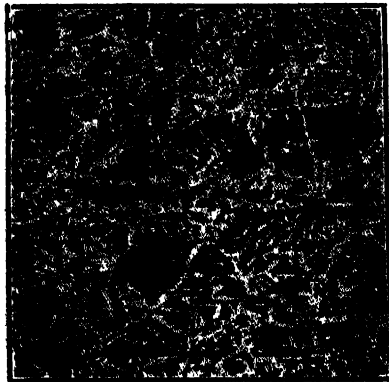
From its beginning, the practice of rolling has been improved only along the lines of increasing the tonnage capacity of mills, without much effort to depart from the manufacture of standard rolled shapes, and bars of constant area and form of section; so, the development of continuous die rolling on a commercial basis for the production of variable-section bars is something new in an industry in which few radical changes have taken place.

National Council Will Consider Railroad Situation

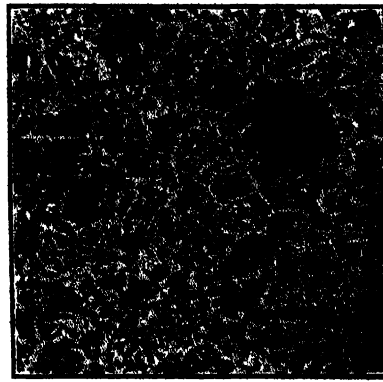
WASHINGTON, Jan. 17.—The railroad situation and what should be done about it from the business standpoint will be considered at a meeting of the National Council of the Chamber of Commerce of the United States to be held in Washington Feb. 8 and 9. The council is made up of one representative each from the



An Untreated Rolled Shaft
(100 diameters)



An Untreated Forged Shaft
(100 diameters)



An Upset Shaft
(100 diameters)

for matching rolls. Production is decreased also, because of the necessity for lower mill speeds than are usual in rolling practice.

In addition to working out the patented features of roll construction and mill design, a long and costly series of experiments was necessary before continuous die-rolled products could be marketed and sufficient data collected to predict with reasonable accuracy the performance of any given variable section. Conversion is made on the usual basis of one gross ton of billets



The Rolling of Front Axle I-Beams Presents a Problem Because of the Marked Variations of Cross-Sectional Area

to the net ton of bars, the bar weight including any flash or gates between impressions of course.

The size and length of pieces produced by continuous die rolling are limited only by the capacity of the mill and the diameters of rolls that can be accommodated in the housings. The equipment operated by the Witherow Steel Co. covers sections from 5/16 in. in diameter to 3-in. squares; and the lengths of individual impressions may vary from a fraction of an inch to 17½ ft., rolls 35 in. in diameter being necessary for this length. The application of the product of this process is largely a matter of the study of local conditions in any manufacturing plant, but the automotive industry generally offers a wide field for its consumption by reason of its

1400 business organizations within the membership of the chamber.

Some business men who have followed closely the railroad situation since the roads were turned back to private control, see a drift toward Government ownership and operation unless there can be worked out some plan by which the roads can be put on a self-supporting basis. They feel that the transportation act should be given a longer trial and that attempts which are being made in Congress to amend the act, if successful, will precipitate a crisis which may make it impossible for the roads to continue under private management. As yet, in their opinion, such an increase in earnings as has been attained may have been reached at the expense of proper maintenance.

The California Foundrymen's Association, one of the oldest organizations of employers in San Francisco, has disbanded and amalgamated with the California Metal Trades Association. Walter W. Johnson, Union Construction Co., was elected president, and M. E. Wright, Atlas Imperial Engine Co., vice-president, at the annual meeting of the Metal Trades Association. The annual banquet of the association will be held early in January.

In the course of the study of heat treatment of non-ferrous alloys, in progress at the Pittsburgh Experiment Station of the Bureau of Mines, annealing experiments are being carried out on leaded brass tubing for the purpose of examining the effect of temperature on the hardness. Tensile tests have been made of heat-treated non-ferrous alloys, and metallographic examinations made.

The Dodge Mfg. Co., Mishawaka, Ind., has declared a dividend of 1 per cent on the common stock, a decrease of ½ per cent from the last previous dividend in October. The regular quarterly dividend of 1¼ per cent on the preferred stock was ordered paid Jan. 1.

Cost Accountants Indorse Standard Invoice Form of Purchasing Agents

At the last meeting of the executive committee of the National Association of Cost Accountants, on the recommendation of C. H. Smith, director-in-charge of standardization, a resolution was adopted indorsing the standard invoice form recommended by the National Association of Purchasing Agents. Mr. Smith has prepared the following brief history of the movement:

The vast conglomeration and variety of printed forms has been a bane of existence to every man connected with any of the clerical branches of a business organization. At the convention of the National Association of Purchasing Agents in October, 1918, the cry for a standardization of the invoice form again made itself heard. The convention appointed a committee to take up the subject and report at the next meeting. This committee immediately entered upon a campaign of intensive work. They engaged the interest of some 275 associations and 125 trade papers and asked for their co-operation. In September of the following year a tentative standard invoice form was presented to a conference in Philadelphia. At this meeting representatives of the United Typothetae of America, as well as other trade associations and purchasing agents were present. Three other tentative forms were submitted for consideration. Nothing definite was done, however, and the following year another standardization conference was called in Chicago on Oct. 9, 1920. Here a fifth form was developed, and this last one was finally approved by the various associations present, which included the Typothetae, the American Railway Association, the National Association of Purchasing Agents and numerous other trade and professional organizations. Following this conference the National Association of Purchasing Agents approved unanimously the form as evolved in Chicago.

Form Corresponds to Bank Checks

The one factor which finally influenced its selection was that it would conform with the size of the standard form of bank checks, which had been adopted by the American Bankers' Association in January, 1909. This check was not only adopted by the Federal Reserve Board at its organization in 1914, but also by over 100,000 business houses throughout the country. From this standard check form there was evolved the standard voucher size.

The committee having in charge the development of the invoice considered that, because so many firms were filing copies of invoices with copies of vouchers, that they should be of such a size so as to file together conveniently. Thus it was that the size of $8\frac{1}{2} \times 7$ in. was adopted as the controlling standard for invoices, which is the same size as the standard voucher and twice the size of the standard bank check, which is $3\frac{1}{2} \times 7$ in.

In order to accommodate invoices of larger size it was decided to have the dimension $8\frac{1}{2}$ in. remain the same in all cases, but that the other might vary between 7 in. and 14 in., the idea being that anything over 7 in. would be folded back on the 7-in. line, thus providing always a sheet $8\frac{1}{2} \times 7$ in. for filing purposes. To accommodate the printer and lithographer a tolerance of $\frac{1}{8}$ in. in either dimension was provided for, so that invoices, when padded, could be trimmed to the proper size.

It is recommended that where invoices are longer than 7 in., dots or short rules be placed down from the top on the sides, to indicate to the file clerk the proper point for folding for filing purposes. It is also urged that all invoices be cut from 17×22 or 17×28 -in. stock. It finally might be pointed out that it is not necessary, in every instance, to utilize each and every blank provided on the form. For example, if there was no contract number that space on the form would be left blank. In a similar way other spaces on the form may not apply in each and every instance, but the form is expected to cover a large majority of cases without the need of a rubber stamp, which has been the case heretofore.

It is customary with all corporations to use rubber stamps on invoices received to provide certain blank

spaces, where individuals, approving invoices, may insert their initials to show that the prices, calculations and other features are correct. This standard form carries a column reserved for the buyer, which will obviate the use of a rubber stamp on millions of these invoices, thus greatly reducing the labor and expense of handling them.

Societies of Detroit Affiliated

The affiliation of the architectural, engineering and other technical societies of Detroit became an accomplished fact Jan. 1 by the ratification of the proposed constitution and by-laws, acceptance of membership and election of councillors by the following twelve societies: Detroit section, American Society of Civil Engineers; Detroit chapter, American Association of Engineers; Michigan chapter, American Society of Heating and Ventilating Engineers; Detroit post, Society of American Military Engineers; Detroit section, American Society of American Mechanical Engineers; Detroit-Ann Arbor section, American Institute of Electrical Engineers; American Institute of Chemical Engineers; Detroit Engineering Society; American Chemical Society and Detroit Chemists; Michigan chapter, American Institute of Architects; Detroit section, Michigan Society of Architects; Detroit chapter, American Society for Steel Treating.

The permanent council met and organized Dec. 13, 1921, and elected officers for 1922 as follows: Chairman, P. W. Keating; vice-chairman, A. A. Meyer; secretary-treasurer, Walter R. Meier.

A central office will be established for conducting the business of the several societies. In the past, the several societies each held a number of meetings throughout the year. Most of the societies met regularly once a month and some of them two and three times a month. In the past the meetings of the various societies have often occurred on the same date. This conflict of dates will hereafter be avoided as the office of the new association will schedule the dates of meetings of all the technical societies. The Associated Technical Societies of Detroit will provide one meeting each month and this meeting will be under the management of one of the member societies. This member society will provide the speaker on a broad subject of interest to the members of all the technical societies.

The paramount use given for the new association to its members and to the public is an opportunity for public service both for the city of Detroit and for the state of Michigan. The association will take an active interest in all matters wherein engineering, architectural and technical subjects are an important factor. The council will study the opinions of the membership and will assist in furnishing definite and accurate information to the public.

The papers to be read at the iron and steel meeting of the Meriden, Conn., branch of the American Society of Mechanical Engineers, at the Home Club, Colony and Foster streets, Meriden, Jan. 19, are the following: "Development and Manufacture of Furniture and Truck Casters with an Outline of the Growth and Progress of a Modern Plant Producing these Wares," by William A. Schenck, first vice-president Bassick Co., and J. A. Johnson, chief engineer of the M. B. Schenck division of the company. "Some Relations Between the Properties of Iron and Steel and their Crystalline Structure," by Bradley Stoughton, consulting engineer, New York.

The January meeting of the Washington Chapter of the American Society for Steel Treating will be addressed on Friday evening, Jan. 20, in the ballroom of the Harrington Hotel by T. H. Nelson, steel works manager Henry Disston & Sons Co., Philadelphia. His subject is "A Comparison of American and English Methods of Producing High Grade Crucible Steels."

Hyatt roller bearings are to be used for the main tables of the 94-in. blooming mill of the Allegheny Steel Co. at Brackendale, Pa.

Tandem Rolling of Cold-Rolled Steel

Special Equipment Developed for This Purpose, Including
Rolls and Their Housings, Wire Straighteners, Edge
Rolls, Turk's Head and Cross Slides

A NEW method used in producing cold-rolled wire and flat steel stock by the operation of rolling mills in tandem is introduced by the Standard Machinery Co., Auburn, R. I. By this method production of both light and heavier work is increased approximately 100 per cent, with a lower labor cost than by other multiple simultaneous rolling operations, and with safety to the operator. The process involves new features in rolling mill construction and attachments, as well as the electrical control of the roll speeds, and the introduction of new coiling reels for taking care of the stock after it is rolled. In dealing with these new features, however, further reference to the reels is omitted, because they relate to a separate machine and therefore a separate proposition.

In reducing from the round wire stock to the flat

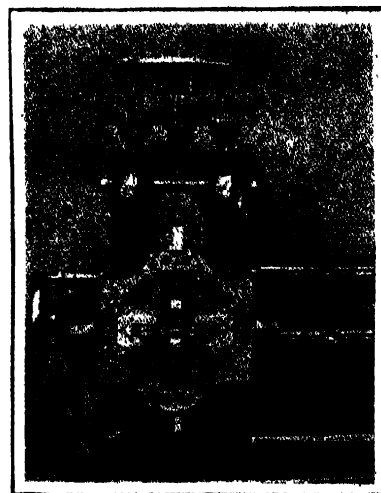
end. It carries the coolant to the extreme further end, where it escapes through eight holes to the inside surfaces of the roll. The coolant then flows back the entire length of the roll and out and away through an outlet pipe. No section of the roll, therefore, is without coolant properties, an important point, as will be noted later when roll speeds are discussed.

Two photographs show a Standard mill for light work, with a turk's head or adjustable draw plate attached, the draw plate face being removed in one photo, of which mention is made later. The mill occupies 3 ft. 4 in. x 5 ft. 8 in. floorspace, and stands 5 ft. 6 in. high. It is equipped with a $7\frac{1}{2}$ -hp., variable speed, d.c. motor, 600 to 1800 r.p.m., and including the motor weighs 6500 lb.

Particular care is taken to incorporate rigidity in design into each mill. The ways of all housings are hand scraped, and each housing is keyed to the bed, the housings being properly alined upon the bed of the mill



General View of
Roll Set with Rolls
6 in. in Diameter
with $4\frac{1}{2}$ -in. Face.
The Detail View
Shows the Turk's
Head or Adjustable
Draw Plate Attach-
ment, with the
Draw Plate Face
Removed



strip the element of elongation is a serious consideration. When several mills are used, the finishing mill must operate at a speed above the efficiency point to compensate for the elongation, and the entering mill at a speed far below its best efficiency. The Standard Machinery Co. in practise has definitely established that the tandem method of wire flattening is more efficient than when any greater number of mills are operated simultaneously.

To perform the tandem process successfully, however, the rolling mills have to be "tooled up," as it were. That is, every operation is facilitated, so that the total elapsed stoppage time is reduced to a minimum. In addition, the mills are equipped with every safeguard possible, to inspire confidence in the operator as to his work and safety. By the adoption of the various attachments and width controlling devices, therefore, it is possible to reduce to a minimum the personal equation, and consequently to employ unskilled labor to operate the mills. The savings effected by the tandem rolling, more particularly on low carbon steel, obviously are important, inasmuch as one operator can now produce more than four men by the old method.

Before treating the method of setting the mills to operate in tandem, some of the construction features and attachments will be discussed. All rolls are water cooled. An intake pipe connected with city water, or, if preferred, with a force pump, enters the roll at one

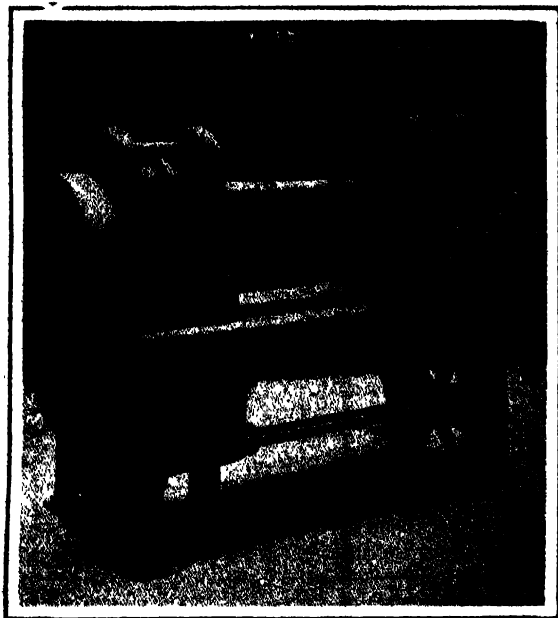
before being keyed and bolted. This alinement is important in saving power. The bearings in the gear housings, as well as on the driving trains and intermediate trains, are also hand scraped, thereby insuring maximum efficiency. All bearings have suitable oil holes and cups. Where an oil hole is not accessible, it is connected with tubing so that it is unnecessary to dismantle the mill to lubricate it. In addition, the gearing and driving mechanism are protected from dust and dirt by detachable covers and guards, which also remove the possibility of accidents to the operator.

The gears in the pinion housings are of forged steel with cut teeth, and revolve in oil. The pinion bearings are of high grade phosphor bronze, and on the roll necks operate the company's standard journal bearings. The latter revolve inside hardened and ground half shells, and eliminate practically all friction that exists in a plain bearing housing. The intermediate, driving and motor gears are of cast steel with maag teeth, and all pinions, with the exception of the herringbone, are of fabroll steel with maag cut teeth. The intermediate bearings are of high-grade phosphor bronze.

After the herringbone pinions have been forged, machined and cut, they are then forced by hydraulic pressure on arbors. Aside from their powerful and rugged features, they develop a smooth and even running on heavy, light and fine loads. The character of the gearing permits the work to be held close to gage, and the work therefore is free from waves and kinks. The mills are equipped with friction clutches, self-contained cone clutches for light transmission, and rim

finger friction clutches for heavy transmission when driven by belt. Direct connected mills are direct connected by gears, and do not as a rule have friction clutches.

As intimated in describing the coolant system, the mills are furnished with shell rolls of the best material obtainable, well proportioned, and designed especially to withstand heavy strains. They have in this case a $4\frac{1}{2}$ -in. face, and are 6 in. in diameter. The wabblers



ends may be any of the different designs usually found in rolling mills. The journals are $3\frac{3}{4}$ in. in diameter, and 5 in. long. The gear ratio of the mill, including the motor, is 19.2 to 1, and the roll speed 63.7 to 191.1 ft. per minute, or 30.4 to 91.2 r.p.m.

Adjusting screws in the roll housings are of high carbon chrome steel, oil treated. Each mill is actuated by a single indexed hand wheel operated through a center pinion, or can also be actuated by independent screw adjustment. When the hand wheel is employed for setting down the rolls, the liability of setting one end of the top roll lower than the other is eliminated, and accurate results are thereby assured with a saving of time.

In two additional photographs is represented a mill in the same class with the one before shown, except that the rolls are 8 in. in diameter, with 4 in. face, while the diameter of the journals is 4 in., and the length $5\frac{1}{2}$ in. The gear ratio of the mill, including the motor, is 25.6 to 1, and the roll speed 68 to 135 ft. per min., or 32 to 65 r.p.m., for the motor applied here is a 15-hp., variable speed, d.c., having 825 to 1650 r.p.m. This mill, as can be readily seen, is larger and heavier than the first one described. Without its bed plate, but including the motor, it weighs 7000 lb. With the bed plate it weighs 8200 lb. It occupies floor-space 3 ft. 8 in. wide and 6 ft. 6 in. long, and stands 6 ft. 3 in. high.

One illustration is a close-up view of the edging device, used on both mills. This photograph gives at the right a view of the water cooling arrangement as it enters and leaves the rolls. The second shows the mill in whole arranged for motor drive, but without the motor, and with the edging device. One photo shows part of one of these mills without either the edging device or the turk's head upon it. It is shown here for the purpose of disclosing the dovetail planed in the roll housing to permit lateral adjustment of the turk's head. This lateral adjustment permits all surfaces of the hardened and ground roll to be utilized, no matter what the size of the stock.

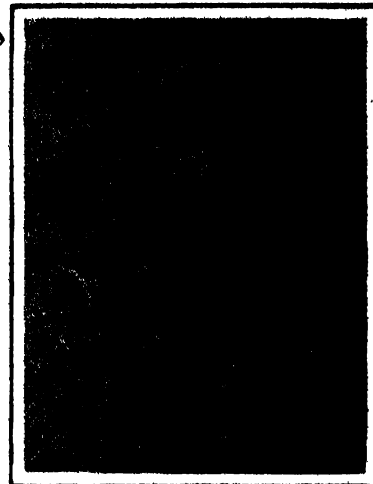
As to the devices and attachments, they are:

Straightener—A wire straightener is necessary when crooked and bent stock is to be used. This device is fastened to the mill cross slide. The wire in passing through it is straightened simultaneously with the

roughing pass. It is not absolutely necessary, however, to employ the straightener unless imperfect wire is used, but better rolling results are obtained by its application under all conditions of the wire to be rolled. Adjustment of the straightener is by hand screw.

Edge Rolls—Edge rolls are used on second and subsequent passes, for width control, but are limited to passes having considerable cross-sectional area, otherwise the wire will tip or buckle in rolling the edge with

General View and Detail View of Roll Set with 8-In. Rolls of 4-In. Face. This is a much heavier outfit than that first shown. The details shows, at its left, the entering and leaving pipes for cooling liquid; it shows also the dovetail permitting lateral adjustment of the Turk's head



any great pressure. The width is controlled by grooves in these rolls, which produce a finely finished edge or side.

Turk's Head—The function of the turk's head is to limit the width of the strip while holding the thickness with exactness, and to prevent tipping of the wire under heavy pressure. It is efficient and superior to the common edging devices. Provision is made for four indexing adjustments, one on each of its four sides, making possible lateral as well as other adjustments. The range of adjustments therefore is more than sufficient for all work for which the mills are constructed. The rolling mills are so built that the turk's head can be attached to the front or the rear of the roll housings, as necessary.

Cross Slides—Cross slides are necessary to facilitate frequent shifting of guide and attachment positions,



Close-up of the Edging Device on the 8-In. x 4-In. Rolling Mill, with Coolant Pipes at Right

and in order that both entry and exit slides may work in unison on each mill. By this arrangement there results an even wear on the entire surface of the rolls.

These edging devices and turk's heads are innovations in rolling mill practice. By their adoption these mills are large producers of round wire flat stock by the tandem method because of the efficiency at which the mills can be operated. In addition, the element of low equipment making costs, as well as low labor charges, and the low rate of power consumed per flat stock produced by the adoption of these attachments is significant.

The method of setting the mills to operate in tandem is as follows:

First, the two mills are used without either turk's head or edging device. These mills operate plain, and are set up one in back of the other. The third mill has the edging device attached, and the fourth mill the turk's head. Each mill has its individual motor. For illustration, assume $\frac{1}{4}$ -in. steel wire is to be reduced. With the first two mills, approximately 0.060 in. per pass is taken off. On the third mill the edging rolls edge the wire, while the turk's head on the fourth mill, operated after rolling, gages it for thickness and width, both the horizontal and vertical rolls being brought into play. The strains on the third and fourth mills are lighter than upon the first and second. By operating the mills in this manner the stock is held to a range, both in width and thickness, of 0.0005 in.

Where heavier mills are placed in tandem, the principle of operation is substantially the same, but on heavier stock it is generally customary to use only two mills in tandem, on account of the heavy strains that the large mills will take. Furthermore, on heavier mills flat stock is rolled, which naturally requires more frequent annealing on account of its size.

Another photograph illustrates a new rolling mill brought out to operate in tandem, having rolls 12 in. in diameter with 14 in. face. The roll journals in this case are 9 in. long and 9 in. in diameter. The ratio of the mill, including the motor train, is 19.6 to 1, and the roll speed 110 ft. per min. The motor used with



With Rolls 12 In. in Diameter and 14 In. Across Face, This Mill Weighs 35,000 Lb.; Its Motor, 3650 Lb. Additional

this mill is 100 hp., d.c., variable speed, shunt wound type, supplemented with automatic control, having 690 r.p.m. The mill occupies a floorspace 9 ft. 10 in. wide and 18 ft. 4 in. long, and stands 7 ft. 3 in. high. Without the motor, which weighs 3650 lb., the mill weighs 35,000 lb.

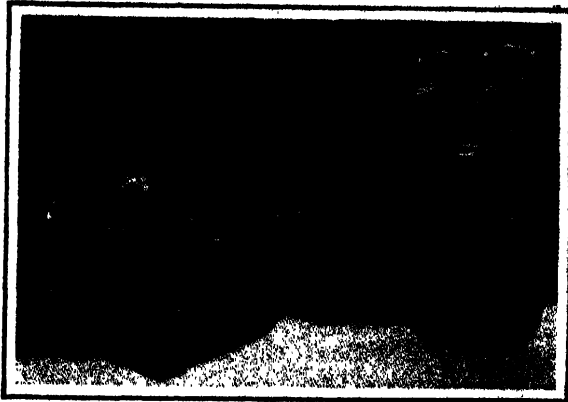
The last photograph shows a 10-in. mill operated in tandem, with rolls 10 in. long and 10 in. in diameter. The journals of this mill are 8 in. long and 8 in. in diameter. The ratio of the mill, including the motor train, is 14.6 to 1, and the roll speed, 124 ft. per min. The motor, a 75-hp., d.c., variable speed, shunt wound type, supplemented with automatic control, having 690 r.p.m., weighs 3100 lb. The weight of this mill, exclusive of the motor, is 12 tons. It occupies floorspace 9 ft. 5 in. wide and 11 ft. 4 in. long, and stands 6 ft. 8 in. high.

The design of these two heavier mills is substantially the same. The rolls are of forged steel, hardened and ground, and have independent adjustment upon each screw. The pinion housings are of forged steel of the herringbone type, operating in an oil bath. The motor and driving gears are of cast steel with maag cut teeth, while the pinions are of fabroll, steel faced, with maag cut teeth. The shaft bearings are of phosphor bronze and of the motor girding type. The mills are very rigid in design, and are capable of maximum production at the speeds indicated.

In tandem rolling by the Standard method the electrical equipment constitutes a very important adjunct. It will be noted that the motors are direct current, variable speed, and that the roll speed on each mill

naturally must synchronize with the first or original mill. Such is the case, and control is in the following manner:

A special rheostat and special control are provided each mill. When the stock passes from the first to the second mill, and from the second to the third, as well as from the third to the fourth, it passes through with a slight sag that is controlled by an ordinary dancer or



Mill and Motor Weighing 13½ Tons; the Rolls Are 10 In. in Diameter, with 10-In. Face

contact roll mounted between mills. This contact roll is connected to the control and automatically governs the speed of the motor, so that a proper momentum of material going through each mill is maintained.

The rheostat for controlling the speed of each mill to compensate for elongation constantly taking place need not necessarily be constantly manipulated. Push buttons provided at each mill, for stopping all mills, can be used to advantage in taking care of an occasional irregularity in the passage of stock through the rolls. These push buttons also insure safety to the operator. The rheostats merely regulate the ratio of the various speeds. The loop of wire between the mills has always been regulated by means of an improved vertical rheostat, which will control the speed of an entry mill. Incidentally it is advisable in this method of tandem rolling to operate the finishing mill at full predetermined speed, doing all fluctuating with the entry mill. By so operating, a full capacity mill production is assured.

Starting of the mills is done automatically, provision being made, first, for low voltage, to prevent self starting after stopping; second, gravity reset time limit with overload relay, to prevent overloading; and third, field accelerating relay, for high initial torque at low speed.

The heating problem of large industrial plants is discussed in a pamphlet prepared for general distribution by the Grinnell Co. It is an engineering selling argument advancing five factors for consideration in heating costs, but emphasizing that as nowadays the fuel item is an important one, the economics of heating need consideration to an extent that did not obtain in the days of \$1 and \$2 coal. In short operating as well as first cost need an engineering analysis. A copy of the pamphlet may undoubtedly be obtained by addressing Harold S. Hall, of the company, Society for Savings Building, Cleveland.

Weights of steel rounds, squares and hexagons, in lb. per ft., are given in a blue-printed wall chart issued by the Betz-Pierce Co., Cleveland. Rounds are covered from $\frac{1}{8}$ in. to $6\frac{1}{2}$ in.; squares, from $\frac{3}{16}$ in. to 4 in.; hexagons, from $\frac{3}{16}$ in. to $2\frac{1}{4}$ in. In all cases the metric size is given alongside its inch equivalent. Copies of this chart will be furnished by the company on request.

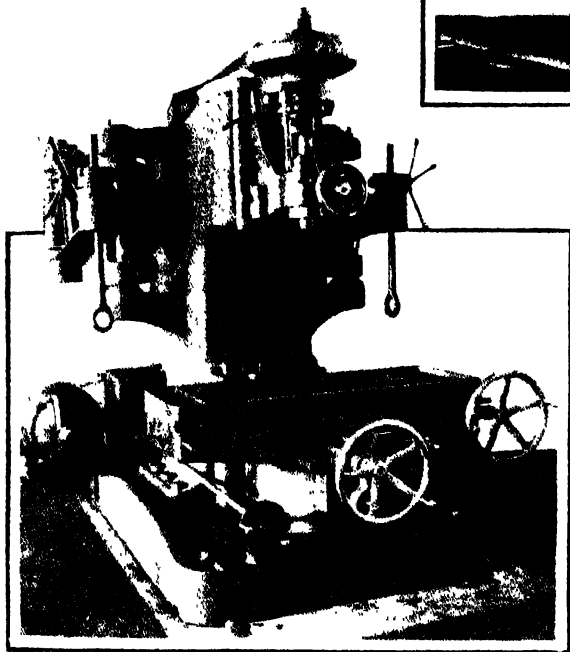
The Allegheny Steel Co., Brackenridge, Pa., has started up after a shutdown of several weeks. Three open-hearth furnaces are making steel preparatory to starting up 10 sheet mills, on Jan. 17, on a 4-day-a-week schedule.

Large Size Die Sinking Machine

A new die sinking machine with features particularly adapting it to handle large dies, has been placed on the market by the Pratt & Whitney Co., Hartford. In this design Bayer's compensating arms are used, permitting dies up to four tons to be suspended by elevating screws and readily placed in position on the table and easily swiveled, tilted or turned on edge. The hand feeds are thereby rendered sensitive to light cuts and the die can be fed over to extreme limits for cutting gates without cramping.

In one of the accompanying illustrations of the machine the compensating arms are shown folded back and latched against the sides of the column. The arms are carried on roller bearings supplemented by ball bearings and are sensitive therefore to any movement of the die. The front view illustration shows the arms

FIG. 1. Up to 4-Ton Max. Be Placed in Position on the Table and Swiveled, Tilted or Turned on Edge. In the view below the arms are folded back and latched against the column, the view to the right showing arms extended supporting the die.

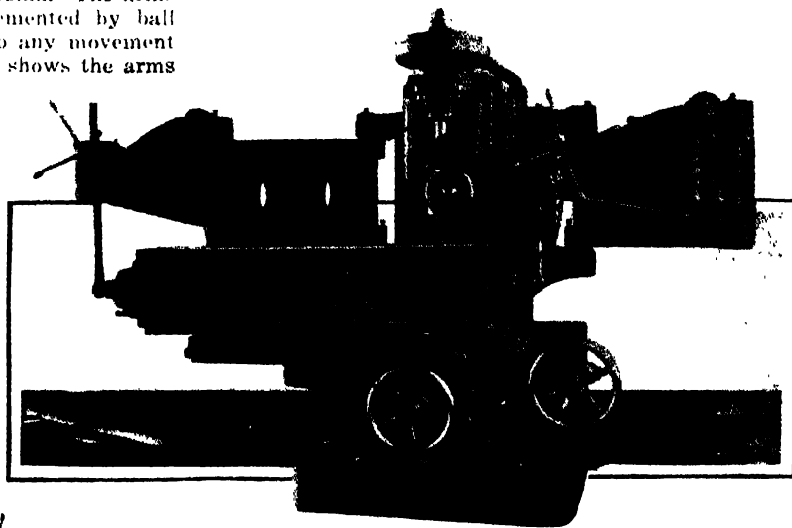


extended supporting a die which is swiveled on the table and moved into position for a cut near the end of the die. Both of the outer carrying arms have balance beams and adjustable weights by which the load of the die can be approximately balanced and relieved from the table. Crabs attached to the ends of the die provide trunnions by which the die is supported, the trunnions furnishing the means of readily tipping the die on its side for edge cuts. When the die is being tipped in this way the table is dropped clear of the die, the arms sustaining the entire load.

The machine is of the knee type which permits elevating dies of various thicknesses to the proper height to bring the cut to a convenient level for the operator. To this end the range of the knee travel is kept unusually low down, and platforms are unnecessary. The cutter spindle is mounted in a counterweighted vertical head provided with hand feed, equipped with a graduated dial. Rapid traverse for the quick adjustment of the head is incorporated. Power to the cutter spindle is through a quarter-turn belt from the gear box in the rear of the machine and changes of speeds and feeds are made by levers at the front. Hand and power feed are provided for both the longitudinal and

cross feed of the table, and in addition, all movements of the table including elevating and depressing have rapid-power movement. The mechanism driving the power movements operates through a friction to prevent injury to parts in case of over running. A cherrying attachment can be applied to the cutter head, the drive being effected through gearing to the nose of the cutter spindle. When not in use the cherrying attachment is swung back out of the way.

The machine is equipped for either a constant-speed drive direct from a line shaft or from a motor mounted on the machine. The table top is 22 by 48 in. The table feeds are, 48 in. longitudinal, 17 in. cross feed and 15 in. vertical feed. The cutter head vertical feed is



12 in. The floor space occupied is 10 by 10 ft. and the height of machine 9 ft. The weight is approximately 16,000 lb. The machine is also made without the die-carrying arms.

Cost of Living in Five Cities

Only a moderate reduction is shown in the December figures of the Bureau of Labor Statistics, as compared with September, for the cost of living in New York, Chicago, Philadelphia, Detroit and Washington. Each city shows a slight decrease, the December average for the five being 74 per cent above December, 1914, while the September average was 77 per cent above the earlier date. In all but Detroit, the peak of housing cost or rental was in the current month, the average for the five showing 60 per cent above 1914. Food is listed as 50.5 per cent up; clothing as 95.3 per cent; fuel and light as 76 per cent; house furnishings as 117.3 per cent and miscellaneous items as 106.8 per cent above December, 1914.

1921 Exports of Industrial Machinery

Exports of American industrial machinery show an increase of some 170 per cent in value in 1921 over 1913, according to a special review of the machinery export situation by the Department of Commerce, in which figures for the first eleven months of 1921 (\$238,007,585) are used to estimate the year's trade at \$250,000,000. The impression that our foreign trade has collapsed is not justified, in so far as exports of machinery are concerned, says the industrial machinery division, in pointing out that exports of such machinery for all of 1913 were only \$92,312,457.

The contract entered into by the Jones & Laughlin Steel Co. for the purchase of 900 acres of land at Hammond, Ind., provides that the sellers must make certain improvements to the property, among which is the dredging of the Indiana Harbor canal to make it navigable for ore carriers from Lake Michigan to the site of the proposed steel plant. The sellers must also provide drainage facilities, including a large sewer which it is reported will have a diameter of 16 ft.

WAGES ADJUSTED

Tonnage Rate for Sheet Mill Workers Advanced —Tin Mill Schedule Reduced

YOUNGSTOWN, OHIO, Jan. 17.—The bi-monthly examination of sales sheets Jan. 11 to determine the tonnage rate for sheet mill workers for the January-February period disclosed an average price on shipments of Nos. 26, 27 and 28 gage black sheets shipped during the 60-day period ending Dec. 31, of 2.80c. per lb. This represents an advance from 2.75c., the average at the settlement two months before. It is the first advance in the average price on shipments by mid-Western independent mills affiliated with the Western Sheet and Tin Plate Manufacturers' Association since the settlement covering the September-October, 1920, period. At that time the average on Nos. 26, 27 and 28 gage shipments was 5.80c., representing the peak which the market attained. In the interim there has been a progressive decline at each bi-monthly examination, until the one just held.

The advance of 5c. per 100 lb. in the selling price, therefore, entitles affected employees to an increase of 1½ per cent in the tonnage rate, for each member of the crew. During January and February, sheet mill workers will be paid a rate 26 per cent above base, as compared with a rate of 109½ per cent above base when sheets were at their peak.

Average invoiced selling prices covering 1921 shipments by affected interests fluctuated as follows, according to the successive settlements: January-February, 4.30c.; March-April, 3.95c.; May-June, 3.85c.; July-August, 3.10c.; September-October, 2.75c., and November-December, 2.80c.

Tin mill workers, on the other hand, sustain a reduction of 3½ per cent in January and February, the average price of a box of 100-lb. coke tin plate primes being \$4.80 on November-December shipments, compared with \$5, disclosed at the settlement two months previous. Under the current rate, employees in tin mills are 19½ per cent above base. The peak tin plate price during the war of \$8.40 was reached in the January-February, 1918, period, at the time when tin plate was in heavy demand for containers. Workers were then paid a rate which averaged 98 per cent above the base.

In 1921 the price of tin plate varied as follows: January-February, \$7.15; March-April, \$6.50; May-June, \$5.95; July-August, \$5; September-October, \$5, and November-December, \$4.80.

The last examination was conducted at Youngstown, James H. Nutt, secretary of the manufacturers' association, acting for the employers, while D. J. Davis of Pittsburgh, assistant to the president of the Amalgamated Association of Iron, Steel & Tin Workers, represented the employees.

Proposed Transmission Line for Puget Sound Company

SAN FRANCISCO, Jan. 11.—The firm of Stone & Webster is considering the construction of a transmission line for the Puget Sound Light & Power Co. from Snoqualmie Falls, 36 miles east of Seattle, to the Wenatchee Valley, Wash., a distance of 110 miles. The local representative will leave in a few days for the North, when investigations will be started.

The line will be carried on steel towers and will be equivalent to No. 0 gage copper, stranded. It is expected that the current will be stepped-up at Snoqualmie Falls from the Falls plant, and from other plants owned and operated by the Puget Sound Light & Power Co., from 60,000 to 110,000 volts, and in the Wenatchee Valley will be stepped-down to various voltages, suitable for distribution. The plan of spacing has not been decided yet, but as it is in a mountainous region, will probably be variable, and generally speaking from 300 to 2000 ft.

The towers will be of extraordinary construction in order to carry the wires under heavy snow conditions in the Cascade Range. There has been no estimate of the amount of steel that will be required, but a very

rough survey seems to indicate in the neighborhood of 2000 tons. This, however, depends whether the power line is for one circuit or two. The total copper requirement is said to be around 1,000,000 lb.

Will Take Census of Safety Workers

Although it is known that the metalworking industry has, because of the inherent hazards of its nature, always been among the leaders in industrial safety, it has never been established definitely how many persons in the metalworking industry are engaged in accident prevention and industrial health work, or how this industry compares with other industries in this respect. All this will soon be shown when a census of safety men in the metalworking industry, which is now being taken by the National Safety Council along with the census of safety men in all other industries and in public safety work, is completed.

Following is the form which all safety workers are requested to fill in and send to the National Safety Council, 168 North Michigan Avenue, Chicago:

Name
 Company or organization.....
 City..... State.....
 Nature of company's business.....
 Is safety your principal work?.....
 Please check other activities you engage in:
 Fire protection..... Legal.....
 Health and sanitation..... Insurance.....
 Workmen's compensation and claims..... Welfare.....
 General executive (such as manager or superintendent)..... Educational.....
 Engineering (other than safety)..... Industrial relations.....
 How long have you been in your present position?.....
 Technical or other special education?.....
 Signed.....
 Title.....

Possible Postponement of Cleveland Foundry Exhibition

Some delay in arranging the details of the Cleveland Exhibition of the American Foundrymen's Association is necessary owing largely to the need of negotiations with the new Cleveland city administration in respect to settling on the special requirements of the foundry show to be held in the Public Hall, which is so new that it has not been opened to the public. It is likely that the exhibition will be delayed to the week of May 22 instead of the week of April 24.

The new Federal coal terminal at Mobile, Ala., is about completed and will be tested at an early date. It has cost \$400,000 and has a capacity of 40,000 tons of coal and 20,000 tons of ore. Cargoes are deliverable from cars or river barges into bins or ships, and from ships into bins, cars, or barges. The terminals are expected to develop export and bunker coal business at Mobile in conjunction with Warrior River barge lines. Fuel oil storage bins were built last fall.

The Railway Supply & Mfg. Co., Cincinnati, has increased its capitalization from \$10,000 to \$600,000. The company is engaged in the railway supply business and has been operated as a part of the Joseph Joseph & Bros. Co. The company recently organized as a separate unit with the following officers: Arthur Joseph, president; Robert Orton, vice-president, and Wm. Ockrant, secretary and treasurer.

Fire destroyed the plant of the Standard Slag Co., at Sharpsville, Pa., Jan. 6, causing a loss of \$75,000. The main building, 56 x 80 ft., was destroyed. The principal loss was occasioned by damage to the machinery. The company has its head office in Youngstown and had leased the building at Sharpsville from the Shenango Furnace Co. It is stated the plant will be rebuilt. The loss is partly covered by insurance.

The plant of Smith & Wesson, Springfield, Mass., firearms, which has been closed for several weeks, reopened Monday with a 20-per cent wage reduction.

New Heald Automatic Surface Grinder

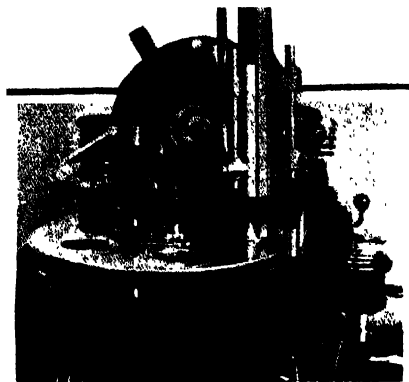
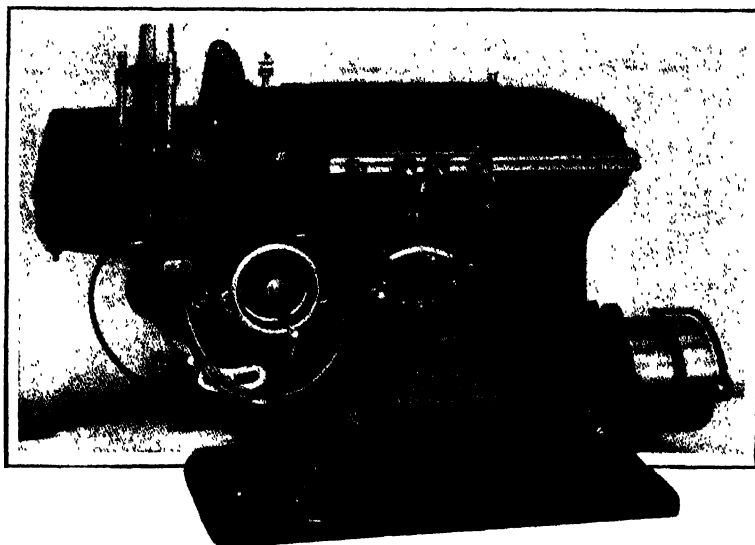
The Heald Machine Co., Worcester, has brought out a new automatic rotary surface grinding machine, known as the No. 25, designed particularly for quantity production in the grinding of piston rings, the sides of ball and roller bearing races, collars, washers, gears and similar work.

The machine is shown in the accompanying illustration. It weighs 4000 lb. net, the base casting alone weighing 1700 lb. and the wheel slide complete 700 lb. The wheel slide has wide flat and V-ways, and is liberally provided with oiling facilities. It is driven by an hydraulic arrangement operated by oil, and desired speeds can be instantly secured and the table reversed instantly without shock or noise. The reverse lever moves in the same direction that the wheel slide is desired to operate, and travel is

allowed to travel beyond its regular reversing position, until it engages two dogs attached to the wheel slide, which reverses it the proper distance for truing the wheel. The movement of the dogs not only controls the wheel slide travel, but the action of the feeding device as well.

The machine is equipped with electric contact for furnishing current for the magnetic chuck when the rings are being ground and as the disk revolves, the current automatically is shut off an instant and reversed, demagnetizing the chuck. By the time the next piece of work is slid into place the current automatically is switched on again. An automatic vertical feed can be furnished as an extra, but it is not adaptable to a machine furnished with a ring feeding arrangement.

The machine can be equipped with 8-in., 12-in. or 16-in. Heald magnetic chucks. The 8-in. chuck, when



The Automatic Feed Is Used in Grinding Rings, Ball Races and Similar Work. The chuck is fed from a magazine. After the work has been ground it slides off the chuck

stopped by pulling the hand lever forward. The spindle is extra large and is of chrome vanadium steel. It is mounted in a straight plain adjustable bearing at the grinding wheel end and adjustment is made through an opening in the top of the wheel slide. No other adjustment is required, as the rear of the spindle is mounted on a self-aligning ball bearing. A sight feed oiler provides oil for the plain bearing.

The main drive shaft is on the rear of the machine, and is mounted on extra heavy roller bearings. It has a two-step cone giving two speeds to the wheel, enabling the operator to maintain an efficient surface speed throughout the life of the wheel. The chuck spindle is mounted on ball bearings and driven by spiral gears. The spindle housing is tight, permitting the immersion of the bearings and gears in oil.

When the machine is used for general work without its automatic feeding device, the chuck bracket can be adjusted to allow for grinding concave and convex surfaces.

The patented automatic feeding arrangement provided is used when the machine is to grind rings, ball races, collars, washers, etc. The automatic features of this arrangement include a feeding plate with five holes bushed to take rings up to 5 in. in diameter. As the plate indexes, a ring slides from a magazine to the center of the chuck, is ground, and then slid from the chuck. The feeding plate is indexed by a lever connected with a crank disk at the back of the machine, operated by a friction device. The disk is held stationary by a latch while the wheel slide is going forward, grinding the ring on the chuck. The latch is tripped when the wheel slide returns, the crank makes one revolution, indexing the feeding plate from one hole to the next, and at the same time sliding off the ground ring and carrying a new one to the center of the chuck.

The diamond is located on the chuck pan and an arrangement provided for giving the proper stroke to the wheel slide in truing the wheel. By lifting a dog as the wheel slide is on the back stroke, the slide is

used for rings, ball races, etc., with the automatic feeding device can handle work up to 2-in. thick. The chuck has a $7\frac{1}{4}$ -in. vertical adjustment, and the distance from the top of the chuck to the center of the grinding wheel is 12 in. and $4\frac{1}{4}$ in. maximum and minimum respectively. In this arrangement the machine will not grind concave or convex. The 8-in. chuck, regular, on the other hand will grind concave and convex, has a face diameter of 9 in., a holding surface of 8 in., will swing 13 in. inside the water pan, has $8\frac{1}{4}$ in. vertical adjustment, a maximum distance from the top of the chuck to the center of the grinding wheel of 13 in. and a minimum of $4\frac{1}{4}$ in.

The 12-in. chuck has a holding surface of 12 in., a $13\frac{1}{2}$ -in. face diameter, a 16-in. swing inside the water pan, an $8\frac{1}{4}$ -in. vertical adjustment, and a maximum distance from the top of the chuck to the center of the grinding wheel of 13 in. The machine in this case will grind concave 10 deg., and convex 15 deg. The 16-in. chuck has a holding surface of 16 in., an 18-in. face diameter, a 20-in. swing inside the water pan, a $7\frac{1}{4}$ -in. vertical adjustment, a maximum distance from the top of the chuck to the center of the grinding wheel of 12 in., and a minimum distance of $4\frac{1}{4}$ in.

Water equipment, including pump, tank, water guard and connections are provided as extras. The machine is adapted for grinding wheels 14 in. in diameter by $\frac{3}{8}$ to $1\frac{1}{2}$ in. face. For motor drive a 10 to 15-hp. motor is recommended according to the character of the work, furnishing speeds of 850 to 1200 r.p.m. The belt-driven machine requires 90 x 40 in. floor space.

The *Illustrated Anchor Post* is a new monthly publication of the Anchor Post Iron Works, Garwood, N. J. It contains brief articles on electric welding in the making of railing and gates, flange welding, factory gates and illustrations of railing and gates made by the company. The publication is in charge of Rickard & Co., New York.

German Pig Iron and Steel Production

First Complete Data of the 1919 Production and Furnace Equipment—Estimates of the 1920 Output—Comparisons with 1913

(Special Correspondence)

BERLIN, GERMANY, Dec. 24, 1921.—No detailed statistics covering Germany's iron and steel production during 1920 and 1921 have been published as yet. While some headway has lately been made in bringing the foreign trade returns for the current year up to date, production statistics are still lagging sadly behind. This delay must primarily be attributed to the lack of personnel at the offices of the federal bureau of statistics during the years of the war as a result of which material has accumulated to an extraordinary extent. One may also not be far off the mark in assuming that military, political and economic exigencies in general are largely responsible for the marked reticence shown in publishing the latest returns. When it is considered that the returns are based on data, the furnishing of which constitutes a voluntary act on the part of the industry, and when it is further considered that mills are as a rule loath to divulge details concerning plant equipment and output and the different trade organizations are showing a similar reluctance to inform the public, the difficulties in the way of an efficient statistical service will be appreciated.

The latest returns on record cover the year 1919 which in many respects will go down as one of the most exceptional years in the annals of the German industry. War had just come to an end but peace not been concluded, the army was in a state of collapse and disintegration, and the entire industrial apparatus in the course of reconstruction. Raw material stores were depleted, the supply of raw products either impossible or rendered rather difficult, the people exhausted and important parts severed from the former empire. All these factors are characteristically reflected in the production returns which show a noteworthy decline in practically every department.

Ore Mining and Consumption

Beginning with ore mining, the total tonnage of iron ore raised is given as 6,153,800 tons as compared with about 28,600,000 tons in 1913. Of blast furnace plants there were 69 with 232 furnaces toward the end of the year, the respective figures for 1918 and 1913 being 23 and 267, and 93 and 330. Consumption of iron ores and ferromanganese, including manganese ores with more than 30 per cent manganese, at the furnaces amounted to 10,592,000 tons as against 38,534,000 tons in 1913 and 18,048,000 tons in 1918. A feature of the ore supply was the notable relative increase of Scandinavian shipments and the heavy decline in the consumption of manganese ores.

Pig Iron Production

Production of coke and charcoal pig iron totaled 5,650,000 tons, comparing with an output of 9,208,000 tons in 1918 and 16,760,000 tons in 1913. A detailed survey is given in the subjoined tabulation (in 1000 metric tons).

Yr	Found	Bei	Steel-making, Spiegelisen	Pu	Scrap from Washery	Tota	
1919	1,372	61.0	2,524	1,521	105	1	5,654.0
1918	1,481	131.6	4,802	2,617	160	17	9,208.6
1913	3,480	375.0	9,868	2,551	464	27	16,765.0

Iron and Steel Foundries

The number of plants decreased from 1,574 in 1913 to 1,469 in 1918 and 1,468 in 1919, the number of employees from 154,300 to 123,930 in 1918 but increased

to 135,000 in 1919. Details of plant equipment are given below:

Year	Cupola	Reverberatory	Open-Hearth	Crucible	Electric	Molten	Small
1919	2,914	104	145	983	13	800	140
1918	2,912	108	176	1,013	14	803	171
1913	2,979	110	102	1,402	3	659	60

Attention must be called to the fact that the 1918 returns include 112 plants whose production has been estimated only and on the 1917 basis; and that 91 plants did not furnish any data. Their aggregate output was estimated by experts to be 66,404 tons and the raw material consumption at 70,907 tons. These figures are not included in the following computation of consumption and production totals.

Consumption, including scrap, totaled 2,060,000 tons against 2,277,000 tons in 1918 and about 3,660,000 tons in 1913. It is interesting to note that foundries were largely adapted to the working of scrap and old material, the consumption of which during 1919 amounted to 809,679 tons, equal to about 90 per cent of the pre-war consumption. This dependence on scrap was less marked in 1918, or 78 per cent, the respective figures being 1,459,000 tons and 1,118,000 tons. The production of foundries in 1919 was 1,820,000 tons as compared with 2,243,000 tons in 1918 and 3,340,000 tons in 1913.

Wrought Iron

The number of plants and furnaces in existence at the end of the year were 16 and 153, respectively, (1918, 18 and 192; 1913, 31 and 326). The heavy decline of production in Upper Silesia compared with that of the Rhenish-Westphalian district forms a striking feature. The trend of developments is illustrated in the appended table in metric tons:

Year	Total	—Wrought Iron—		Refined and Converted Steel	
		Rhenish- Westph.	Upper Silesia	Rhenish- Westph.	Upper Silesia
1919	48,919	21,650	13,139	1,971	70
1913	212,203	62,443	67,917	946	938

Steel Plants

At the end of 1919 there were 99 steel plants, while 108 were in existence in 1918 and 106 in 1913. The decrease in the means of production is shown in the tabulation below:

Year	—Converters—		Open-Hearth	Electric	Crucible
	Basic	Acid	Furnaces	Furnaces	Furnaces
1919	64	15	451	38	71
1918	82	23	505	46	81
1913	109	13	432	27	116

Here again, scrap was extensively used, consumption of domestic pig representing but one third of the 1913 figures as is shown in the following in 1000 metric tons:

Year	—Pig Iron—		Scrap	Iron Ores
	Domestic	Foreign		
1919	4,122	85	3,387	102
1918	7,805	—	5,252	178
1913	13,282	45	5,579	297

The decrease is chiefly due to the cession of Alsace-Lorraine and the temporary elimination of the Saar district, the total production in Lorraine, the Palatinate and the Saar district amounting to 4,400,000 tons or 25.7 per cent of the German total. The total output for 1919 was 6,877,000 tons only against 11,829,600 tons in 1918.

Rolling Mills

The number of plants in existence in 1913 declined

from 174 to 153 in 1919. The subjoined table shows the relation in the production of semi-finished material and finished products in metric tons:

Year	Semi-Finished	Finished
1919	1,132,000	5,239,000
1918	2,028,400	8,775,000
1917	2,958,000	13,113,000

Estimates for 1920

As already stated, no detailed returns for 1920 have been issued yet. According to a statement by the Verein Deutscher Eisen und Stahl Industrieller (Federation of German Iron and Steel Industries), 5,550,000 tons of pig iron and 7,710,000 tons of steel were produced in 1920. If these figures are correct, they would indicate a decline in iron output by 104,000 tons com-

pared with the 1919 production (using the figures of the bureau of statistics for the comparison) and an increase in steel production of 978,000 tons over 1919.

A recapitulation of the production data expressed as a table is as follows:

Year	Pig Iron	Steel Ingots and Castings
1919	5,654,000	6,732,000
1918	9,208,600	14,072,000
1913	16,765,000	17,340,000
*1920	5,550,000	7,710,000

*Not official.

These data cover Germany proper and evidently do not include Lorraine and Luxemburg.

BELGIAN EXPORT PROSPECTS

Despite British Competition Exports Increase—Cheaper Coke—More Furnaces Blown In

(Special Correspondence)

CHARLEROI, BELGIUM, Dec. 17.—Despite the decline in shipments to the United Kingdom and keener British competition, sentiment in the iron and steel market is improving as other foreign business increases. Producers have every reason to consider the future hopefully as, with the exception of wages, production costs are decreasing.

After several months of protracted deliberations between the Government and pig iron and coke producers, an agreement has been reached to reduce coke prices 15 fr. per ton. Further measures for lowering the price of coke are reported and another cut in coke prices in January is anticipated. Belgian and French collieries will probably be forced to make substantial cuts in coal quotations, as British exporters are now offering stocks, c.i.f. Charleroi, below the quotations of local collieries. Negotiations by the industry for a reduction of freight rates on export shipments have been pending for some time.

British competition in Continental markets is no longer confined to semi-finished material, but includes pig iron and bars. It is difficult to see how British producers can sell on the Continent at a profit, but it may be largely accounted for by the necessity of maintaining the position of British industry in world markets, even at a temporary loss.

In pig iron, Belgian exports have been placed at a disadvantage by the recent reduction in Cleveland iron, but the tone of the market is still strong. Active buying during the past few weeks has caused a scarcity of material, causing several plants to arrange for blowing in a number of blast furnaces.

The Thyse-Chateau works at Marcinelle is blowing in one of its blast furnaces which has been idle since last June. At Chatelineau one furnace will shortly be blown in. The Société Métallurgique de Sambre et Moselle is planning to start up one stack by January. Two furnaces have been relighted at the Ougrée and two at the Espérance Longdoz works. Furnaces are also ready to resume operation at La Louvière (Société Boel) and Monceau (Société Monceau-St. Fiacre).

Poundry iron No. 1 is quoted at 265 to 275 fr., No. 3 at 240 to 250 fr., basic at 235 to 245 fr. In semi-finished material the scarcity continues, as most of the output is being retained by the producers for their own consumption. Lorraine producers are averaging three months' delivery, while the terms of Luxemburg works for moderate tonnages are about 10 to 12 weeks. Sheet bars are quoted at 410 fr. per ton.

The upward trend of bar iron prices has been halted by the lowering of quotations in the United Kingdom and increasing competition in Holland, the latest quotations being 420 to 430 fr. for wrought iron bars No. 2, and 450 to 460 fr. for No. 3, while mild steel bars have been quoted at 455 to 465 fr., all for domestic delivery. Export prices for mild steel bars average 440 fr. The pipe and tube market shows a further improvement, but conditions in the wire and rail markets are less satisfactory. A decidedly stronger tone

prevails in sheets, prices tending upward. Heavy sheets, basic, are quoted at 515 fr., medium sheets, basic, according to gage, 620 to 650 fr., and light plates about 840 fr. Steel hoops bring £11 to £11 10s., for export, f.o.b. Antwerp. Domestic prices for hoop iron are firm at 660 to 675 fr.

British Pig Iron and Steel Output for December and for 1921

LONDON, ENGLAND, Jan. 13.

The production of pig iron in Great Britain in December was 275,000 gross tons and that of steel ingots and castings 381,000 tons. These compare with an output of 271,800 tons of pig iron and 442,800 tons of steel in November.

The production of pig iron and steel in Great Britain in 1921, as compared with 1920, according to National Federation of Iron & Steel Manufacturers, was as follows:

	Pig Iron		Steel Ingots and Castings	
	1921	1920	1921	1920
January	642,100	665,000	493,400	754,000
February	463,600	645,000	483,500	798,000
March	386,000	699,000	359,100	840,000
April	60,300	671,000	70,600	794,000
May	13,800	738,000	5,700	846,000
June	800	726,000	2,700	845,000
July	10,200	750,600	117,200	789,900
August	94,200	752,400	434,100	709,200
September	158,300	741,000	429,300	884,700
October	235,500	533,200	405,400	544,300
November	271,800	403,200	442,800	505,100
December	275,000	682,500	381,000	746,600
Total	2,611,400	8,007,900	3,624,800	9,056,800

These data compare with 7,398,000 tons of pig iron and with 7,894,000 tons of steel ingots and castings in 1919.

The 1913 production was 10,260,000 tons of pig iron and 7,668,000 tons of steel ingots and castings.

Will Sell Shell Steel

WASHINGTON, Jan. 17.—Bids will be received until Jan. 31, by the Ordnance Salvage Board of the War Department, at Chicago, on approximately 31,491 tons of shell forgings located at Columbus and Toledo, Ohio, and Savanna, Ill. The bids will be accepted on the total quantity of all three lots or the entire quantity of one or more lots. The forgings are rough and semi-finished and are said to be suitable for charging box scrap. They will be sold without regard to analysis of material, quality, quantity or condition.

The salvage officer at the arsenal at Rock Island, Ill., will receive bids until Jan. 27, for the sale of a large quantity of surplus building material at the arsenal. Included in the list of material are approximately 80,000 lb. of sheet lead of various dimensions; cast iron floor plates; structural steel; 38,000 bolts and nuts in various sizes; anchors and tie bolts; and over 20,000 lb. of railroad and boat spikes.

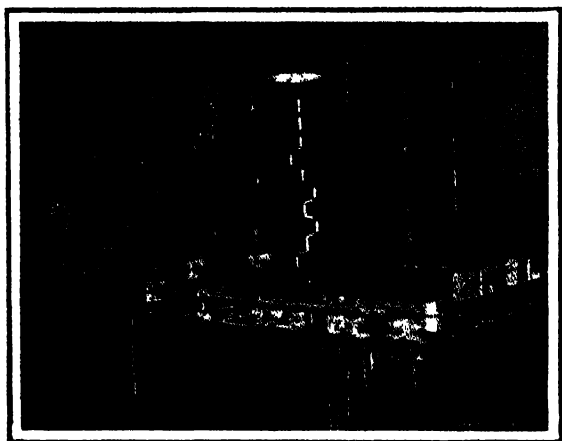
CASE HARDENING A CRANKSHAFT

Method Developed by Franklin Motor Car Co.— Only Wearing Surfaces Treated

In the case hardening of crankshafts as developed and put into a regular production proposition by the Franklin Motor Car Co., Syracuse, only the wearing surfaces are treated, the object being to secure harder surfaces for the main and throw bearings. The results from exhaustive tests are said to indicate that the wear of the case-hardened shaft is only one-sixth as much as on the company's former production crankshafts, tested under similar conditions. It is said that the life of the heat-treated bearings is three to four times greater than that of the soft crankshafts.

In the beginning of the process of case hardening, the wearing surfaces are wound with tape. The shaft is then dropped into a copper plating tank as shown, the copper protecting the exposed parts which

The Dipping of the Crankshaft into the Copper Plating Tank Is Shown Below. At the right the crankshaft is shown placed in the hardening die, or straight jacket, and being quenched. The hardening die serves to prevent distortion.



ity of forming a joint agency of manufacturers under the auspices of the association, for the collection, production and distribution of industrial motion pictures. It is also suggested that a report be made on the plans and methods for carrying forward such a project if the conference should deem an undertaking of this character to be advisable, and that the Bureau of Foreign and Domestic Commerce be asked to participate in such a conference.

Iron and Steel Production in Canada

The production of pig iron in Canada during November was fairly well maintained, the total output of basic iron amounting to 41,232 long tons as compared with 42,356 tons in October. With the exception of some 300 tons the whole output was produced by makers for their own further use. Foundry iron fell off slightly from 7217 long tons in October to 6348 tons in November, practically all of which was produced for sale. No malleable iron has been made in Canada since



are not to be hardened by preventing the penetration of the carbonizing gases.

The shaft is then packed into a box containing carbonizing material, each box accommodating three shafts. The box is sealed with fire clay and placed in the heating furnace where it is kept for 24 hr. at a temperature of between 1600 and 1700 deg. Fahr. The box is then removed and the crankshafts permitted to cool. They are then reheated to 1450 deg. Fahr., after which they are quickly placed into the hardening die, as illustrated, and then quenched. The hardening die, or "straight jacket," as it is called, holds the shaft rigidly, effectively preventing distortion.

After coming from the case-hardening room there are two grinding operations and a certain amount of aligning of the shaft to be done.

Will Confer in Regard to Moving Pictures

WASHINGTON, Jan. 17.—Based upon responses received from industries and upon the activities of the Department of Commerce, which also has interested itself in the question, Nathan B. Williams, associate counsel of the National Association of Manufacturers, has made a report to President Edgerton recommending that the board of directors of the association invite manufacturers who have industrial motion pictures or who are interested in the subject, to a conference to consider the question of production and distribution methods now employed by manufacturers using motion pictures. The recommendation suggests the advisabil-

ity of forming a joint agency of manufacturers under the auspices of the association, for the collection, production and distribution of industrial motion pictures. It is also suggested that a report be made on the plans and methods for carrying forward such a project if the conference should deem an undertaking of this character to be advisable, and that the Bureau of Foreign and Domestic Commerce be asked to participate in such a conference.

The output of ferroalloys showed a creditable increase from 1266 long tons in October to 1683 tons in November, in spite of the fact that only two plants were in operation. No spiegeleisen was made during the month, the output of ferroalloys consisting entirely of ferrosilicon in grades from 15 to 75 per cent.

The production of steel ingots and castings showed a decided improvement for November, the output rising from a high record of 72,204 long tons in October to a total of 75,039 long tons in the month of November. Of the November output 73,806 tons was made by the producers for their own use in the manufacture of steel rails. A small tonnage was produced for direct sale, the total under this item being 1233 long tons, practically all of which was in the form of steel castings.

The National Metal Trades Association will hold its twenty-fourth annual convention at the Hotel Astor, New York, on April 19 and 20.

Worm Gear Drive for Line Shafting

Following the modern tendency to inclose all gears and other moving parts the Cleveland Worm & Gear Co., Cleveland, has developed the inclosed worm gear drive shown in the illustration, for the operation of line shafting with direct right-angle drive from the motor shaft through the worm and worm wheel to the line shaft. It is pointed out that this drive possesses various desirable features among the most important of which is that it permits the use of smaller, high-speed motors operating at 1800 r.p.m. and that not only is the first cost much less because of the use of smaller motors, but they have the added advantage of a higher power factor and higher efficiency which tend to give better starting conditions for the motor. The ease with which large ratios of reduction can be obtained with



Where Steel Girders Are of Sufficient Strength, the Unit Is Mounted on the Steel Work

the type of worm drive used, which is mounted on ball bearings, permits the use of this drive on high or low speed line shafts.

The drive runs in a bath of oil in an oiltight and dustproof housing, the case being filled with oil to the petcocks and about every three months drained, washed out and refilled with fresh oil. It is stated further that as there is no slip, the power being uniformly transmitted by the worm and wheel, the drive is a desirable one to use in manufacturing processes that require a constant application of torque. The drive operates with practically no vibration or noise and may be mounted with the motor on a cast-iron bed plate attached to the ceiling as shown in the illustration. Where the steel girders are of sufficient strength, the unit may be mounted directly on the steel work.

The efficiency of this drive is stated to be approximately from 93 to 97 per cent, depending upon the ratio of reduction. The unit stresses are kept at a minimum to insure long life with practically no interruption of service. The necessity of shutdowns because of broken driving belts or chain is eliminated. As the drive is totally inclosed, no guards are required to cover moving parts nor is it necessary to make adjustments for wear.

Safety Meetings for Carnegie Plants

A course of safety lectures for the instruction of the workmen of the Edgar Thomson Works, Carnegie Steel Co., and other plants in the Braddock, Pa., district, has been arranged by the safety organization of the Edgar Thomson Works, O. J. H. Hartsuff, general superintendent. Last fall a series of safety lectures for the foremen of the district was conducted by the Braddock plants. The current course for the education of workmen is modeled after the successful course that preceded it. At each session, in addition to the speaker, music is furnished by organizations from the local steel plants, supplemented by readings and musical perform-

ances by volunteers from the district. Several playlets are now being rehearsed in which employees of local mills will enact scenes from everyday life in the steel mills which carry a lesson in safety to the audience. John B. Trusel, safety director of the Edgar Thomson Works, is chairman of the committee arranging the course. The first session was held Thursday evening, Jan. 12, with an address by John A. Oertel, safety director of the Carnegie Steel Co. E. S. Willis, who conducted the safety course held for the foremen last fall is in charge of the present course.

First Sectional Meeting of the American Society for Steel Treating

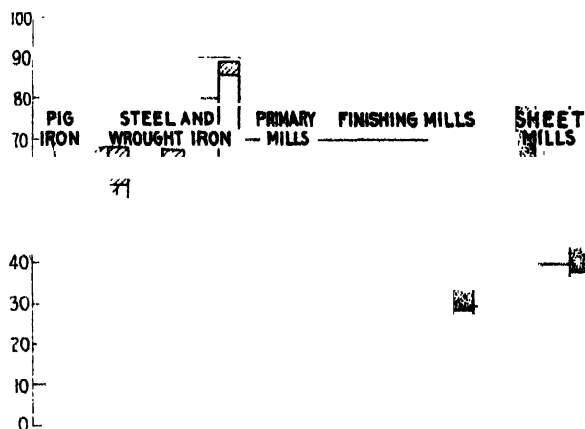
The first of two sectional meetings of the American Society for Steel Treating, to be held in 1922, is scheduled for March 3 in New York, under the auspices of the New York Chapter. The meeting is to embrace the members of all the chapters in the eastern territory, including Syracuse, N. Y., and Washington.

The meeting is distinctly a technical one, at which six papers on various heat treatment subjects are to be presented by members of the various chapters. These are to be pre-printed and an extended discussion is aimed at. The papers are to be presented at an afternoon and evening session. An informal dinner is scheduled.

The second meeting of this nature is to be held in Pittsburgh some time in May. At both meetings an invitation is to be extended to the members of other technical societies in the vicinity, urging their attendance and participation in the discussions. The program for the March meeting will be available soon.

Wages in Iron and Steel Plants

In the chart, the average earnings of all employees in each of the ten departments mentioned are shown separately for 1920, 1919, 1917 and 1913, except that



the 1917 figures for puddling mills, rail mills, bar mills and tin plate mills are missing. The top of each column represents the average 1920 hourly earning; the bottom of the upper shaded section shows the earning for 1919; the top of the lower shaded section, that for 1917, and the bottom of the lower shaded section, that for 1913, as indicated at the left. From this it will be easy to compare department with department at any given date.

This chart was inadvertently omitted from page 156, THE IRON AGE, Jan. 12, where some of the detailed figures are given on which the chart is based.

The Philadelphia Foundrymen's Association, at its annual meeting, Jan. 10., re-elected Thomas Devlin of the Thomas Devlin Mfg. Co., president. R. C. Spars, American Manganese Bronze Co., was elected vice-president, succeeding George C. Davies of Pilling & Co., pig iron merchants. Howard Evans of the J. W. Paxson Co., was re-elected secretary and the same executive committee will serve for another year.

CONTENTS

JANUARY 19, 1922

Crucible and Electric Tool Steel	201
Aspect of Choice in Their Manufacture—Electric Furnace a Sealed Crucible	

Applications of Continuous Die Rolling	207
Especially Adapted for Forging Blanks—Macrographs and Micrographs Show Smooth and Uniform Metal Flow	

Tandem Rolling of Cold-Rolled Steel	211
Special Equipment Includes Wire Straighteners, Edge Rolls, Turk's Head and Cross Slides	

German Pig Iron and Steel Production	217
First Complete Data of 1919 Production and Furnace Equipment—Estimates of 1920 Output	

Shippers Will Strongly Urge Lower Freight Rates	229
Railroad Executives Have Been Heard—Representatives of Iron and Steel and Other Industries to Testify Before Commission	

American Pig Iron Association Meets..	205	Editorials	222
German Hardware in Damascus.....	205	Future of the Trade Associations—Steel	
Patent Bill Passes House.....	206	Demand for Replacement—Fighting by	
Automobile Production in 1921.....	206	Injunction—Labor's Share in Steel—	
Electric Melting and Heat Treating		Making Transportation Adequate.	
Furnaces Designed by Students.....	206	Correspondence	224
Cost Accountants Indorse Standard In-		Split Blast Furnace Shafts.	
voice Form.....	210	Bids on Old Warships.....	225
Detroit Technical Societies Affiliated...	210	Basing Point Hearing	225
Large Die Sinking Machine.....	214	Open Price Policy	225
Cost of Living in Five Cities.....	214	Shaping the Tariff	226
1921 Exports of Industrial Machinery..	214	No Competition Between Steel Corpora-	
Proposed Transmission Line for Puget		tion's Ships and Rail Lines.....	226
Sound	215	Conference of Railroad Executives and	
Census of Safety Workers to be Taken..	215	Brotherhoods	226
Possible Postponement of Cleveland		British Industries Fair.....	226
Foundry Exhibition.....	215	Open Price Competition	227
Heald Automatic Surface Grinder.....	216	New Trumbull Furnace Lighted.....	227
Belgian Exports Increase.....	218	Bank Takes Over Cromwell Steel Co....	227
British Pig Iron and Steel Output for		New Forcing and Bending Press.....	228
December and for 1921.....	218	Improvement in Shipbuilding Predicted	228
Case Hardening a Crankshaft.....	219	Worm and Spur Gear Speed Transformer	228
Iron and Steel Production in Canada...	219	Motor-Driven Buffing Machine.....	228
Worm Gear Drive for Line Shafting...	220	December Business in Fabricated Steel..	233
Safety Meetings for Carnegie Plants...	220	Foreign Trade Conditions.....	243
First Sectional Meeting of Steel Treat-		Transfer of Jamison Coke Properties..	246
ing Society.....	220	Trade Changes	248
Wages in Iron and Steel Plants.....	220	Plans of New Companies.....	248
		Industrial Finance	248, 257

Iron and Steel Markets	230
Comparison of Prices	231
Personal Notes	244
Obituary Notes	245
Non-Ferrous Metal Market	246
Prices Finished Iron and Steel f. o. b. Pittsburgh	247
Machinery Markets and News of the Works	249
New York Jobbers' Prices	258

ESTABLISHED 1855

THE IRON AGE

EDITORS:

A. I. FINDLEY

WILLIAM W. MACON

GEORGE SMART

CHARLES S. BAUR, Advertising Manager

Member of the Audit Bureau of Circulations and of
Associated Business Papers, Inc.

Published every Thursday by the IRON AGE PUBLISHING CO., 239 West 39th Street, New York

F. J. Frank, President

PRINTED IN U. S. A.

George H. Griffiths, Secretary

Owned by the United Publishers Corporation, 243 West 39th
St., New York. H. M. Sweetland, Pres., Charles G. Phillips,
Vice Pres., A. C. Pearson, Treas., F. J. Frank, Secy.

BRANCH OFFICES: Chicago: Ohio Building Pittsburgh:
Park Building Boston: 116 Unity Building Philadelphia:
1120-1422 Widener Building Cleveland: Guardian Building.

Detroit: 317 West Fort St. Cincinnati: Mercantile Library
Bldg. Washington: 816 Fifteenth St., N. W. San Fran-
cisco: 320 Market St. London, Eng.: 11 Haymarket, S.W. 1.
Subscription Price: United States and Possessions, Mexico,
Cuba, Shanghai, \$6.00; Canada, \$8.50; Foreign, \$12.00 per
year. Single copy 50 cents.

Entered as second class matter June 18, 1879, at the Post Office at New York, New York, under the Act
of March 3, 1879

The Future of the Trade Associations

Unexpectedly small concern is shown over the right of the so-called open price trade associations to exist. Their members commonly believe they have kept in the right path, but they are disposed to question the present need of association activities. This view grows out of the mood which raises an interrogation on every expenditure. The uncertainty created by the so-called hardwood decision of the Supreme Court gives the cue to the member for chopping off the association assessment. Only a portion of the members recognize in times like these the value of definitely discovering signs of a turn in the consumption as well as in the production trend and of checking the shrewd moves of opportunist buyers. The average manufacturer is an average man and he finds it hard to take from his surplus or to extend his credit when there is little promise of early reward. Thus the association is weakened financially and its activities crippled.

That organizations of competing manufacturers have been studiously innocuous, since the first finding against the now famous hardwood association nearly two years ago, has not made for tight bonds of membership. The business depression, too, has caused many to forget what the associations have accomplished. Legal advice, as always, has been a safeguard, but the close decision of the Supreme Court in the hardwood case has shaken confidence in the opinions of legal advisers.

It remains that the association members do not care to test their contentions of entirely legal conduct by being parties to a Government suit. The attitude, as stated, is one influenced largely by the lean pocketbook. It shows the distorted perspective in which many view their problems in the depths of a depression. The result may be the cessation of practices close to the border line, even though many of the benefits of the past be given up. Thus small associations may find it difficult to retain a sufficiently large percentage of the industrial or trade group to make the association properly efficient or influential, and industry generally will be the loser.

It is yet to be seen how far the abandoning

of associations will check Government efforts to help business, as through the Department of Commerce. Before long a clear pronouncement may be expected. The Chamber of Commerce of the United States has made a good move in starting a special investigation. Meanwhile, it behooves the trade associations to go slowly in taking steps to disband and thus destroy a usefulness which it has taken long, hard work to build and maintain.

Steel Demand for Replacements

In September, 1918, the rate of steel ingot production in the United States was approximately 47,000,000 tons a year. In March, 1920, a rate of 45,000,000 tons was attained. One of these high points was reached during the war, the other more than a year after hostilities ended. Last July the rate was approximately 11,000,000 tons. At the beginning of last November it was probably not far from 25,000,000 tons. Never before in the history of the steel industry were there such wide swings in the operating rate, and the present seems like a strange time in which to suggest that in future years the production of steel is likely to be at a steadier rate than used to obtain, yet there is some reason to suppose that the steel trade is approaching a period in which demand and production will run along more uniformly than has been the average experience in the history to date.

The swing in production down and back in 1921 was based on circumstances quite unlikely to be repeated. Late in 1920 and early in 1921 stocks of steel and of various manufactures of steel piled up because men did not realize suddenly enough the extent of the readjustment that had begun. The liquidation of these stocks was the chief cause of the special dip in the rate of steel production last summer, the production at that time being no measure of the then current rate of consumption. This dip, therefore, may be disregarded, and we should consider that recent experience was of consumption being reduced only by one-half, not by three-quarters.

Leonard P. Ayres, vice-president of the Cleveland Trust Co., has made a careful study of the automobile trade. By taking the production of

passenger vehicles and dividing it into Fords and "all other" he has seen a point which the superficial observer, glancing simply at tables showing "the production of automobiles" has missed. Mr. Ayres finds that the production of "all other" increased rapidly up to and including the year 1916, and that since then the production has increased but slightly. The spread of the automobile has been downward into the ranges of smaller purses, and the production of the Ford car doubled from 1916 to 1920. Mr. Ayres reaches the conclusion that it is a practical working rule to assume that the life of an automobile is six years and that without expansion in the use of the automobile one can count upon a demand in a given year equal to the production of six years earlier.

This is precisely the sort of rule the steel trade has been wishing it had for each class of steel consumption. Even a few such rules, applicable to some of the important classes of steel consumption, would prove very helpful. For instance, in every one of the three years, 1905, 1906 and 1907, more freight cars were built than in any preceding or subsequent year. A large part of that work was in the building of steel cars to replace wooden cars. If steel cars had a definite and uniform life we would know when to look for replacement orders.

While it may not be possible to formulate such rules, one can generalize to the extent of saying that as the total amount of steel in service grows the average annual replacement requirements must grow. As an index the statistics of pig iron production are, of course, better than the statistics of steel production. At the beginning of 1882, 1892, 1902 and 1912, the condition was in each case that of all the pig iron that had been made up to that time approximately one-half had been made in the preceding ten years. That is an index to the newness of the store of iron and steel in use at any date in the period. Up to the beginning of 1912 about 440,000,000 tons of pig iron was made, but in the past ten years the production, minus the equivalent represented in regular exports and our own war material sent abroad, was hardly more than 270,000,000 tons. Instead of equaling 440,000,000 tons, it was only about 60 per cent of that amount. Thus the average age of the material we now have in service is considerably greater than in the other periods named, and we are at a time when the ratio of replacement demand to expansion demand is decidedly higher than formerly.

Fighting by Injunction

A very unusual if not unprecedented decision was given a few days ago in the Supreme Court in New York by Justice Robert F. Wagner, who held that the Cloak, Suit and Shirt Manufacturers' Protective Association was guilty of breaking a contract in attempting to establish piece work and the 49-hour week in the shops of its members. He permanently enjoined the association from pursuing what he finds is a conspiracy. Although an officer of the union hailed the decision with de-

light and announced that the employers would be sued for an amount "running into the millions" on account of wages lost since the strike was declared last November, some of the union men are not at all satisfied with the victory and one of their attorneys asserted that he was by no means converted to the opinion that court injunctions are the proper method of adjusting industrial disputes.

Certainly it must be conceded that if the contending sides in a strike fight each other by injunctions, it is better than to resort to violence which so often has been the labor union's method of securing its ends. In fact, the decision seems to put the participants on a higher plane and might suggest a further argument for incorporation of unions so that decisions could be more easily and effectually enforced. As the court said, "the fact that the employees entered equity's doors by a hitherto untraveled path" does not lessen their right to the law's decree. They are placed in the position of respecting courts and injunctions and that is an unusual attitude for many of the labor agitators.

In the last analysis the issue comes down to a matter of fact. If the employers in any case violate a contract, they ought to be held responsible, just as the employees should always be held responsible for any contract which they have made. If labor leaders are compelled to give up their defiance of the courts and take their chances when they submit disputes to legal decisions, there will be reason for believing that real headway has been made on a problem on which there has been so much traveling in a circle.

Labor's Share in Steel

Although the rapid progress of events has made the census figures for manufactures of 1919 decidedly out of date, yet some interesting deductions are to be drawn from the relations between those figures, some of which are not yet published, and corresponding figures for 1914, the previous census year. These deductions, which do not appear on the face of the returns as put out by the census bureau, follow a close and discriminating analysis of those returns.

Taking the figures for blast furnace plants, steel works, rolling mills and pipe mills, covering a total of 745 establishments in 1919, it is found that the total outlay for wages and salaries in that year was 22.72 per cent of the entire value of products made, as compared with 20.53 per cent in 1914. The element of prices is evaluated here, because both the wage bill and the products are quoted each year, in terms of the same dollar. It is thus evident that labor's share during that interval increased by something more than 10 per cent. Putting this in another way, the wages paid in 1919 amounted to 37.07 per cent of the value of the materials upon which labor, purchased by those wages, was expended. This compares with only 29.41 per cent in 1914, and shows that, in spite of the heavy increase in the cost of materials purchased, the wages of labor far outstripped it.

It has become common practice of late for self-

appointed economists, arguing in favor of labor unions, to point accusing fingers at the high salaries paid the directing minds of large enterprises. In the case of the steel mill units above mentioned, salaries in 1914 amounted to 20.71 per cent of the wage payments; in 1919 the proportion was only 16 per cent. This shows that, although the salary list has been heavily augmented, it is relatively much smaller than the wage list, when compared with operations of earlier days. From whatever angle it is considered, therefore, it is apparent that the wage earner has been getting his full share (and somewhat more) of the output of the steel industry.

Making Transportation Adequate

While many things are essential in making the foundation upon which a people may be prosperous and make progress, it is obvious that the two most important requisites are a sound medium of exchange and good transportation facilities. In all the analyses that have been made of the poor economic conditions in Europe two points have been emphasized—the absence of sound currencies and the absence of adequate transportation facilities. Conditions vary greatly in different parts of Europe, yet whatever the situation these two desiderata for improvement are conspicuous.

In the United States we have one of these two requisites, an admirably sound currency. In transportation we have something of doubtful adequacy, there being quite a range of opinion as to how poor or how good the rail transportation situation is.

The variation in opinion is due to an extent to differences in the viewpoints of individuals, but largely it is due to failure to form definite conclusions as to the quantity and quality of the rail transportation the nation requires. There has been very little quantitative or qualitative analysis of the transportation service the railroads have furnished from time to time in relation to the volume of business activity in the various lines of industry.

Let us illustrate this suggestion that rail transportation should be studied in connection with industrial activity: The iron and steel industry would like to operate at a rate involving a production of 40,000,000 or 50,000,000 gross tons of ingots a year. The bituminous coal industry would like to produce 600,000,000 tons a year. The building trades would like to see a million or so of dwelling houses built in a couple of years. Motorists and others would like to see tens of thousands of miles of improved roads built. We go on thinking and hoping that these things can and will be done, but there is nothing like careful analysis and study to determine whether the best transportation service we can expect from present facilities would permit of their being done. If they cannot be done and we should become all set for the accomplishment, we should simply run into disappointment by what we have experienced before, called a "breakdown in transportation."

It is not logical to set our minds on high

standards of performance in industry, such as those cited, without making sure that we have the requisite transportation facilities. It is plain that we have not. In 1920, with vexatious delays to shippers and heavy losses to industry from poor transportation, the railroads made their highest record in freight movement, 448,500,000,000 ton-miles. That was the maximum in quantity of service, but the quality of service was very poor, certainly not the quality shippers want. Yet 1920 was not a year of great industrial activity. It was a year of high prices due to difficulties in producing goods and securing delivery of goods and to profiteering and speculation. For nine months the steel mills, importuned by customers for heavier shipments, had their operations curtailed by 20 per cent, chiefly from lack of transportation. The coal and coke produced was far under the capacity, yet prices were outrageously high because transportation was insufficient. Road and dwelling house construction was far below what the people expect and want in future. Yet in 1920 there was not enough transportation capacity to furnish good service for the restricted amount of industrial activity in that year.

We now have logically but two choices. We must either renounce the hopes we have been entertaining of there being great industrial activity in future or we must become willing to do the work and spend the money necessary to establish the needed transportation facilities.

CORRESPONDENCE

Split Blast Furnace Shafts

To the Editor: The editorial entitled "Split Furnace Shafts," which appears on page 166 of your issue of Jan. 12, the writer has read with a great deal of interest. It furnishes us with information which apparently is not generally known.

The view you have taken that the splitting of the shells is not so much due to the fire brick as to the accumulation of metallic zinc, also zinc oxide on the brick and penetrating it, seems entirely reasonable. The remedy which you point to, viz., using heavier plates and banding the furnace, seems to me, however, only changing the effect of the expansion from one point to another. This suggestion which you make will without doubt save the shell, but on the other hand will ruin the fire brick.

The great amount of pressure which is brought to bear on account of the expansion, when the plates will not give, will cause the brick to spall off, starting on the inside. It is a well-known fact that it is next to impossible to convince any one handling a furnace, regardless of the kind, to lay the blame for spalling to anything but inferior fire brick. Therefore, your remedy does not cure, but merely relieves the afflicted part.

I would like to offer a suggestion in conjunction with that made by yourselves, not only to strengthen the shell of the furnace but to make it perhaps a trifle larger in diameter—the amount to be determined upon by those who are able to figure these matters—and between the brickwork and the shell to make a cushion of dry quicksand. With such an arrangement, when the bricks expand, they would exert the pressure against the sand rather than the shell. The shell will be practically immovable. The sand on the other hand will flow when pressure is brought to bear, and the horizontal expansion of fire brick would be taken up

by the vertical movement of the sand, provided there is provision made at the top of the furnace to take the sand forced up by this expansion. It might be that sharp sand would do as well as the quicksand. The reason that quicksand is suggested is that there is a better chance of its moving and allowing for the necessary expansion.

My interest in this matter is readily understood by yourselves on account of my connection with the fire brick industry.

JOSEPH PODMORE,
Secretary Ostrander Fire Brick Co.

Troy, N. Y., Jan. 13.

BIDS ON VESSELS

Much Interest Manifested in the Proceedings at Washington

WASHINGTON, Jan. 17.—With 17 concerns from the various sections of the United States submitting bids on obsolete naval vessels at the opening here yesterday, the interest created was even greater than had been expected. What it may indicate as to the proposed establishing of a ship salvaging industry in the country remains to be seen, but naval officials professed to see in the bidding good prospects for the creating of such an industry provided the scrapping of ships is undertaken on a broad scale as the result of the action of the Conference on the Limitation of Armaments and the maintenance of an adequate American merchant marine. While some bidders undoubtedly do not intend to engage permanently in the salvaging business, others apparently are ready to do so, while still others already have been so engaged to differing degrees in the work. The vessels for which bids were submitted included three battleships, two cruisers and four monitors. The battleships are the Maine, Missouri and Wisconsin, the cruisers the Columbia and Memphis and the monitors, the Ozark, Puritan, Tonopah and Miantanomoh.

Among the most prominent bids were the following:

Bidder	Vessels Bid On	Bids (Cents Omitted)
Henry A. Hittner's Sons Co., Philadelphia	All or none	\$235,000
Harde Industrial Co., Seattle, Wash.	All or none	213,013
*Meritt Chapman Derrick & Wrecking Co., New York	Maine	25,194
*Meritt Chapman Derrick & Wrecking Co., New York	Missouri	25,194
*Meritt Chapman Derrick & Wrecking Co., New York	Wisconsin	23,094
John Kanzler & Sons, Bay City, Mich.	Missouri	26,700
John Kanzler & Sons, Bay City, Mich.	Wisconsin	22,600
Robert McGregor, New York	Maine and Missouri, each	37,777
Boston Iron & Metal Co., Baltimore	Columbia	51,265
Newport News Shipbuilding & Dry Dock Co.	Missouri	15,000

*Bids do not include 22 plates of armor weighing 506 tons which are to come off of each ship.

The Kanzler bids provide for removal of armor by the Government.

Other bidders were: The F. J. Lewis Mfg. Co., Chicago; William F. Callahan, Boston; F. J. Lucius, New York; Irvin A. Taylor, Oakland, Cal.; J. L. Barnard, Baltimore; A. H. McDonald, Washington; John S. Turner, Newburyport, Mass.; A. H. Roberts, Denver.

The bids are to be submitted by the Board of Survey, Appraisal and Sale to the Division of Operations, Navy Department, and final decision as to making awards rests with the Secretary of the Navy.

The Hyman-Michaels Co., Chicago, submitted a proposal to bring from England an official of a large wrecking company to organize, finance and operate a company in this country.

Hickman, Williams & Co., brokers, Chicago, have opened a storage yard at West Pullman, Ill., for the purpose of storing the various commodities they handle, including pig iron, ferroalloys and scrap. The yard is 300 x 600 ft. and is served by a locomotive crane. It is situated on the Chicago, West Pullman & Southern Railroad at 119th Street and Ashland Avenue.

OPEN PRICE POLICY

Government Will Issue a Statement in Regard to Hardwood Decision

WASHINGTON, Jan. 17.—It finally has been definitely determined by the Government to issue a statement regarding practices of open price associations. This proposal, which originally had been planned and which trade associations have been urging with increasing persistence since the decision of the Supreme Court in the Hardwood case, still is the subject of conference between Attorney General Daugherty, Secretary of Commerce Hoover and members of the Federal Trade Commission. Attorney General Daugherty this afternoon said that he has prepared a tentative draft outlining the attitude of the Government toward practices of trade associations with the expectation of making it public soon. This follows on the heels of the understanding that the Department of Justice had concluded not to issue the statement.

While the character of the statement to be given out is not known, it is believed that it will be scrupulously drafted so as not to cause any conflict with cases before courts or that may come before them bearing on trade association activities. It was stated by the attorney general that the Department of Justice will give its judgment to show how far such associations may go and to provide a guide for them as far as possible. The department, it was declared, desires to encourage lawful associations both by reason of constructive work they may do for the trades they represent and through co-operation with the Department of Commerce. It is the purpose of the Department of Justice to see that Government officials coming in contact with trade associations are profound in the law and also to see to it that "no ground is cut from under the Department of Justice." Intimation was made that violators of the law would be pleased to see a statement from the Department of Justice which they could use in shielding themselves in case of prosecutions. The department evidently is going to be cautious so as to avoid such a circumstance. At the same time, it was made known that a statement coming from the department is not binding and would not hold if a court should hold against its principles and such holding were affirmed by the higher court.

One outstanding benefit of such a statement, it was indicated, would be to assure continued co-operation between the Department of Commerce and trade associations, which has been lessened somewhat since the Hardwood decision. Another advantage, it was declared, might be to decrease the number of investigations of trade association activities by the Federal Trade Commission and make contemplated investigations unnecessary.

Date for Basing Point Hearing

WASHINGTON, Jan. 17.—The Federal Trade Commission has definitely set Jan. 30 as the date to begin hearings in the Pittsburgh base case and this date has been accepted by the United States Steel Corporation, the respondent. Hearings are to begin in Milwaukee and it is probable that the proceedings will be transferred to Minneapolis as the second point.

The Tribute to Steel Reprinted

Many letters have come to us asking for copies of the tribute to steel, by Henry D. Hubbard, of the Bureau of Standards at Washington, which was strikingly displayed on pages 20 and 21 of our Annual Review Number of Jan. 5. Arrangements have been made for a special reproduction of these pages on India coated paper and an extra copy will be sent to any IRON AGE reader requesting it.

SHAPING THE TARIFF

Senate Committee Agrees on Valuation Bases — Studying Smoot Amendment

WASHINGTON, Jan. 17.—The agreement of the Senate Committee on Finance tentatively determining to base the ad valorem import duties in the permanent tariff bill on the basis of the wholesale selling price in the United States is in harmony with the report published in THE IRON AGE of last week. The proposal is said to have the endorsement of the Treasury Department and the Tariff Commission. The duties would be based on the prices in the domestic market prevailing at the time of shipment of the imports. Details of the plan, together with other questions, are still being discussed by the Finance Committee with Treasury Department experts and members of the Tariff Commission. The plan is provided in an amendment offered by Senator Smoot. Chairman McCumber of the committee hopes to announce a definite agreement within a day or so, he said. The plan to assess duties is similar to that which was originally suggested to the House Committee on Ways and Means, which finally adopted, and had the House pass the strictly American valuation plan fixing duties on the basis of the wholesale American market of American products comparable to foreign products.

The committee is making a study of the Smoot amendment, which deals with several important features of the tariff question. One of the principal sections would authorize the President to exclude products of countries which discriminate against the commerce of the United States and is more drastic than previous provisions which have been suggested to deal with this problem. The Smoot amendment fixes the maximum of the new or additional duties which the President would be empowered to impose in retaliation for discrimination at 250 per cent ad valorem or its equivalent. Other amendments by Senator Smoot would provide for an elastic tariff, giving the President discretionary authority to make it effective. The fact that the amendments have the indorsement of Commissioners Marvin and Burgess of the Tariff Commission and Judge Marion Devries, presiding justice of the United States Court of Customs Appeals, indicates that the Administration stands back of the Smoot proposal. Senator Watson of Indiana, prominent member of the finance committee, and other senators, have endorsed the amendments.

The report on the steel section of the tariff bill as it relates to the assessment of duties on the American valuation basis is expected to be submitted to the committee some time this week. It covers reports made by domestic steel manufacturers as well as data taken from the books of importers showing prices of domestic steel products and of imported steel as well as profits made by importers.

Encouraging Results of Conferences of Railroad Executives and Brotherhoods

WASHINGTON, Jan. 17.—Efforts to adjust differences between railroad executives and employees and to prevent a possible strike appear to be bearing fruit. Negotiations to this end still are in a preliminary state and it necessarily is not possible to say what the ultimate outcome may be. The conference held yesterday by Secretary of Commerce Hoover with railroad executives and representatives of the four railroad brotherhoods resulted in a provisional agreement to submit wage and working questions affecting train service employees to regional conferences for adjustments without making it necessary to take the questions up before the Railroad Labor Board.

Conferences are to take place as near Feb. 10 as practicable, according to a statement by Secretary Hoover. It was declared that the sole discussion was upon the practicability of re-establishing the pre-war regional conferences in order to facilitate the work of the Railroad Labor Board and above all to create a spirit of

working good will by adjustment instead of litigation. A meeting of the railroad executives has been called for Saturday at Chicago. Secretary Hoover said that the conference did not discuss wages and working agreements in themselves and stated that he considered the railroad labor situation as entirely disconnected from negotiations over coal mining wages.

Notice has been given formally by the railroads to the labor board and the organization of railroad employees that general reductions in existing wage schedules will be asked. The Administration is also making active efforts through negotiations with President John L. Lewis of the United Mine Workers of America to prevent trouble in the industry. The miners' union is endeavoring to prevent the reduction in wages proposed by coal operators after expiration of the existing wage contract of April 1.

No Competition Between Steel Corporation's Ships and Rail Lines

WASHINGTON, Jan. 17.—Subsidiary railroads of the United States Steel Corporation do not and may not compete with the steamship lines of the United States Steel Products Co. operating through the Panama Canal and the Interstate Commerce Commission should enter an appropriate order to this effect, according to a tentative report of Examiner Burton Fuller made public yesterday. His recommendation, if adopted, would mean reaffirmation by the commission of its holding previously made that the Steel Corporation subsidiary rail lines "do not and may not compete" with the steamship lines of the Products company operating through the canal.

The case was reopened by the commission on June 22, 1921, for further hearing in order to ascertain whether conditions with respect to competition between the applicant railroads and the steamship lines of the Products company operating through the canal had so changed since the issuance of the original report as to make the continued operation of such steamship lines by the Products company a violation of the act.

British Industries Fair

The British Industries Fair will be held at Birmingham and London Feb. 27 to Mar. 10. The centralized exhibit of British-made merchandise will be divided into two sections.

The Birmingham section will include displays of brasswork; hardware; ironmongery; metals; construction and building materials; power; lighting and heating equipment; ventilating; engineering; agriculture; mining equipment; motors; guns, etc.

The exhibits at London will embrace musical instruments; cutlery; scientific goods; photographic goods; drugs and chemicals; glassware; toys; jewelry; silverware and other manufactures.

Information regarding the fair can be obtained from the British Consulate or Trade Commissioner, 44 Whitehall Street, New York.

Dayton Malleable Iron Co. Buys Plant

The Dayton Malleable Iron Co., Dayton, Ohio, has purchased the Canton, Ohio, plant of the Timken-Detroit Axle Co., Detroit. This is a malleable iron foundry which has been used by the Detroit company for making automobile castings. It is stated that the Dayton company will operate it as a railroad specialty shop. The transfer of ownership will take place Feb. 1.

Testing Materials Meeting

The twenty-fifth annual meeting of the American Society for Testing Materials will be held on June 26 to July 1 inclusive at Atlantic City, N. J., with headquarters at Chalfonte-Haddon Hall Hotel.

OPEN PRICE COMPETITION

Plan of Knitgoods Manufacturers Expected to Provide a New Test Case

WASHINGTON, Jan. 17.—Considerable speculation exists as to the attitude of the Department of Justice toward the establishment of an "open-price" plan by the National Association of Hosiery and Underwear Manufacturers, despite the decision of the United States Supreme Court in the Memphis Hardwood case. It is expected that the establishment and actual operation of the plan will bring about a test case which, if carried to the highest tribunal, will develop an amplification of its decision in the Hardwood case. Attorneys who have followed the proceedings in the case and interpreted the decision believe that the same principle is involved in this proposed organization but expect it will have the effect of clearing up misunderstandings which have arisen as to the scope of the Supreme Court decision.

According to information received by representatives of various trade associations, the hosiery and underwear manufacturers' organization proposes to put the "open-price" plan into effect this week, and a statement issued by J. M. McCullaugh, business manager, advises that the members will file price lists in the Philadelphia headquarters where a statistician will direct the compilation of the data and forward it to each member for his own information. It is also proposed to handle production statistics in the same way. This outline of proposed activities is looked upon by some as being similar in several respects to the arrangement carried on by the members of the American Hardwood Manufacturers' Association, which the majority of the Supreme Court condemned. However, Mr. McCullaugh insists that the decision does not affect them in the least, inasmuch as there is nothing in the hosiery and underwear men's dissemination of price or production figures antagonistic to "open-price" competition. Furthermore, he declared that the data will be distributed without comment as to ways and means of increasing or decreasing production or regulating competition.

It is reported that 25 members of the Southeastern Division of the association unanimously endorsed the plan last week. It is the contention of Mr. McCullaugh that manufacturers should be able to follow the trend of the industry from an analysis of the data sent out for that purpose. He is said to have vigorously denounced any intimation that the "open-price" competition system as followed by the association is for any but an honest and fair aim.

Stack of Trumbull-Cliffs Furnace Co. Lighted

WARREN, OHIO, Jan. 17.—The new 600-ton blast furnace of the Trumbull-Cliffs Furnace Co. was placed in operation Jan. 16, in presence of officials of the Trumbull-Cliffs company and the Trumbull Steel Co. The addition of this stack to the active list brings the total number of furnaces in the Mahoning and Shennango valleys to 17 of 47, the highest number in blast since Feb. 28, 1921. The molten product of the furnace will be carried by a hot metal run across the Mahoning River to the open-hearth department of the Trumbull Steel Co. Surplus output will be diverted to the merchant trade.

Little Miss Mary Reinette Clark, daughter of Mr. and Mrs. E. F. Clark, and granddaughter of Jonathan Warner, president of the Trumbull Steel Co., and Miss Flora Mather, daughter of Mr. and Mrs. S. Livingston Mather of Cleveland, simultaneously applied torches at two different tuyeres, thus lighting the furnace. Mr. Clark is president of the Newton Steel Co., Youngstown, while Mr. Mather is secretary of the Cleveland-Cliffs Iron Co. Grouped about were the officials and employees.

Guests attended the event from Cleveland and Warren, journeying to the furnace in a special coach, and

were later entertained, at lunch by Mr. Warner at his home in Youngstown, following inspection of the property.

Directors of the Trumbull-Cliffs Furnace Co. are William G. Mather, Jonathan Warner, S. L. Mather, A. N. Flora, D. T. Croxton, Philip Wick, W. H. B. Ward, Allen Hoffer, H. A. Raymond, John T. Harrington and William P. Belden. Officers are: President, W. G. Mather; vice-president, Jonathan Warner; secretary, S. L. Mather, and treasurer, C. G. Heer.

With all modern labor devices, only 100 men will be required to operate the stack.

Expanding Wheeling Steel Plant

The Wheeling Steel Corporation is actively going ahead with the construction of its new rod and wire mill at Portsmouth, Ohio, and with the extensions and betterments at its Steubenville, Ohio, works. For the latter plant, the company has just closed with the Mackintosh-Hemphill Co., Pittsburgh, for a 35-in. blooming mill, which is to be driven by a four-cylinder Nordberg uniflow reversing engine, this constituting the first attempt in this country to drive a blooming mill with this type of engine. The manipulator for this mill also will be furnished by the Mackintosh-Hemphill Co., which will install one of its newest patented manipulators. The Wheeling Mold & Foundry Co. has been awarded the tables and transfers while the Morgan Construction Co., Worcester, Mass., will furnish one 750-ton and one 900-ton steam hydraulic shears and a 3-cylinder upcut shears. This company some time ago was awarded the contract for a continuous mill for this works. It is probable that the company will close on the cranes for this plant soon. Buildings to house the new rod and wire mill at Portsmouth will be fabricated and erected by the McClintic-Marshall Co., Pittsburgh. The company also is figuring on a new boiler plant at Steubenville, Ohio, to furnish power for the uniflow engines, the boilers to be 250-lb. pressure and to be superheated. It also will install turbo-generators which will make the company independent of outside sources for electric power.

Bank Takes Over Cromwell Steel Co.

The Guardian Savings & Trust Co., Cleveland, has taken over the plant of the Cromwell Steel Co., Lorain, Ohio, and has placed a custodian in charge. This action was taken to prevent receivership and bankruptcy proceedings and follows a recent adjustment agreement to which committees of bondholders, creditors and stockholders, the Cromwell company and the bank are parties. The obligations of the company include \$2,000,000 in bonds on which interest has been defaulted, and approximately \$1,000,000 in notes and accounts. About \$1,250,000 in bonds, stocks and other claims have been deposited with the bank under the terms of the adjustment agreement. The bank is trying to find a purchaser for the plant.

COMING MEETINGS

January

Engineering Institute of Canada, Jan. 24 and 25. Annual meeting at Montreal. J. L. Busfield, secretary-treasurer Montreal branch, 260 St. James Street, Montreal.

February

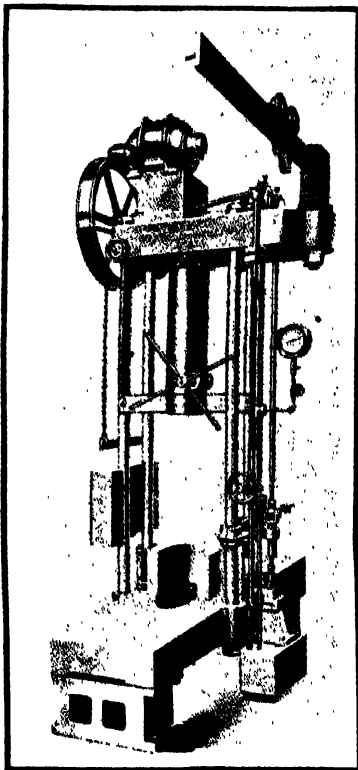
American Boiler Manufacturers' Association, Feb. 13. One-day winter meeting, Fort Pitt Hotel, Pittsburgh. Secretary, H. N. Covell, 191 Dikeman Street, Brooklyn, N. Y.

American Institute of Mining and Metallurgical Engineers, Feb. 20-25. Spring meeting, Engineering Societies Building, New York. Secretary, Frederick F. Sharpless, 29 West Thirty-ninth Street, New York.

New Forcing and Bending Press

A press designed for operations involving forcing, pressing and bending, and adaptable more especially to railroad and other large shops, has been placed on the market by the Watson-Stillman Co., New York. It not only provides the means for rapid and convenient pressing in and out of driving box brasses, pressing gears on and off, etc., but because of its wide bed it can be used also for many operations of bending and straightening.

The press is of the reversed cylinder type having the ram movement from the top downward. The pump



The Capacity is 75 Tons and the Ram Movement 21 In. The bottom platen is 72 in. long

is required only for the pressure application, the hand-wheel shown in the illustration being provided for bringing the ram quickly to and from the work. The latter feature thus eliminates waiting for the pump to move the ram through the idle part of the stroke.

The bottom platen is amply strong for bending with bending blocks on its ends under the full capacity of the press. The "U" piece is hinged to one of the columns of the press which enables it to be swung to the center, as shown, or to one side and out of the way. The jib crane is provided with a trolley which, equipped with a chain hoist, is used in handling the work in and out of the press. The hole in the bottom platen is

for receiving shafts and pressing gears and other work.

The drive is either by belt through tight and loose pulleys or by directly attached constant speed motor as shown. The gage indicates the pressure on the ram in pounds per square inch, and the total pressure in tons. The pump is a two-plunger type and the entire control of the press is through a single screw stem valve. The top and bottom platen cylinder and crane bracket are open-hearth steel castings, and the ram and rods of machinery steel. The cylinder is copper-lined.

Improvement in Shipbuilding Predicted

A combination of developments in the shipbuilding industry that have forged to the front within recent months have given rise to considerable optimism and have served to brighten the outlook for the ensuing year, says Clarence Samuel King, secretary of the Atlantic Coast Shipbuilders' Association, in an article published in the current issue of the Association Bulletin.

"Exclusive of large repair contracts and port development plans recently projected," says Mr. King, "new vessel construction bids for which have not yet been opened but which are definitely contemplated, are reported to aggregate an expenditure of approximately \$10,000,000."

Mr. King states that although 1921 was a lean year for shipbuilders it should not be overlooked that all major industries have suffered proportionately, and while there is little pleasure in suffering even in good company it is gratifying to note that the dearth of shipbuilding contracts has been due to a general recession in world trade and not to faults in the industry.

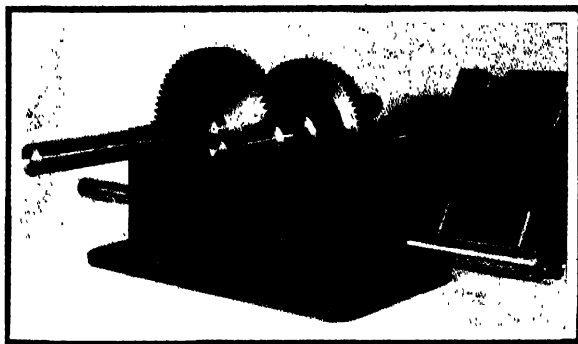
"Busy times are just around the corner," says Mr.

King, and to justify his optimistic forecast reference is made to the idle ships now in our ports which will need much repairing before being placed in service. He also points out that we are greatly in need of fast passenger ships to balance our fleet of cargo carriers.

Worm and Spur Gear Speed Transformer

A combined worm and spur gear speed transformer of the type shown in the illustration has been placed on the market by the Natisch Gear Works, 451 Hudson Avenue, Brooklyn, N. Y. It is made in various ratios between 1 to 75 and 1 to 1000, and for transmitting up to 5 hp.

The design is similar in all sizes, the same case being used for many different ratios. The change is accomplished by varying the number of teeth in the spur gears and also by changing the pitch and number



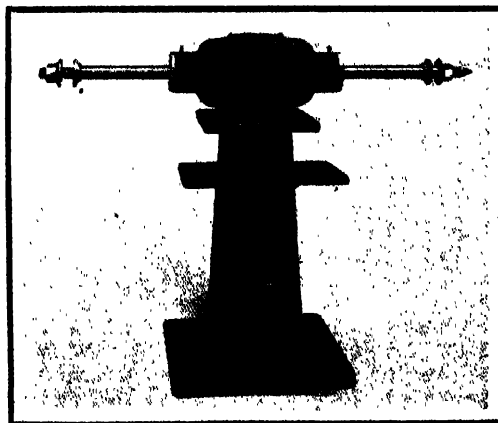
Combined Worm and Spur Gear Speed Transformer

of teeth in the worm gear. The case is of cast iron, ruggedly built and is oil tight and dust proof. The illustration shows a drive arranged for a ratio of 1 to 600, to transmit $\frac{1}{2}$ hp.

New Line of Motor-Driven Buffing Machines

A line of alternating current motor buffing machines, built in four sizes from $\frac{1}{2}$ hp. for wheels 6 x $\frac{1}{2}$ in. to 3 hp. for wheels 12 x 2 in., has been placed on the market by the J. G. Blount Co., Everett, Mass.

Among the salient features are S. K. F. ball bearings in dust proof housings, spindles of high carbon



Spindles Are of High Carbon Steel Ground to Size

steel ground to size, large tool tray bolted to the column, snap switch having thermal cut-outs for motor protection, and a taper point fitted to right-hand end of spindle for small wheels.

The head or motor unit is regularly mounted with pan on the column, but may be mounted on a bench base if preferred. All parts bolting together are planed or milled to insure proper contact. The safety snap switch is mounted on the column beneath the tool tray, an arrangement intended to protect it from the buffing compounds used, and also from breakage. The motors are of the Westinghouse design. The machines are finished with an oil proof enamel, which permits keeping them looking good by wiping off occasionally.

Shippers Will Strongly Urge Lower Rates

Railroad Executives Heard and Will Be Followed by Representatives of Iron and Steel and Other Industries
Before the Interstate Commerce Commission

BY L. W. MOFFETT

WASHINGTON, Jan. 17.—Testimony of railroad executives before the Interstate Commerce Commission in its rate investigation will be concluded to-morrow, after which the shippers' side will be presented. On Thursday and Friday of the present week, the rate situation as it applies to coal and coke will be submitted, while on Saturday and Monday representatives of the iron and steel industry will present their case, discussing rates with relation to ore, furnace materials, iron and steel products, etc. Iron and steel manufacturers, as well as producers in all other lines, are demanding lower rates, but naturally are concerned over the labor situation. Railroad executives have repeatedly told the commission that lower costs are necessary before a general reduction can be made. President Daniel Willard of the Baltimore & Ohio Railroad said that rates will eventually come down, but to hasten the movement would be unwise and would not tend to promote the public interest. It has been pointed out that net operating revenues of railroads for November, the latest statistics available, were at the rate of 3.8 per cent handled on the value of railroad properties, while the transportation act provides that the commission shall fix rates which will enable the railroads to earn 6 per cent of their valuation.

"High as railroad charges are, they are not higher relatively than other prices are or were, and it is important to remember that railroad charges or prices were the very last to go up and in the nature of things cannot be the first to come down," Mr. Willard told the commission. "They can and will participate in the downward movement of all other prices."

Forced Economies

Mr. Willard said that the financial results already obtained by the railroads have been accomplished "only by forced economies that are neither in the public interest nor can they be indefinitely continued."

He pointed out that rate adjustments already have been made to correct disarrangements as to localities and some dislocations as to commodities, and in a few instances adjustments have been made for purely economic reasons, as in the case of certain export rates revised in an effort to stimulate competition in world markets, and more recently with reference to agricultural products which perhaps have more widely and more completely been forced downward to a pre-war basis. Rates having generally been advanced on a uniform or percentage basis, he said, it would seem desirable, in fact, necessary, that when general reductions are made, they should be made in the same way.

President R. H. Aishton, of the American Railway Association, described the organization and work of that association, which, through its various committees and divisions, constantly makes studies of improved methods and practices for the benefit of all the railroads. He showed that the railroads had reduced their fuel consumption per train mile and per ton mile and excluding bad order and surplus freight cars, he showed the average miles per freight car per day had increased in 1921 and the average train speed had increased from 10.3 to 11.6 miles per hour.

Needs of Railroads

Other railroad representatives testified that on the basis of the present volume of business \$791,905,811 would be needed in 1922 by the railroads of the country in order to keep abreast of the present needs of the nation, while \$683,043,244, additional would be required in 1922, to be spent in order to handle adequately the volume of traffic under normal conditions.

H. E. Byram, of Chicago, president of the Chicago,

Milwaukee & St. Paul railroad, and others, asserted that while some relief has already been provided the carriers through the action of the Railroad Labor Board in reducing wages, it is inadequate to enable any further reduction in wages at this time. Mr. Byram said that while immense opportunities are available for further increasing economy of operation by large investments in reducing grades, double track, improving and increasing terminal facilities, etc., these improvements cannot be made because they would require the investment of large sums of new capital which cannot be obtained unless the earnings of the railroads are such as to satisfy investors that such investments in railroad securities would be safe and productive.

Continuing, Mr. Byram said that it would seem that the need of the immediate situation requires a reduction in operating costs. Fuel and labor, which absorb 80 per cent of the total operating cost, must bear the larger portion of the reduction. Fuel and other supplies already are coming down and the United States Railroad Labor Board decision decreased his company's payroll almost 11 per cent, or about \$770,000 per month, effective last July.

Editor Dunn Testifies

Samuel O. Dunn, of Chicago, editor of the *Railway Age*, testified that because of a progressive decline in railway development in the United States as measured by miles of line and cars and locomotives ordered and built in recent years, the carriers, owing to lack of revenues, have been unable to keep abreast of the growth in other industries. If this continues, he said, the country will be brought face to face with a serious situation where the railroads will be unable to handle the traffic unless by increased earnings they are enabled to obtain increased facilities.

This decline, Mr. Dunn showed, has been accentuated since the war and by 1920 there was an actual reduction in the mileage and in the number of locomotives and freight and passenger cars in service, but the decline in the annual rate of increase had begun long before the war.

In each of the last five years the mileage of railroad line abandoned in the United States has exceeded the mileage of new line built, Mr. Dunn said, and in 1921 the mileage of new lines and the cars and locomotives ordered were less than in almost any previous year in railway history. The new railroad mileage built in 1921 was 475 miles, or less than has been reported in any previous year except in 1920, when only 314 miles were built.

For the five years 1917 to 1921, inclusive, the mileage of railroad abandoned in the United States has totalled 4,989 miles, the witness said. The number of locomotives in service on the railways of the United States increased 7,378 in the four years ended with 1913, Mr. Dunn said, but only 473 in the four years ended with 1917 and 617 in the four years ended with 1920. The number built for service in the United States and Canada in 1921 was 1,185, or less than the number built for the United States alone in any year since 1897.

As to freight cars, the number built in 1921, according to Mr. Dunn, was only 40,292, which is the smallest number ever reported since the *Railway Age* began to compile the statistics in 1899. In 1906 and 1907 alone, Mr. Dunn said, the number built was 516,667. The number of passenger cars built in 1921 for use in the United States was 1,275, the smallest number ever reported except in 1920 and 1919, and the number of new passenger cars ordered during the year was only 246.

Iron and Steel Markets

LIGHTER OPERATIONS

Some Price Concessions on Heavier Products

Tin Plate Output Well Maintained—Export Orders for Plates, Sheets and Pipe

The common expectation of activity in the early spring is more of an influence in the steel market than anything buyers have done since the year opened. Operation of steel works has fallen off slightly. In the case of the Steel Corporation it has been not far from 40 per cent in the past week, while 30 per cent is not uncommon with independent companies. Pittsburgh reports some buying of lighter products that go into consumption through jobbers.

It is recognized that replenishment demand still must be counted on for alternating improvement in mill schedules, since manufacturing consumers of steel as a rule have no definite plans for increased production in the immediate future. Steel companies are more sanguine of a higher rate of output in the next few months than of a turn for the better in prices.

In new railroad demand the inquiry of the Southern Railway for 26,600 tons of 85-lb. and 8500 tons of 100-lb. rails is the chief new item, and there is an order from the Grand Trunk for 9500 tons of 100-lb. rails for its American lines. Chicago mills are counting on 65,000 tons of steel for the cars placed last week; and 5000 tons more will be needed for 500 cars the Central of Georgia is about to order.

Prices of the principal forms of finished steel are still sagging, though there are producers who have declined business because they would not add \$1 or \$2 per ton to the losses they have been making lately. While 1.50c. is a common line of resistance on bars and structural shapes, a 1.40c. price on steel plates is not as rare as it was.

The New York-New Jersey tunnel will require 10,000 tons of plates and makers of bolts will be in close competition for the 45,000 kegs that will be needed.

A \$1 reduction in bar iron by Eastern makers brings that product to 1.45c., Pittsburgh. In the Middle West, hard steel reinforcing bars have sold down to 1.40c. Some irregularity has developed in wire products and in the past week \$2.40 has been done on wire nails, or 10c. per keg below the price last announced.

Sheet mill output in Pittsburgh and outlying districts is on a 75 per cent basis for Steel Corporation and 50 per cent for independent plants. Tin plate mills for some weeks have run at a high rate and are likely to hold to it through the winter. This will be a good year for tin plate.

The Port Arthur (Ont.) Shipbuilding Co. has placed 4000 tons of plates for a lake boat for Canadian account. Lake shipyards are figuring on one or two ore vessels.

December business in fabricated steel work amounted to 71,500 tons against about 99,000 tons

in each of the two previous months. Of the 758,000 tons contracted for in 1921, 47 per cent developed in the last four months.

Many foundries are planning to bid on the segments for the New York-New Jersey vehicular tunnel, which will require over 100,000 tons of pig iron, but the largest tonnage inquired for by any foundry is 50,000, to be delivered over a period of 20 months at the rate of 2500 tons per month. Owing to the long period of delivery, furnaces are very slow to sell and their policy has not yet been definitely determined. Southern pig iron has again receded 50c. to \$16. In the North there is very little activity, but prices are fairly well maintained. A western Pennsylvania steel company has appeared in the market as a seller of foundry iron.

An interesting item in the export trade is the sale of 5000 tons of plates for a Melbourne, Australia, water pipe line. England was a close competitor. Japan has bought here 2000 tons of large pipe for a high pressure line, and at Chicago an independent mill has a 3000-ton sheet order from Japan.

Brazil, India, China and Japan figure in current tin plate buying. From South Africa as well as South America considerable inquiry is now before export steel companies.

Drastic price cuts in England, in both pig iron and steel items, have resulted in virtually stopping Continental competition. Sheets and tin plates are weaker, production exceeding demand.

THE IRON AGE composite price for pig iron is at last back again at the low point of \$18.52 which it touched in August last.

Pittsburgh

PITTSBURGH, Jan. 17.

Completion of inventories is beginning to find reflection in a slightly better demand for a number of steel products, notably in the lighter materials which usually pass into consumptive channels through jobbing and warehouse interests. Another important development of the past week has been increased steadiness in prices. The effort to stimulate business by cutting prices and also by attempting advances over what had previously been done, as in the case of sheets, having failed, the trade now is inclined to make something of a stand on the basis of quotations of the last few weeks. The heavy tonnage products are more confidently quoted at 1.50c. base, Pittsburgh, than was the case recently, and on bars and structural shapes the claim is made that some business has been entered as high as 1.60c. There continues to be some doubt as to the real basis of plates, makers asserting that 1.50c. is minimum, while buyers are equally firm in their insistence that 1.40c. can be done on real orders. Buyers of the heavier lines are placing the business at the lowest delivered price and this condition localizes strictly the business of the mills in the different centers. Irregularity still marks both the demand and prices for wire products, but efforts to depress the sheet prices established late last November have been unsuccessful and it is noted that blue annealed sheets in the heavier gages now are fully up in price to the lighter gages. Demand in general characteristics is much as it has been during the past

A Comparison of Prices.

Advances Over the Previous Week in Heavy Type, Declines in Italics
At date, one week, one month, and one year previous

For Early Delivery

Pig Iron,					Sheets, Nails and Wire,				
Per Gross Ton:					Per Lb. to Large Buyers:				
	Jan. 17, 1922	Jan. 10, 1922	Dec. 20, 1921	Jan. 18, 1921		1922	1922	1921	1921
	Cents	Cents	Cents	Cents		Cents	Cents	Cents	Cents
No. 2X, Philadelphia...	\$21.34	\$21.34	\$21.34	\$33.25	Sheets, black, No. 28, 1'xh	3.00	2.00	3.00	4.35
No. 2, Valley furnace...	19.50	19.50	19.50	31.50	Sheets, galv., No. 28, 1'xh	4.00	4.00	4.00	5.70
No. 2, Southern, Cin'tit...	20.50	21.00	21.50	36.50	Sheets, blue an'd, 9 & 10	2.25	2.25	2.25	3.55
No. 2, Birmingham, Ala...	16.00	16.50	17.50	32.00	Wire nails, Pittsburgh...	2.50	2.50	2.75	3.25
No. 2 foundry, Chicago*	19.00	19.00	19.50	31.00	Plain wire, Pittsburgh...	2.25	2.25	2.50	3.25
Basic, del'd, eastern Pa...	20.25	20.25	20.25	33.86	Barbed wire, galv., 1'xh	3.15	3.15	3.40	4.10
Basic, Valley furnace...	18.25	18.25	18.25	39.00	Tin plate, 100 lb box, 1'xh	\$4.75	\$4.75	\$4.75	\$7.00
Bessemer, Pittsburgh...	21.46	21.46	21.96	33.96					
Malleable, Chicago*	19.00	19.00	19.50	31.50					
Malleable, Valley...	19.50	19.50	20.00	32.00					
Gray forge, Pittsburgh...	20.96	20.96	20.96	32.46					
L. S. charcoal, Chicago...	31.50	31.50	31.50	40.50					
Ferromanganese, del'd...	60.00	60.00	60.00	100.00					
Rails, Billets, etc., Per Gross Ton:					Old Material, Per Gross Ton				
	Jan. 17, 1922	Jan. 10, 1922	Dec. 20, 1921	Jan. 18, 1921		1922	1922	1921	1921
	Cents	Cents	Cents	Cents		Cents	Cents	Cents	Cents
O.-h. rails, heavy, at mill	\$40.00	\$40.00	\$40.00	\$47.00	Carwheels, Chicago...	\$15.50	\$15.50	\$15.50	\$21.00
Basic, billets, Pittsburgh...	28.00	28.00	29.00	43.50	Carwheels, Philadelphia...	16.50	16.50	16.50	25.00
O.-h. billets, Pittsburgh...	28.00	28.00	29.00	43.50	Heavy steel scrap, 1'xh	11.50	11.50	11.50	16.00
O.-h. sheet bars, 1'xh...	29.00	29.00	30.00	47.00	Heavy steel scrap, Phila...	11.50	11.50	11.50	14.50
Forging billets, base, 1'xh	32.00	32.00	32.00	48.50	Heavy steel scrap, Ch'go...	11.50	11.50	11.00	15.00
O.-h. billets, Phila...	33.74	33.74	33.74	49.24	No. 1 cast, Pittsburgh...	16.50	16.25	16.00	25.00
Wire rods, Pittsburgh...	36.00	36.00	38.00	57.00	No. 1 cast, Philadelphia...	16.50	16.50	16.50	24.50
					No. 1 cast, Ch'go (net ton)	13.00	13.00	12.50	17.00
Skelp, gr. steel, 1'xh, lb...	1.50	1.50	1.50	2.15	No. 1 RR. wrot, Phila...	14.50	11.50	14.50	20.00
Light rails at mill...	1.50	1.50	1.55	3.00	No. 1 RR. wrot, Ch'go (net)	10.50	10.50	10.50	13.50
Finished Iron and Steel,					Coke, Connellsville, Per Net Ton at Oven:				
	Jan. 17, 1922	Jan. 10, 1922	Dec. 20, 1921	Jan. 18, 1921		1922	1922	1921	1921
	Cents	Cents	Cents	Cents		Cents	Cents	Cents	Cents
Per Lb. to Large Buyers:					Furnace coke, prompt...	\$2.75	\$2.75	\$2.75	\$5.00
Iron bars, Philadelphia...	1.81	1.85	1.85	2.70	Foundry coke, prompt...	3.75	3.75	3.75	6.50
Iron bars, Chicago...	1.60	1.60	1.60	2.68					
Steel bars, Pittsburgh...	1.50	1.50	1.50	2.35					
Steel bars, Chicago...	1.60	1.60	1.60	2.73					
Steel bars, New York...	1.88	1.88	1.88	2.73					
Tank plates, Pittsburgh...	1.50	1.50	1.50	2.65					
Tank plates, Chicago...	1.60	1.60	1.60	3.03					
Tank plates, New York...	1.83	1.83	1.83	3.03					
Beams, Pittsburgh...	1.50	1.50	1.50	2.45					
Beams, Chicago...	1.60	1.60	1.60	2.83					
Beams, New York...	1.88	1.88	1.88	2.83					
Steel hoops, Pittsburgh...	2.00	2.00	2.00	3.05					

*The average switching charge for delivery to foundries in the Chicago district is 70c. per ton.
†Silicon, 1.75 to 2.25. ‡Silicon, 2.25 to 2.75.

The prices in the above table are for domestic delivery and do not necessarily apply to export business.

Composite Price, Jan. 17, 1922, Finished Steel, 2.062c. Per Lb.

Based on prices of steel bars, beams, tank plates, plain wire, open-hearth rails, black pipe and black sheets	These products constitute 88 per cent of the United States output of finished steel.	Jan. 10, 1922, 2.062c. Dec. 20, 1921, 2.098c. Jan. 18, 1921, 3.057c. 10-year pre-war average, 1.684c.
---	--	--

Composite Price, Jan. 17, 1922, Pig Iron, \$18.52 Per Gross Ton

Based on average of basic and foundry irons, the basic being Valley quotation, the foundry an average of Chicago, Philadelphia and Birmingham	Jan. 10, 1922, \$18.60 Dec. 20, 1921, 18.85 Jan. 18, 1921, 31.04 10-year pre-war average, 15.72
---	--

few weeks. Buyers are covering only their most pressing needs and insisting on prompt delivery. The gain in business has been in the number of orders rather than in the size, and the mills still have difficulty in building up back logs.

Plant operations in this district do not change much as far as the steel works are concerned but finishing mill operations show some expansion, notably in sheets. The independents are now averaging close to 50 per cent and the Steel Corporation sheet subsidiaries about 75 per cent. Strip mill activities also are somewhat heavier than they were recently. Tin plate mills, which for several weeks have been running at a high rate, show no signs of an immediate let down.

Entrance of the Cambria Steel Co. into the market as a maker of foundry iron is a feature of an otherwise uninteresting situation in pig iron. This company is reported to have taken some business in and around Johnstown on a basis of \$19.50 furnace for No. 2. This means a further restriction in the territory of furnaces which previously had served Johnstown melters of foundry grade. The scrap market remains firm in the face of only a moderate demand from the steel makers. The situation in coke and coal is without new features.

Pig Iron.—This market again has become extremely dull, the only important sale of the past week being

500 tons of basic to a Pittsburgh district sheet maker at about \$18.25, at Valley furnace. Information about this sale is limited, but the common impression is that the iron was sold by a furnace with a lower freight rate to point of consumption than Valley furnaces. Hollanslee Bros. Co. again is seeking 1000 tons of basic for prompt delivery. Nothing lately has been done in Bessemer or malleable iron and interest in foundry grade centers about an inquiry for 3000 tons by the Oil Well Supply Co. of iron of 1.60 to 2 per cent in silicon, 0.05 and under in sulphur and 0.40 to 0.70 in phosphorus and manganese. Some makers have quoted \$19.50 Valley furnace against this inquiry, and others \$19, but the company claims to have had a quotation of \$18.50. The tonnage, which is for delivery during the remainder of this quarter, is expected to be placed in a day or two.

We quote Valley furnace, the freight rate for delivery to the Cleveland or Pittsburgh district being \$1.96 per gross ton:

Basic	\$18.25
Bessemer	19.50
Gray forge	19.00
No. 2 foundry	19.70
No. 3 foundry	19.00
Malleable	19.50

Ferroalloys.—Inquiries are somewhat more numerous than they were recently, but as yet there has been no corresponding gain in actual sales. Apparently the enlarged interest of consumers is created by fears

about the new tariff rather than by actual needs, as most of them are running at a low rate and have fair-sized stocks on hand or under contract. Prices do not change much. The latest business in 50 per cent ferro-silicon was 100 tons to a Pittsburgh foundry interest on the basis of \$55 delivered. This price about measures the market, despite the efforts on the part of producers to obtain \$60 or more. The market on spiegeleisen shows a firmer tendency, the result of the fact that production for several months past has been practically nil, and there has been a sufficient demand to materially reduce makers stocks. Practically no 20 per cent material now is available and that of lower manganese content is not plenty. The former grade is nominally quotable at \$26, furnace, or \$30 to \$32 delivered this immediate territory, and 16 to 19 per cent at \$25, furnace. Hardly enough has been done recently in ferromanganese to establish any change in prices.

We quote 78 to 82 per cent domestic ferromanganese at \$59 to \$63.67 delivered, 78 to 82 per cent foreign ferromanganese, \$58.35, c.i.f. Atlantic seaboard; German, for 76 to 80 per cent, \$54, seaboard. Average 20 per cent spiegeleisen at \$30 to \$32 delivered, Pittsburgh or Valleys, 16 to 19 per cent spiegeleisen, \$28 to \$30 delivered Pittsburgh, 50 per cent ferro-silicon, domestic, \$54 to \$57, freight allowed. Bessemer ferro-silicon is quoted f.o.b. Jackson and New Straitsville, Ohio, furnaces as follows: 10 per cent, \$38.50; 11 per cent, \$41.80; 12 per cent, \$45.10; 13 per cent, \$49.10; 14 per cent, \$54.10; silvery iron, 6 per cent, \$27; 7 per cent, \$28; 8 per cent, \$29.50; 9 per cent, \$31.50; 10 per cent, \$33.50; 11 per cent, \$36; 12 per cent, \$38.50. The present freight rate from Jackson and New Straitsville, Ohio, into the Pittsburgh district is \$1.06 per gross ton.

Billets, Sheet Bars and Slabs.—So little is going on as to make impossible anything more than an appraisal of prices. A number of makers of sheet bars, who during the latter part of December entered contracts for January and first quarter delivery report specifications from sheet makers to be extremely difficult to obtain. Makers of tin plate, however, are specifying fairly freely. Interest in billets and slabs still is extremely small. There has been some increase in open-hearth and Bessemer furnace operations in the Valley district, but here in Wheeling no appreciable change is noted.

We quote 4 x 4 in. soft Bessemer and open-hearth billets at \$28 to \$29, 2 x 2 in. billets, \$29 to \$30; Bessemer and open-hearth sheet bars, \$10; slabs, \$29 to \$30; forging billets, ordinary carbons, \$32 to \$33, all f.o.b. Youngstown or Pittsburgh mills.

Wire Rods.—Export demands to a considerable extent counterbalance a lack of demand of the usual proportions from domestic consumers, and makers in this district are doing a relatively good business. The base price ranges from \$36 to \$38, Pittsburgh or Youngstown, depending upon the origin and size of the order. Prices are given on page 247.

Steel Skelp.—Interest in this material is not especially large and the quotation of 1.50c. Pittsburgh, for steel pipe skelp is nominal and untested.

Steel Rails.—The railroads still are moving cautiously in the matter of specifications on standard rail orders, and this is reflected in rather light operations of the rail mills. It is evidently not the intention of makers to build up stocks in anticipation of future releases, as such a course proved pretty costly last year. Interest in light rails is limited and prices are easy. These sections rolled from new steel now are offered at 1.55c. by leading makers and actually have been sold at 1.50c.

We quote 25 to 15-lb. sections rolled from new steel, 1.55c. base, rolled from old rails, 1.45c. to 1.50c. base; standard rails, \$40 per gross ton mill for Bessemer and open-hearth sections.

Iron and Steel Bars.—The most interesting development of the past week in steel bars is a firmer stand by makers on a base of 1.50c. and an effort which has been successful in part to obtain \$1 or \$2 per ton more for small lots. Sizable lots can be placed at 1.50c., but bids of less are not getting much consideration. Makers of refined iron bars still are quoting them at 2.15c., base, but with common iron bars available at 1.85c. delivered from Eastern mills, it is rather difficult for local makers to obtain quotations.

We quote steel bars rolled from billets at 1.50c. to 1.60c.; reinforcing bars, rolled from billets, 1.50c. to 1.60c. base; reinforcing bars, rolled from old rails, 1.35c. to 1.40c.; refined iron bars, 2c. to 2.10c. in carloads, f.o.b. mill, Pittsburgh.

Wire Products.—One important maker here reports the past week to have been the best in the matter of orders and specifications since early last fall, the betterment being ascribed by this interest to its firm refusal to consider less than \$2.50 base per keg for bright nails, \$2.25 base per 100-lb. for plain wire and \$2 base per count keg for cement coated nails. Other makers have experienced no appreciable gain in business due to the fact, they say, that there is so much talk of concessions that their customers are inclined to move slowly in the matter of purchases. There has been no public announcement of any reduction from the Dec. 21 prices, but there are well authenticated instances of manufacturers asking buyers to come back if they are quoted less than the recognized market quotation.

We quote wire nails at \$2.50 base per keg, Pittsburgh, and bright basic and Bessemer wire at \$2.25 base per 100 lb., Pittsburgh.

Sheets.—The leading interest reports the past week to have been the best both as far as shipments and mill operations that it has had in the past few months. It enjoyed an average operation for the week of slightly more than 75 per cent of capacity. Independents also have had some increase in business, current orders being at the rate of about 50 per cent of normal production. The feature of the market is the continued firm adherence on the part of all makers to 3c. base, Pittsburgh, for black sheets, and 4c. base Pittsburgh for galvanized. An interesting development is that the market lately has been growing stronger on blue annealed sheets which have sold at 2.25c. base for the heavy, as well as the light, gages. There are reports from the East, notably from Philadelphia, that concessions of as much as \$5 per ton have been made on galvanized sheets, but verification is lacking and the reduced prices are believed to refer to some liquidating sales by jobbing interests. Prices are given on page 247.

Tin Plate.—The market continues satisfactory in that container manufacturers are specifying against contracts freely and there is a continued high rate of operation of mills in this and nearby districts. The leading interest last week operated close to 90 per cent of capacity and independent operations ran almost as high despite the fact that a few of them still were idle. Less disposition to make prices attractive is noted and only the large consumers, who usually have preferential price treatment, now are able to buy production plate, much under \$4.75 per base box.

We quote standard production coke tin plate at \$4.75 per base box f.o.b. Pittsburgh for carload lots.

Cold-Finished Steel Bars and Shafting.—Some makers of cold-rolled and cold-drawn screw stock and shafting detect a slightly better inquiry and also a somewhat firmer tendency of prices, which is manifest in the reappearance in a number of centers of the usual price differential for less than carload tonnages. For the larger lots there are fewer instances than recently of a willingness on the part of makers to accept less than 2c. base Pittsburgh. The Cumberland Steel Co. effective Jan. 13, made a reduction of \$5 per ton in ground shafting to \$2.25 per 100-lb. base for carloads and \$2.50 per 100-lb. base for less than carloads, with the usual extras, f.o.b. cars, Cumberland, Md.

Hoops and Bands.—Cooperage material still is firmly held at 2c. base, Pittsburgh, but on the heavier gages the market is quotable from 1.75c. to 2c. In the latter, competition for business is sharp because there are so many manufacturers who have facilities for rolling what is classified as band steel. Some of them are using the old bar card in making prices.

Hot-rolled and Cold-rolled Strips.—Now that jobbers and consumers have practically completed their inventories and know where they stand, manufacturers of strips are beginning to get more orders and also specifications against old business. Demand, however, is good only by comparison with the extremely limited buying of the past two weeks. There is no special change in prices, cold-rolled strips holding fairly well

at 2.50c. base Pittsburgh, while hot-rolled strips are 2c. base Pittsburgh, for carload lots, with some concessions being made to quantity buyers.

Nuts and Bolts.—Makers in this district still report no occasion for satisfaction over the amount of business coming in. Both consumers and jobbers are going along with rather light stocks, but despite that fact they are inclined to make frequent small purchases rather than enter their requirements for a period of a month or longer. Discounts are given on page 247.

Rivets.—There has been no appreciable improvement in business, but it is expected that with the completion of inventories, consumers and distributors will find themselves in need of supplies at least to round out their stocks, and the next few weeks are expected to see some increase in orders. No change is noted in prices or discounts, which are to be found on page 247.

The market still leans in buyer's favor. On large lots of standard spikes as low as \$2.15 base per 100-lb. lately has been done. That was the base on 11,700 kegs for the Louisville & Nashville railroad, taken by a Pittsburgh maker. The Missouri Pacific Railroad has closed for 1000 kegs with a Western maker. The Southern Pacific Co. inquiry for 2000 kegs still is open. The maximum on carload lots of standard spikes now is \$2.20 base and small spikes also are down about \$1 from recent quotations. New prices are given on page 247.

Structural Material.—Makers are inclined to take a firmer stand on prices, although both sales and inquiries are few and small. Fabricating shops in this district are figuring upon a fair number of inquiries, but most of the projects are outside this immediate district. Mills here are holding pretty firmly to 1.50c. as a minimum, and are encouraged in this attitude by the news that a large Eastern mill recently quoted 1.50c. to 1.60c. against a structural steel inquiry of the New York Central Lines. Prices are given on page 247.

Plates.—The market is such a limited affair as regards demand and sales that prices are not at all well defined. Makers insist that 1.50c. is minimum, but buyers claim that if they had orders to place they would not have to go above 1.40c. or 1.45c. Not much business recently has been taken by tank or barge builders and the car shops are getting close to the end of their railroad repair orders.

We quote sheared plates 1/4 in. and heavier, tank quality, at 1.50c. f.o.b. Pittsburgh.

Iron and Steel Pipe.—Makers of both steel and wrought iron pipe are having a fair run of orders in merchant pipe, but note no abandonment on the part of buyers of a policy of meeting only their actual requirements. Not much is going on in oil well or line pipe, due to fears of lower oil prices in other fields following the recent reductions in Pennsylvania crude oil. Booth & Flinn, Ltd., have put out an inquiry for 400 tons of 3, 4, 6, 8 and 12-in. pipe for the new vehicular tunnel in New York. Prices are holding fairly well in all lines, although there are intimations that a sizable order for line pipe might occasion some sharpening of pencils. Discounts are given on page 247.

Boiler Tubes.—Demand in both steel and iron tubes is purely hand to mouth, and while orders are coming along steadily, few of them are for sizable lots. Prices are rather easy, especially on seamless steel tubes, which are selling at prices well under cost. The railroads are making occasional purchases of the latter. Discounts are given on page 247.

Coke and Coal.—There is only a limited market for spot tonnages of furnace coke and efforts to bring prices more in line with these for contracts have not yet been especially successful. Operators with tonnages available for immediate delivery generally are asking \$3 per net ton, oven, but consumers still claim ability to secure supplies anywhere from 10c. to 25c. below that price. Spot foundry coke holds at \$3.75 to \$4.25. The coal market remains dull and weak on spot tonnages. Non-union mine run steam coal recently sold as low as \$1.35 and \$1.50 has become the maximum

figure. Non-union by-product coal, mine run grade, is selling anywhere from \$1.50 to \$1.75. Gas coal, coming entirely out of union districts, is quotable from \$2 to \$2.35 for run of mine.

Old Material.—The market exhibits a very firm tone, notwithstanding that the demand from the steel companies still is light. This outwardly finds its chief explanation in the fact that dealers still have some short contracts to cover and are easily frightened into paying rather stiff prices by the fact that open market offerings are moderate. The steel foundries lately have been taking on tonnages with some freedom and their purchases have contributed to the firmness of the market on the better grades of railroad steel. There is sufficient demand to keep the market clear of the lighter grades of open hearth material, prices of which are well maintained.

We quote for delivery to consumers' mills in the Pittsburgh and other districts taking the Pittsburgh freight rate, as follows:

Heavy melting steel, Steubenville, Follansbee, Brackebridge, Monessen, Midland and Pittsburgh.....	\$14.50 to \$15.00
No. 1 cast, cupola size.....	16.50 to 17.00
Revolving rails, Newark and Cambridge, Ohio; Cumberland, Md.; Huntington, W. Va. and Franklin, Pa.....	15.50 to 16.00
Compressed sheet steel.....	11.75 to 12.00
Bundled sheets, sides and ends.....	10.50 to 11.00
Railroad knuckles and couplers.....	15.50 to 16.00
Railroad coil and leaf springs.....	15.50 to 16.00
Low phosphorus standard bloom and billet ends.....	17.50 to 18.00
Low phosphorus plates and other grades.....	17.00 to 17.50
Railroad malleable.....	12.50 to 13.00
Iron car axles.....	23.00 to 24.00
Locomotive axles, steel.....	21.00 to 22.00
Steel car axles.....	15.50 to 16.00
Cast iron wheels.....	15.00 to 15.50
Roller steel wheels.....	17.50 to 18.00
Machine shop turnings.....	9.50 to 10.00
Sheet bar crop ends.....	11.50 to 12.00
Heavy steel axle turnings.....	11.50 to 12.00
Short shoveling turnings.....	10.75 to 11.00
Heavy breakable cast.....	14.25 to 14.75
Stove plate.....	13.00 to 13.50
Cast iron borings.....	10.75 to 11.00
No. 1 railroad wrought.....	11.50 to 12.00

Poor Year's Business in Fabricated Steel

The records of the Bridge Builders and Structural Society, from reports collected by its secretary, George E. Gifford, 50 Church Street, New York, show that in December 71,500 tons of fabricated steel was contracted for throughout the United States. This is roughly equivalent to 40 per cent of the capacity of the bridge and structural shops of the country, put at 180,000 tons per month.

The total fabricated steel business for 1921 appears thus to be 758,000 tons or 35 per cent of annual capacity. This exceedingly low performance of slightly over 63,000 tons per month compares with about 90,000 tons per month in the two poor years of 1913 and 1914 and with nearly 105,000 tons per month for the nine years of 1912 to 1920 inclusive. Whereas normally the tenth year of the decade should, other things being equal, show a large total, as a mark of the expansion of the country, the 1921 volume is in fact only 70 per cent of either of the two poorest years for which records are available. The foregoing recapitulation is merely another commentary on a year which furnishes many records for low production.

Buffalo Iron and Steel Makers Complain

WASHINGTON, Jan. 17.—Formal complaint for filing with the Interstate Commerce Commission has been prepared by counsel representing iron and steel makers in the Buffalo district charging that they are unduly discriminated against in rates on iron ore, coal and coke which they have to pay in favor of interior competitors by reason of rates the latter pay on ore. The complaint puts in formal shape charges which have been informally made previously, resulting in a hearing before members of the commission and the ordering by the commission of the restoration of the old rates on ore, effective Jan. 11 from Lake Erie ports to interior furnaces.

Chicago

CHICAGO, Jan. 17.

The market is exceptionally quiet in all departments. A slight improvement in the wire trade is noted, and a fair amount of soft steel bar business is coming from miscellaneous sources, while sheets, though firm, are inactive so far as the domestic market is concerned. Further tonnage is being booked from abroad, however, the local independents having taken orders for 3000 tons of sheets from Japan within the past week. It will take some time for the specifications to be prepared for the steel required for the cars recently placed by the railroads, but local mills expect to book 65,000 tons for that work. Other car orders are looked for soon, the largest among them being 7300 cars which will be bought by the Burlington.

In the building construction field the largest inquiry which has come out for many weeks is one calling for 15,000 to 20,000 tons for the head-house and concourse of the Chicago Union Station. This project, which has undergone numerous delays since its inception, is now scheduled to reach completion within two years.

Although the local building trades council failed to call a strike a week ago, an insurgent movement has sprung up in the union ranks which threatens to tie up all construction jobs on which non-union labor is employed. Of broader significance is the threatened strike of bituminous coal miners, scheduled for April 1. With labor troubles in the coal, building and railroad industries still demanding settlement, progress toward industrial recovery is impeded, and buyers of iron and steel continue to adhere to a cautious policy in covering their needs.

Mill and furnace operations are on about the same basis as a week ago. The Illinois Steel Co. has made a slight gain in steel output, being on a 33 per cent basis, but the Inland Steel Co. and other producers are running at approximately the same rate as last reported.

Pig Iron.—New inquiries are small, ranging from carloads to 300, 400 and 500 tons. Interest is centered in 2000 tons of malleable wanted by the Auto Specialties Co., Benton Harbor, Mich., for second quarter delivery. This is the only large inquiry still pending and it is possible that it will bring out concessions below present ruling prices. On ordinary business, however, the ruling market is \$19, base, local furnace, for foundry, malleable and basic. Few orders of any size have been closed within the past week. Weakness in Southern iron is reported and some observers believe that this product will soon become a factor in some parts of this territory where the freight advantage is not too much in favor of Chicago. Recent sales of Southern foundry include 400 tons for local delivery and 200 tons for Michigan delivery, both of which were closed at \$16, base, Birmingham. In support of the belief that even lower prices might be quoted, attention is called to a Southern interest which is said to be quoting f.o.b. furnace rather than f.o.b. Birmingham, thereby reducing the freight charge which is included in the delivered price. There is little activity in charcoal, low phosphorus and silvery irons. In connection with silvery, it is to be noted that competition by electric furnaces is confined largely to grades from 9 per cent up, and does not so seriously affect 7 and 8 per cent business.

Quotations on Northern foundry, high phosphorus malleable and basic irons are f.o.b. local furnace and do not include a switching charge averaging 70c. per ton. Other prices are for iron delivered at consumers' yards, or when so indicated, f.o.b. furnace other than local.

Lake Superior charcoal, averaging sil. 1.50, delivered at Chicago...	\$31.50
Northern coke, No. 1, sil. 2.25 to 2.75	19.50
Northern coke, foundry, No. 2, sil. 1.75 to 2.25	19.00
Northern high phos.	19.00
Southern foundry, sil. 1.75 to 2.25	22.67
Malleable, not over 2.25 sil.	19.00
Basic	19.00
Low phos., Valley furnace, sil. 1 to 2 per cent copper free	33.00
Silvery, sil. 8 per cent	\$32.82 to 34.82

Ferroalloys.—Outside of local inquiries for two cars

of spiegeleisen and one carload of ferromanganese, the market is quiet. Some weakness has developed in 50 per cent ferrosilicon and it is now available at from \$56.50 to \$57.50, delivered.

We quote 78 to 82 per cent ferromanganese, \$66.75, delivered; 50 per cent ferrosilicon, \$56.50 to \$57.50, delivered; spiegeleisen, 18 to 22 per cent, \$36 to \$37, delivered.

Railroad Equipment.—The Burlington has ordered 74 all-steel passenger carrying cars from the Pullman Co. and 56 all-steel baggage and mail cars from the Standard Steel Car Co. The Central of Georgia is expected to place 500 box cars this week and the Union Pacific will take early action on 38 passenger service cars.

Rails and Track Supplies.—Buying of standard steel rails is suspended for the present and no inquiries are now active before mills. The rail mill at Gary will be idle practically all this month. Tonnages held over from last year will supply most roads with sufficient rails for ready work and there is no pressure for buying at this time. Track fastenings are equally slack in this market.

Standard Bessemer and open-hearth rails, \$40; light rails rolled from new steel, 1.60c. to 1.65c. f.o.b. makers' mills.

Standard railroad spikes, 2.15c. to 2.25c., Pittsburgh; track bolts with square nuts, 3.20c. to 3.25c., Pittsburgh; tie plates, steel and iron, 1.875c. to 2c., f.o.b. mill; angle bars 2.10c., f.o.b. mill.

Bars.—Bar buying is confined to small lots from a wide variety of sources, making a fair total. Buyers lack confidence in the future and buy from hand to mouth, knowing mills can make immediate delivery. However, this condition may change almost without warning, leaving the slow buyer without stock. One mill in Chicago is now scheduled full for six weeks. An inquiry for 1000 tons for reinforcing where soft steel or rerolled bars may be used is encouraging to makers of the latter. Paul J. Kalman Co. will furnish 205 tons for highway work in Marion and Fayette counties, Ill. Bar iron demand is somewhat better and mills are operating heavier, most demand being from railroads. No bar iron has been specified for newly bought cars, and soft steel, cheaper than iron, is believed to be substituted. Rerolled bars are not active.

Mill prices are: Mild steel bars, 1.60c. to 1.70c., Chicago; common bar iron, 1.60c., Chicago; rail carbon, 1.50c., mill or Chicago.

Jobbers quote 2.53c. for steel bars out of warehouse. The warehouse quotation on cold-rolled steel bars and shafting is 3.40c. for rounds and 3.90c. for flats, squares and hexagons. Jobbers quote hard and medium deformed steel bars at 2.88c. base. Hoops and bands, 3.13c.

Wire Products.—Good buying of wire and nails, especially the latter, has marked the past week, coming from practically all sources except from manufacturers. Nails are especially in demand. Mills now have good stocks in warehouses and can make immediate shipments. Jobbers are still engaged in inventory, but this has not delayed buying. Prices are steady and unchanged.

We quote warehouse prices f.o.b. Chicago: No. 9 and heavier black annealed wire, \$3.13 per 100 lb.; No. 9 and heavier bright basic wire, \$3.28 per 100 lb.; common wire nails, \$3.25 per 100 lb.; cement coated nails, \$2.66 per keg. The mill quotation on plain material ranges from 1.60c. to 1.75c., Chicago. Jobbers quote 2.78c. for materials out of warehouse.

Sheets.—Domestic consumers of sheets are not buying much and producers would be in a bad way except for export tonnage, which makes 50 per cent of their tonnage in some cases. The local independent continues operation at full capacity. Prices are held firmly in spite of small buying.

Mill quotations are 3c. for No. 28 black, 2.25c. for No. 10 blue annealed and 4c. for No. 28 galvanized, all being Pittsburgh prices, subject to a freight rate to Chicago of 38c. per 100 lb.

Jobbers quote: Chicago delivery out of stocks, No. 10 blue annealed, 3.38c.; No. 28 black, 4.15c.; No. 28 galvanized, 5.15c.

Plates.—Slow specification of material by car builders is rendering the plate market slack, especially as oil tank demand has fallen to nothing and other plate users do not require much material. Renewal of auto-

mobile production promises increased demand from that source. Prices remain unchanged.

The ruling mill quotations range from 1.60c. to 1.70c., Chicago. Jobbers quote 2.63c. for plates out of stock.

Bolts and Nuts.—No revival is seen in this market and producers are operating at a slack rate, buying being in small lots. Discounts are being disregarded and every maker has his own price.

Jobbers quote structural rivets, 3.43c.; boiler rivets, 3.53c.; machine bolts up to $\frac{3}{8}$ x 4 in., 60, 10 and 10 per cent off, larger sizes, 60 and 10 off; carriage bolts up to $\frac{3}{8}$ x 6 in., 60 and 10 off; larger sizes, 55 and 5 off; hot pressed nuts, square and hexagon tapped, \$3.75 off, blank nuts \$4 off, coach or lag screws, gimlet points, square heads, 65 and 5 per cent off. Quantity extras are unchanged.

Structural Material.—While unsettled labor conditions in the building trades are holding back much work in Chicago, this center being less active than others, prospective closing of some important projects offer hope of larger business for spring. Costs aside from labor seem well liquidated and successful establishment of the open shop will lend encouragement. Bids on the warehouse at Louisville for the Belknap Hardware & Mfg. Co. have been deferred to Jan. 30. Recent Western lettings are for moderate totals and various purposes. Prices remain unchanged at 1.50c. for car material, 1.60c. to 1.75c. for general business. Recent fabricating awards include:

Bryant Junior High School, Minneapolis, Minn., 112 tons, to American Bridge Co.

United Comstock Mines Co., mill buildings, Gold Hill, Nev., 182 tons, to Minneapolis Steel & Machinery Co.

Six crude stills at Sugar Creek, Mo., for Standard Oil Co., 152 tons, to Standard Tank Car Co., Sharon, Pa.

High school building at Lawrence, Kan., 170 tons, to Federal Bridge Co.

Store building at Denver for L. R. Steel, 400 tons, reinforced concrete.

Harsh & Chapline, Northwestern Division, Craddock-Terry Co. plant at Milwaukee, 315 tons, to Lakeside Bridge & Structural Co.

City of Sheboygan, Eighth Street bascule bridge, 650 tons, to Wisconsin Bridge & Iron Co., Milwaukee (reported low bidder Dec. 1).

Pending business includes:

Sewage disposal plant, Jones Island, Milwaukee, 500 tons bids closed Jan. 18.

Chicago Union Station headhouse and concourse, 15,000 tons, bids asked.

Los Angeles & Salt Lake Railroad, subsidiary of Union Pacific, freight station, Los Angeles, Cal., 500 tons bids in.

Putnam Department Store, Davenport, Iowa, 800 tons.

Interstate bridge, Prescott, Wis., 500 tons, bids Feb. 2.

Toitz, King & Day, Pioneer Building, St. Paul, Minn., consulting engineers.

The mill quotation on plain material ranges from 1.60c. to 1.70c., Chicago. Jobbers quote 2.63c. for plain material out of warehouse.

Cast Iron Pipe.—Though fully 50 miles of water-mains are known to be under consideration by municipalities, inquiry for cast iron pipe is not yet active. The last week of the month is expected to yield large buying when appropriations have been made. Prices are being shaded \$2 in the present lull, but are expected to stiffen on renewed inquiry. A contractor has been awarded 750 tons, but has not awarded the material to a maker. Bids will be opened Jan. 30 at St. Paul on 1500 tons, Jan. 24 on 115 tons at Lake Wilson, Minn., and Minneapolis is expected to inquire shortly for two and a half miles of 24-in. pipe, about 1700 tons.

We quote per net ton, f.o.b. Chicago, as follows: Water pipe, 4-in., \$47.10 to \$48.10; 6-in. and above, \$43.10 to \$44.10, class A and gas pipe, \$4 extra.

Coke.—Sellers report a moderate improvement in buying and a greater willingness on the part of purchasers to contract over periods. Current consumption of foundry coke in this territory is variously estimated at from 25 to 40 per cent of normal.

Old Material.—Buying of heavy melting steel and similar grades last week has not been continued and except for some tonnages of malleable for foundries and a small buying by rolling mills, the market is dull. Prices are stationary and in some cases weaker. Railroad lists include the Rock Island, 4250 tons, including 1000 tons steel rails, the Chicago Great Western, 1000

tons, and the Monon 400 tons. Cast iron car wheels were quoted in error last week and have been stationary at \$15.50 to \$16. Other prices are unchanged.

We quote delivery in consumers' yards Chicago and vicinity, all freight and transfer charges paid, as follows:

Per Gross Ton	
Iron rails	\$15.00 to \$16.50
Relaying rails	23.00 to 27.50
Cast iron car wheels	15.50 to 16.00
Roller or forged steel car wheels	13.00 to 13.50
Steel rails, rerolling	12.00 to 12.50
Steel rails, less than 3 ft.	12.50 to 13.00
Heavy melting steel	11.50 to 12.00
Frogs, switches and guards cut apart	11.50 to 12.00
Shoveling steel	11.00 to 11.50
Low phos. heavy melting steel	13.50 to 14.00
Drop forge flashings	7.50 to 8.00
Hydraulic compressed sheet	7.50 to 8.00
Axle turnings	8.50 to 9.00

Per Net Ton	
Iron angles and splice bars	14.00 to 14.50
Steel angle bars	10.50 to 11.00
Iron arch bars and transoms	15.00 to 15.50
Iron car axles	19.00 to 19.50
Steel car axles	12.50 to 13.00
No. 1 bushing	8.25 to 8.75
No. 2 bushing	6.00 to 6.50
Cut forge	10.25 to 10.75
Pipes and flues	7.00 to 7.50
No. 1 railroad wrought	10.50 to 11.00
No. 2 railroad wrought	10.00 to 10.50
Steel knuckles and couplers	11.50 to 12.00
Coil springs	12.50 to 13.00
No. 1 machinery cast	12.00 to 12.50
No. 1 railroad cast	12.50 to 13.00
Low phos. punchings	11.00 to 11.50
Locomotive tires, smooth	10.00 to 10.50
Machine shop turnings	3.50 to 4.00
Cast borings	5.50 to 6.00
Stove plate	12.00 to 12.50
Grate bars	10.50 to 11.00
Brake shoes	10.50 to 11.00
Railroad malleable	11.50 to 12.00
Agricultural malleable	11.50 to 12.00

Buffalo

BUFFALO, Jan. 17.

Fig Iron.—No. 2 plain iron is being offered through an Eastern broker for \$19.50—the only departure from the \$20 base price standard which Buffalo furnaces have maintained as the lowest they will go. Some good inquiries are in the market, one for 3000 tons; one for 2000 tons and several for tonnages from 250 to 500 tons. The radiator interests made their recent purchase of 7000 tons at one furnace and on lowest silicons paid \$19. Inquiry holds up, but a great portion is from outside the district. Furnaces are making occasional quotations for second quarter delivery, but are reluctant to book any business beyond April 1. Operation is the same and after minor repairs the Donner Steel Co. will again operate the furnace which was banked a week ago.

We quote f.o.b. per gross ton Buffalo as follows:

No. 1 foundry, 2.75 to 3.25 sil.	\$20.00 to \$21.00
No. 2 N. foundry, 2.25 to 2.75 sil.	19.50 to 20.50
No. 3 plain, 1.75 to 2.25 sil.	19.00 to 20.00
Basic	20.00 to 21.00
Malleable	20.00 to 21.00
Lake Superior charcoal	31.75

Finished Iron and Steel.—All sellers find better inquiry and only a few find an increase in actual selling. Bar and shape inquiry is brisk and in one office the size of tonnages on which prices are sought, shows improvement. The sheet market is firm at \$3, although a New York State buyer offering a 500-ton order claims to have a price of \$2.85 and that he is holding off for a more favorable quotation. Bolts and nuts and tin plate are extremely quiet—though in other cities tin plate is understood to be in fair demand. An inquiry for 500 tons of bars for a buyer within the district is out but has not been awarded on bids of 1.50c. No structural awards have been made—in fact, little work of any size is in immediate prospect. One structural mill has sufficient orders to keep going without seeking small business where immediate delivery is a factor.

Warehouse Business.—In comparison with conditions a year ago, the market is livelier. Prices are lowest, in the judgment of warehouse interests and a shading of prices on plates and sheets to be in alignment with new schedules announced last week, makes the adjustment complete.

We quote warehouse prices f.o.b. Buffalo as follows: Structural shapes, 2.65c.; plates, 2.65c.; plates, No. 8 gage, 3.35c.; soft steel bars and shapes, 2.55c.; hoops and bands, 3.15c.; blue annealed sheets, No. 10, 3.40c.; galvanized steel sheets, No. 28, 5.25c.; black sheets, No. 28, 4.25c.; cold-rolled strip steel, 5.90c.; cold-rolled round shafting, 3.55c.

Old Material.—Dealers are not interested in the buying desires of two mills—at present prices. Some purchases of heavy melting steel have been made, but the majority of dealers have bought this material at \$15 and \$16 and have no willingness to sell at \$13.50. In consequence the tonnages are small. Generally, feeling is better and new prices are expected before Feb. 1. Inquiries for turnings and borings from the Youngstown and eastern Pennsylvania fields have not met with response here.

We quote dealers' asking prices per gross ton f.o.b. Buffalo as follows:

Heavy melting steel.....	\$13.00 to \$14.00
Low phosph., 0.01 and under.....	17.00 to 18.00
No. 1 railroad wrought.....	15.00 to 16.00
Car wheels.....	16.50 to 17.50
Machine shop turnings.....	7.50 to 8.00
Cast iron borings.....	7.00 to 8.00
Heavy axle turnings.....	10.50 to 11.50
Grate bars.....	12.00 to 13.00
No. 1 bushings.....	10.00 to 11.00
Stove plate.....	15.00 to 16.00
Bundled sheet stampings.....	8.00 to 9.00
No. 1 machinery cast.....	17.00 to 18.00
Hydraulic compressed.....	10.50 to 11.50
Railroad malleable.....	13.00 to 14.00

St. Louis

ST. LOUIS, Jan. 17.

Pig Iron.—More interest is being shown in pig iron than at any time during last month, and there is a better feeling among buyers. More sales are being made and additional shipping instructions are being given against contracts. The sale is reported of 700 tons of foundry iron to a local melter, while other purchases to local melters were of carload to 200-ton lots. A central Illinois radiator corporation bought 500 tons of foundry, while a southern Illinois melter bought 60 tons, and other sales of carloads are reported. There is an inquiry out from a local melter for 300 tons of foundry iron. The market is unchanged at \$19, Chicago, for Northern, although a good-sized tonnage might be had at less, and \$16.50, Birmingham, for Southern iron. A Kansas City concern wants 25 tons of ferromanganese.

We quote delivered consumers' yards, St. Louis as follows, having added to furnace prices \$2.88 freight and war tax from Chicago and \$5.31 from Birmingham:

Northern foundry, sil. 1.75 to 2.25.....	\$21.88
Northern malleable, sil. 1.75 to 2.25.....	21.88
Basic.....	21.88
Southern foundry, sil. 1.75 to 2.25.....	22.41

Finished Iron and Steel.—The demand from the railroads is increasing, and a number of inquiries for iron and steel were issued during the last week, and the indications are that there will be freer buying. The Missouri, Kansas & Texas wants 200 tons of structural shapes and plates for repair work. The St. Louis & San Francisco Railway is in the market for 150 tons of shapes. The Texas & Pacific has an inquiry out for 50 tons of locomotive tires on contract. The Texas Construction Co., Dallas, is in the market for 3100 tons of 70-lb. rails. The San Antonio Public Service Co. has asked for prices on three miles of 65, 70 and 90-lb. rails, and a Pine Bluff, Ark., concern desires quotations on 70-lb. rails, without stating quantity desired. The Missouri Pacific placed an order for 1000 kegs of track spikes, dividing the order between two concerns. The United Railways Co. of St. Louis now in receivership will ask the Federal Court this month for permission to build 50 additional cars to cost \$600,000. Bids are to be received shortly on St. Mary's Hospital, St. Louis County, involving 930 tons of structural shapes and 100 tons of bars. The local situation is upset by the prospect that the Building Trades Council will reject the proposal of the master builders for a reduction of 20 per cent in the base wage scale of \$1.25 an hour, the carpenters' vote being 25 to 1 against the proposition.

For stock out of warehouse we quote: Soft steel bars, 2.62½¢. per lb.; iron bars, 2.62½¢.; structural shapes, 2.72½¢.; tank plates, 2.72½¢.; No. 10 blue annealed sheets, 3.47½¢.; No. 28 black sheets, cold rolled, one pass, 4.15¢.; cold drawn rounds, shafting and screw stock, 3.65¢.; structural rivets, \$3.52½. per 100 lb.; boiler rivets, \$3.62½.; tank rivets, 7/16 in. and smaller, 65 and 5 per cent off list; machine bolts, large, 60-10 per cent; small, 60, 10 and 10 per cent; carriage bolts, large, 55-5 per cent; small, 60 and 10 per cent; lag screws, 65-5 per cent; hot pressed nuts, square or hexagon blank, 44; and tapped, \$3.75 off list.

Coke.—The demand for coke is increasing, sales of one by-product producer being 800 tons for the week, with scattering orders for a carload or more. There is an inquiry pending for 2000 tons of furnace coke for shipment through January and February to the Southwest. Colder weather has brought forth increased consumption and demand for domestic coke. There is some inquiry from railroads for blacksmith coke.

Old Material.—The market for old material is weak and unsteady and there is absolutely no trading of any description. However, prices have not declined to any appreciable extent, owing to the fact that dealers are looking for a better market in the near future and are absorbing all railroad offerings at present levels. Relaying rails are in demand and some good inquiries have developed, although no large contracts are reported closed as yet. Current railroad offerings include: Southern Railway, 8100 tons; Texas Pacific Railway, 1750 tons; Chicago, Rock Island & Pacific, 830 tons.

We quote dealers' prices f.o.b. consumers' works, St. Louis industrial district and dealers' yards, as follows:

Per Gross Ton	
Old iron rails.....	\$15.00 to \$15.50
Steel rails, rerolling.....	11.50 to 12.00
Steel rails, less than 3 ft.....	11.50 to 12.00
Relaying rails, standard section.....	23.00 to 28.00
Cast iron car wheels.....	14.00 to 14.50
No. 1 heavy railroad melting steel.....	10.50 to 11.00
No. 1 heavy shoveling steel.....	10.00 to 10.50
Ordinary shoveling steel.....	9.00 to 9.50
Frogs, switches and guards cut apart.....	10.50 to 11.00
Ordinary bundle sheet.....	4.50 to 5.00
Per Net Ton	
Heavy axles and tire turnings.....	5.00 to 5.50
Iron angle bars.....	13.50 to 14.00
Steel angle bars.....	12.00 to 12.50
Iron car axles.....	18.00 to 18.50
Steel car axles.....	13.50 to 14.00
Wrought iron arch bars and transoms.....	13.00 to 13.50
No. 1 railroad wrought.....	9.50 to 10.00
No. 2 railroad wrought.....	8.50 to 9.00
Railroad springs.....	11.25 to 11.75
Steel couplers and knuckles.....	11.25 to 11.75
Locomotive tires, 42 in. and over, smooth inside.....	8.00 to 8.50
No. 1 dealers' forge.....	7.00 to 7.50
Cast iron borings.....	6.50 to 6.00
No. 1 bushings.....	8.50 to 9.00
No. 1 boilers cut in sheets and rings.....	7.00 to 7.50
No. 1 railroad cast.....	13.00 to 13.50
Stove plate and light cast.....	11.50 to 12.00
Railroad malleable.....	9.50 to 10.00
Agricultural malleable.....	9.00 to 9.50
Pipes and flues.....	7.50 to 8.00
Heavy railroad sheet and tank.....	6.00 to 6.50
Light railroad sheet.....	4.50 to 5.00
Railroad grate bars.....	9.50 to 10.00
Machine shop turnings.....	4.50 to 5.00
Country mixed iron.....	6.50 to 7.00
Uncut railroad mixed.....	7.00 to 7.50
Horseshoes.....	9.50 to 10.00
Railroad brake shoes.....	9.00 to 9.50

Birmingham

BIRMINGHAM, ALA., Jan. 17.

Pig Iron.—By the middle of the month Birmingham pig iron was selling at \$16 a ton in competitive territory, and that price was as often made as \$16.50 in strictly Southern territory. One maker held for higher prices, but there was no business done above the general scale. Makers report bookings of small tonnages for prompt shipment. A lot of buying expected to have been done by sanitary pipe makers did not materialize. The lower scale of prices announced by pipe makers is credited with having provoked a temporary lull. The conviction remains that this buying will start again soon. The leading pipe interest is credited with having quietly bought a minimum of 20,000 tons at bottom prices. One maker is believed to have taken 10,000 tons. The American Radiator Co. has lately taken 2500 tons for Southern plants, which are continuously on a 100 per cent production base. Small iron tonnages continue to move to the Pacific Coast out of Mobile, 50 tons leaving this week. Several lots went into Ohio and other competitive fields last week on a base of \$16. Large tonnages for that delivery could be gotten under \$16, the lots entering that field at \$16 being small ones.

We quote per gross ton f.o.b. Birmingham district furnaces as follows:

Foundry, silico. 1.75 to 2.25.....	\$16.00 to \$16.50
Basic.....	15.00 to 15.50
Charcoal, warm blast.....	32.00

Cast-Iron Pipe.—Sanitary pipe scale has been lowered to \$37 for standard, \$28 for extra heavy, \$40 for fittings.

and \$36 for 8 to 12-in. sizes. Trade simmered down while digesting the new scale. High pressure pipe works feel confident of considerable business this spring. Base is \$33.

Finishing Mills.—The Tennessee company continues the operation of five of its nine open-hearth furnaces, car works, rail mill and Bessemer plate, guide and bar mills. The Gulf States Steel Co. is operating three of the six open hearths and all the finishing mills. New business in wire and nails has reopened and is better than it was just before the holidays. Wire mill operations have increased over December, in which month there was a considerable drop from November and October operations. Hoop and band mills remain idle.

Old Material.—Cast scrap is moving with fair regularity out of yards, but steel scrap is on the dead list. Prices are unchanged from last week.

We quote per gross ton f.o.b. Birmingham district yards as follows:

Steel rails	\$11.00 to \$12.00
No. 1 steel	10.00 to 11.00
No. 1 cast	14.00 to 15.00
Car wheels	13.00 to 14.00
Tramcar wheels	12.00 to 13.00
No. 1 wrought	12.00 to 13.00
Stove plate	11.00 to 12.00
Cast iron borings	6.00 to 7.00
Machine shop turnings	6.00 to 7.00

New York

NEW YORK, Jan. 17

Pig Iron.—The contract for segments for the vehicular tunnel between New York and New Jersey, involving over 100,000 tons of pig iron, continues to be the leading topic of discussion among foundrymen. The largest inquiry of any foundry is for 2500 tons a month for 20 months, or 50,000 tons, and it is evident that no foundry is figuring on doing all the work. Furnaces continue to maintain a very conservative attitude and are slow to quote for delivery so far in the future. In the past when tunnel contracts have been awarded, the pig iron market has advanced, but at present the market is stationary without any tendency to advance. It is expected that a more definite attitude on the part of furnaces will be disclosed soon. The melt in the metropolitan district seems to be increasing moderately and a hopeful feeling prevails. There is very little inquiry and selling is limited. Prices show little, if any, change.

We quote delivered in the New York district as follows, having added to furnace prices \$2.52 freight from eastern Pennsylvania, \$5.46 from Buffalo and \$6.16 from Virginia:

East. Pa. No. 1 fdy., sil. 2.75 to 3.25	\$23.52 to \$24.02
East. Pa. No. 2X fdy., sil. 2.25 to 2.75	23.02 to 23.52
East. Pa. No. 2 fdy., sil. 1.75 to 2.25	22.52 to 23.02
Buffalo, sil. 1.75 to 2.25	24.46 to 24.96
No. 2 Virginia, sil. 1.75 to 2.25	27.16 to 28.16

Ferroalloys.—Demand for ferromanganese is still confined to carload lots and sales of about 100 tons of the British alloy are quoted at \$58.35, seaboard. Consumers are interested only in hand-to-mouth necessities. There is no activity in the spiegeleisen market nor is there any interest shown by consumers of manganese ore, quotations remaining nominally unchanged. There are signs of more activity in the 50 per cent ferrosilicon market, but quotations are unchanged. There have been sales of carload lots at prevailing prices and it is not unlikely that the week's developments will reveal the closing of some contracts for 1922 consumption. Quotations are as follows:

Ferroalloys

Ferromanganese, domestic, delivered, per ton.	\$60.00 to \$63.00
Ferromanganese, British, seaboard, per ton	\$58.35
Spiegeleisen, 20 per cent, furnace, per ton	\$26.00
Ferrosilicon, 50 per cent, delivered, per ton,	\$55.00 to \$60.00
Ferrotungsten, per lb. of contained metal	40c. to 50c.
Ferrocromium, 6 to 8 per cent carbon, 60 to 70 per cent Cr., per lb. Cr., delivered	11c. to 14c.
Ferrovandium, per lb. of contained vanadium	\$4.50

Ores

Manganese ore, foreign, per unit, seaboard	20c.
Tungsten ore, per unit, in 60 per cent concentrates	\$2.00 up
Chrome ore, 40 to 45 per cent Cr ₂ O ₃ , crude, per net ton, Atlantic seaboard	\$20.00 to \$25.00
Chrome ore, 45 to 50 per cent Cr ₂ O ₃ , crude, per net ton, Atlantic seaboard	\$30.00
Molybdenum ore, 35 per cent concentrates, per lb. of MoS ₃ , New York	50c. to 60c.

Finished Iron and Steel.—With limited buying in all steel products still the rule, the steel companies are making further concessions in prices to get orders. On plates, shapes and bars 1.45c., Pittsburgh, is now a frequent quotation, and business in plates and shapes has been taken as low as 1.40c., Pittsburgh. Bars do not show such pronounced weakness, 1.45c. appearing to be the minimum. The low prices are not confined to large tonnages. A jobber's order for five carloads of steel was taken by a leading producer at 1.45c. for the shapes and 1.50c. for the bars. A competitor had quoted 1.45c., Pittsburgh, on the bars, but the order for shapes at 1.45c. was accepted only upon the condition that the bars at 1.50c. were included. Plates in lots not exceeding 100 tons have been sold at 1.45c., Pittsburgh, and in a few instances at 1.40c. Many of the mills continue to quote 1.50c. on these three products, but make their concessions later to close the business. The New York Central Railroad last week opened bids on 3000 tons of plates, shapes and bars, 500 tons of forging billets and 600 tons of wire nails and other wire products. Bids were put in in various ways, including mill and delivered prices. The Worth Steel Co. bid 1.60c., mill, on plates. The Carnegie Steel Co. bid 1.605c., Pittsburgh, on plates, shapes and bars; Cambria Steel Co. bid 1.50c., Pittsburgh, on all three products; the Alan Wood Iron & Steel Co. bid 1.61c., mill, on plates; the Donner Steel Co., 1.60c., Buffalo, on plates and small shapes, and 1.50c., Buffalo, on bars; the Lackawanna Steel Co., 1.65c., delivered West Seneca, N. Y., on plates, shapes and bars; the Bethlehem Steel Co., 1.835c., delivered Newberry Junction, Pa., on plates, shapes and bars; Jones & Laughlin Steel Co., 1.50c., Pittsburgh, on plates, shapes and bars; the Bourne-Fuller Co., Cleveland, 1.605c., Cleveland, on bars. On forging billets there were bids of \$32, Pittsburgh, and \$33, Buffalo, the Lackawanna Steel Co. bidding \$33, delivered West Seneca, N. Y. The Alan Wood Iron & Steel Co. bid \$36, f.o.b. its mill. The Bourne-Fuller Co. bid \$37.10, Cleveland, and the Bethlehem Steel Co., \$40.32, delivered Newberry Junction. The Youngstown Sheet & Tube Co. put in a bid of 2.50c., Youngstown, on wire nails, other makers bidding 2.50c., Pittsburgh. Inquiries for finished steel are few in number and mostly for small tonnages. Exceptions are requests for bids on 2000 tons of bars for construction work at Seattle, Wash., on which Eastern contractors are figuring, and on 1700 tons of plates for tanks for the Vacuum Oil Co., New York. Little new structural steel work is up for bids. The new projects include 500 tons for an apartment house on Seventy-fifth Street, New York; 300 tons for an apartment house on East Eighty-first Street, New York; 300 tons for a branch of the Corn Exchange Bank, New York; 500 tons for a private residence on Fifth Avenue, New York. Two sections of the new Standard Oil building will require about 1500 tons of steel. The American Bridge Co. will fabricate 300 tons for a railroad bridge in California. The Lackawanna Steel Co. will furnish 100 tons for a bridge for the Long Island Railroad. The Bethlehem Steel Bridge Co. will fabricate 1000 tons for a building at Amsterdam, N. Y.

We quote for mill shipments, New York, as follows: Soft steel bars, 1.85c. to 1.88c.; plates, 1.83c. to 1.88c.; structural shapes, 1.83c. to 1.88c.; bar iron, 1.83c. to 1.88c. On export shipments the freight rate is now 28.5c. per 100 lb., instead of 35c., the domestic rate.

Warehouse Business.—Business has apparently shown a slight improvement since the recent revision of prices, but while this is viewed with satisfaction, there is a feeling that it may not be permanent. Sheet prices are slightly weaker, black sheets being obtainable at 3.85 per lb. for No. 28 gage, although the usual quoted price is still 4c. per lb. Galvanized sheets can also be had at better than 4.85c. per lb. Warehouses handling electric sheets report a recent spurt of activity in this material from both small and large consumers, which were evidently unwilling to wait for mill delivery. The brass and copper market maintains an active tone and orders are reported to be slightly larger as well as more numerous. Copper screening is notable among active brass and copper items, as dealers are now beginning to stock up for spring and summer

sales. The wrought iron and steel pipe business has entered upon its dull season, January, February and early March. We quote prices on page 258.

High Speed Steel.—The market is inactive and prices continue weak. Producers quote from 85c. to 95c. per lb. and as low as 80c. per lb. on 18 per cent tungsten high speed steel, with \$1.05 per lb. still being held on some special brands.

Cast-Iron Pipe.—Orders come in for spring delivery from private companies in satisfactory volume and prices remain firm. Whereas a year ago many foundries had shut down ostensibly for repairs, the real reason being lack of orders. Repair shutdowns now are genuine. We quote per net ton, f.o.b., New York, carload lots, as follows: 6-in. and larger, \$47.30; 4-in. and 5 in., \$52.30; 3-in., \$62.30, with \$4 additional for Class A and gas pipe.

Old Material.—An eastern Pennsylvania heavy melting steel consumer reduced buying prices on the yard grade 50c. to \$11 on Monday, thereby causing a corresponding reduction in the New York f.o.b. price. Borings are 50c. stronger because of a demand from several consumers. Otherwise the market is without change and lifeless.

Buying prices per gross ton, New York, follow	
Heavy melting steel, yard...	\$7.50 to \$8.00
Steel rails, short lengths, or equivalent	8.50 to 9.00
Revolving rails	9.50 to 10.00
Relaying rails, nonhard	28.00 to 30.00
Steel car axles	10.00 to 10.50
Iron car axles	18.50 to 19.00
No. 1 railroad wrought	10.50 to 11.00
Wrought iron track	8.50 to 9.00
Forge ore	5.00 to 5.50
No. 1 yard wrought, long	9.00 to 9.50
Cast borings (telescopic)	7.50 to 8.00
Machine shop turnings	4.00 to 5.00
Mixed borings and turnings	4.50 to 5.00
Iron and steel pipe (1 in. diam. not under 2 ft. long)	7.00 to 7.50
Stove plate	9.00 to 10.00
Locomotive grate bars	9.00 to 10.00
Malleable cast (railroad)	8.00 to 8.50
Car wheels	10.50 to 11.50

Prices which dealers in New York and Brooklyn are quoting to local foundries, per gross ton, follow:

No. 1 machinery cast	\$16.50 to \$17.00
No. 1 heavy cast (columns, building materials, etc.), cupola size	15.50 to 16.00
No. 1 heavy cast, not cupola size	14.00 to 14.50
No. 2 cast (radiators, cast boilers, etc.)	10.00 to 10.50

Cleveland

CLEVELAND, Jan. 17.

Iron Ore.—Many consuming interests have made inquiries as to probable ore prices for 1922 in order to determine how much they should write down their ore in their inventories for income tax purposes, but sellers have not been able to give any definite information, as prices for this year have not been considered. Some consumers have stated that they will inventory their ore at at least \$1 a ton below 1921 prices. A year ago, consumers cut ore values in their inventories from 50c. to \$1.50 a ton below the 1920 prices and when the \$1 a ton reduction was finally made, their inventories were readjusted on that basis. With the decline in pig iron and steel prices and the losses sustained by operators of steel plants and blast furnaces in 1921, ore consumers seem inclined to insist on sharp reductions in ore prices for this year. Last year was, also, very unprofitable to the mining companies and they naturally would like to keep ore prices at a point where they might expect some profit this year. However, the cost of mining was reduced last year by the various reductions of miners' wages, and a further reduction in the vessel carrying rate for ore is looked for during the coming season, and consumers are expected to ask for all the benefit of the reduced cost of mining and shipping ore.

We quote delivered lower lake ports: Old range Bessemer, 55 per cent iron, \$6.45; Old range non-Bessemer, 51½ per cent iron, \$5.70; Mesabi Bessemer, 55 per cent iron, \$6.20; Mesabi non-Bessemer, 51½ per cent iron, \$5.55.

Pig Iron.—The demand for foundry iron shows some increase, but sales are almost wholly in small lots, no single orders being reported for over 300 tons. Some of the smaller foundries that consume around 50 tons of iron or less per month are buying for six months'

requirements, but nearly all purchases are for only immediate requirements. One Lake furnace during the week sold 5000 tons, all in small lots and mostly for prompt shipment, but sales by other producers were lighter. Shipments show a gain over the first half of December, but the improvement in foundry conditions is only slight, apparently being more pronounced in the case of malleable foundries engaged in railroad work. On foundry iron \$19 has become a more general Lake furnace price, although for shipments to consumers in close proximity to the furnace, \$20 is still being obtained. A leading producing interest which has been holding to \$20 for foundry iron for shipment from its Valley furnace has reduced its price to \$19.50. The Ford Motor Co. is supplying foundry iron to some consumers in this territory making flywheels for Ford cars and it is understood to be charging \$19.50, Detroit, for this iron. Prices on Southern foundry iron have again declined and this iron is now being freely offered at \$16 of 1.75 to 2.25 per cent silicon iron.

Quotations below are f.o.b. local furnace for Northern foundry iron, not including a 56c. switching charge. Other quotations are delivered Cleveland, being based on a \$1.96 freight rate from Valley points, a \$3.36 rate from Jackson and a \$6.67 rate from Birmingham.

Basic	\$20.21 to \$20.71
Northern No. 2 fdy., sil. 1.75 to 2.25	19.00 to 20.00
Southern fdy., sil. 2.25 to 2.75	23.17
Ohio silvery, sil. 8 per cent	32.86
Standard low phos., Valley furnace	33.00

Semi-Finished Steel.—The market is very dull. One sale of 250 tons of sheet bars is reported at \$29 which is the common quotation for sheet bars and slabs.

Finished Iron and Steel.—While there seems to be more business in prospect than during the latter part of last year, little has come out so far this month. The market lacks firmness and while the 1.50c., price which has held for some time on steel cars, plates and structural material is still the minimum quotation by most mills, concessions from this price have appeared. A further concession of \$2 a ton to 1.40c. has appeared on hard steel re-enforcing bars. Very little steel has been bought by the automobile companies this month. The Ford Motor Co., which usually covers about the middle of the month for the following month's requirements, is understood to have deferred its purchases. A lake shipyard has taken a small boat requiring 600 tons of steel which has been placed and one or two ore boats are still being figured on. The Port Arthur Ship Building Co., Port Arthur, Ont., has placed 4,000 tons of steel for a lake boat ordered last month by a Canadian interest. This business went to the leading interest as an export order. The agricultural implement manufacturers are displaying little activity although some small orders are coming from this source. In structural lines, local fabricators are figuring on a warehouse for the Belknap Hardware Co., Louisville, Ky., which is the only new inquiry in structural line.

Jobbers quote steel bars, 2.36c.; plates and structural shapes, 2.46c.; No. 9 galvanized wire, 3.25c.; No. 9 annealed wire, 2.75c.; No. 28 black sheets, 3.75c.; No. 28 galvanized sheets, 4.75c.; No. 10 blue annealed sheets, 3.10c.; hoops and bands, 2.96c.; cold-rolled rounds, 3.25c.; flats, squares and hexagons, 3.75c.

Wire Products.—Reports of weakness in the market are frequent and it is definitely established that a concession of 10c. to \$2.40 a keg has appeared on wire nails. Mention is made elsewhere of the decision to adopt an arbitrary differential on wire for Cleveland delivery in place of the present regular freight differential.

Sheets and Tin Plate.—The demand for sheets is rather slow and few orders are being placed for more than car lots. Many consumers are only filling in their stocks. While regular prices are being firmly held buyers are apparently skeptical about their being maintained and consequently they are not placing first quarter contracts. A weakness in tin plate has developed in that quotations have appeared based on an Ohio shipping point instead of f.o.b. Pittsburgh.

High Speed Steel.—In the absence of a demand, the market is weak and while 85c. per lb. is nominally the minimum quotation, it is evident that an inquiry of any size would bring out a 75c. price.

Coke.—There is quite a little activity in car lots of

foundry coke for prompt shipment. Prices are unchanged at \$4 to \$4.25 for standard Connellsville makes.

Bolts and Nuts.—The demand for bolts and nuts has improved, now that inventories are mostly over, but orders are generally for small lots, evidently for filling in stocks. Prices are well maintained. Rivet manufacturers are getting a fair volume of small lot business and one order for 60 tons was placed by a lake shipyard, being the first order from this source for some time. The recent establishment of prices at a lower level of 2.25c. for structural and 2.35c. for boiler rivets has not stabilized prices, as concessions of \$1 from these prices are reported.

Old Material.—The market became a little more active during the week owing to a demand from dealers who have been buying to cover against recent contracts placed by Youngstown mills for steel making scrap. There was also some demand for heavy melting steel for Massillon shipment. No further buying by consumers was reported, but some mills are expected to come into the market again around the end of the month. Some speculative buying is being done by dealers. Prices are firm on nearly all grades and there is a feeling that it would not take much of a buying movement to stiffen up the prices somewhat.

We quote per gross ton, f.o.b. Cleveland, as follows:

Heavy melting steel.....	\$12.00 to \$12.50
Steel rails, over 3 ft.....	12.50 to 13.00
Steel rails, re-rolling.....	11.00 to 11.50
Iron rails.....	12.00 to 12.50
Iron car axles.....	18.00 to 19.00
Low phosphorus melting.....	13.00 to 13.50
Cast borings.....	8.50 to 9.00
Machine shop turnings.....	8.00 to 8.25
Mixed borings and short turnings.....	8.50 to 9.00
Compressed steel.....	9.00 to 9.50
Railroad wrought.....	12.00 to 12.50
Railroad malleable.....	12.50 to 13.00
Light bundled sheet stampings.....	6.00 to 7.00
Steel axle turnings.....	9.00 to 10.00
No. 1 cast.....	15.00 to 16.00
No. 1 busheling.....	8.25 to 8.75
Drop forge flashings, over 10 in.....	7.50 to 8.00
Drop forge flashings, under 10 in.....	7.50 to 8.00
Railroad grate bars.....	12.75 to 13.00
Stove plate.....	13.00 to 13.25
Pipes and flues.....	8.50 to 9.00

Will Withdraw Differential on Wire

CLEVELAND, Jan. 17.—The freight differential of 21c. per 100 lb. on Bessemer and bright wire for Cleveland delivery will be withdrawn and in its place an arbitrary differential of 10c. or 10½c. will be established, making what would be about equivalent to using Youngstown as a basing point. This change has resulted from efforts of the Cleveland bolt and nut manufacturers who asked that Cleveland be made a basing point on bolt wire and wire rods used in their plants in order to remove the disadvantage as compared with the Pittsburgh bolt and nut makers of the 21c. freight rate from Pittsburgh to Cleveland. With the change, the Cleveland bolt and nut makers have secured half the concession they asked for on wire. No announcement as yet has been made as to what will be done in the way of fixing an arbitrary differential for Cleveland in the place of the Pittsburgh-Cleveland freight rate on wire rods, nails and some other products, but it is understood that new differentials on these products are under consideration.

Ore Producers Will Attend Washington Hearing

At a meeting of the rate committee of the Lake Superior Iron Ore Association, held Jan. 16, plans were outlined for presenting data before the Interstate Commerce Commission in connection with the commission's general investigation of railroad freight rates. F. B. Richards, M. A. Hanna & Co., H. G. Dalton, Pickands, Mather & Co., and John A. Topping, Republic Iron & Steel Co., representing ore shippers, will present statements outlining the present condition of the iron and steel industry and point out the necessity of lower rail rates on ore. Percy Sprague, traffic manager M. A. Hanna & Co., will present a brief showing old rates on ore and the percentage of increases in the present rates. The representatives of the Ore Association will appear before the Interstate Commerce Commission either Jan. 21 or 23.

Boston

BOSTON, Jan. 17.

Pig Iron.—Most eastern Pennsylvania furnaces hold to \$20 or \$20.50 furnace base with regular silicon differentials, but are getting comparatively little business in this territory. At least three furnaces, however, this week sold iron on a basis of \$19.50 for silicon 2.25 to 2.75, and even less for No. 2 plain, and secured most of the business offered. One Buffalo furnace, holding for \$20 furnace, for any grade of silicon a fortnight ago, this week sold No. 2X iron at \$19.50. Another Buffalo furnace quotes \$19 furnace base, and central Pennsylvania iron is obtainable at \$19.50 furnace base. Because furnaces are closed and have limited stocks, and because of the limited demand, it is difficult to determine what the market on Virginia iron really is. Virginia iron unquestionably can be had at \$22 furnace, which represents a decline. Alabama iron also is lower, but still not on a competitive basis in this territory with eastern Pennsylvania or Buffalo. The pig iron market in general, therefore, appears easier notwithstanding the stand taken by most eastern Pennsylvania furnaces. Sales for the week include 1,000 tons No. 2 plain, second quarter delivery, to a maker of textile machinery; 200 tons No. 2X to the American Hardware Corporation, New Britain, Conn.; 200 tons No. 2X, special analysis, to a car wheel maker; 200 tons No. 2X to a Massachusetts foundry, first quarter delivery and all eastern Pennsylvania iron, and scattering 100 ton lots Buffalo No. 2X and No. 1X, and one 200 ton lot No. 2X, first and second quarter delivery. Sales in the aggregate amount to about 2500 tons. Foundries report business as shaping up slowly.

We quote delivered at common New England points as follows, having added to furnace prices \$4.66 freight from eastern Pennsylvania, \$5.16 from Buffalo, \$6.58 from Virginia and \$10.66 from Alabama.

East. Penn. silicon 2.25 to 2.75.....	\$21.96 to \$25.06
East. Penn. silicon 1.75 to 2.25.....	21.56 to 24.56
Buffalo, silicon 2.25 to 2.75.....	21.16 to 26.96
Buffalo, silicon 1.75 to 2.25.....	21.16 to 25.16
Virginia, silicon 2.25 to 2.75.....	29.08 to 29.78
Virginia, silicon 1.75 to 2.25.....	28.58 to 29.08
Alabama, silicon 2.25 to 2.75.....	27.16 to 27.66
Alabama, silicon 1.75 to 2.25.....	26.66 to 27.16

Warehouse Business.—Local warehouse prices on iron and steel have been revised once more. This time steel half rounds, ovals, half ovals and bevels are 83½c. per 100 lb. base higher; steel bands 15c. to 30c., blue annealed sheets 25c., cold-rolled steel 20c., and most of the other kinds carried 16½c. lower. No change is noted in black and galvanized sheets. Broken stocks of certain kinds of iron and steel are beginning to develop. For the first time since the week before Christmas, a real improvement in the demand is noted. The market is not active, however. Some firms quote stove bolts at 75 and 10 per cent discount and others 80 per cent. Movement of all kinds of bolts and nuts out of stock is better. Local chain quotations have been reduced to conform with a cut of \$3 to \$10 a ton in manufacturers' lists. Most everybody has marked up cap screws 5 per cent.

Jobbers now quote: Soft steel bars, \$2.55½, per 100 lb. base flats, \$3.05½; concrete bars, stock lengths, \$2.55½; structural angles and beams, \$2.65½; plates, \$2.65½ to \$2.85; tire steel, \$3.85 to \$4.25; open hearth spring steel, \$4.50; crucible spring steel, \$11.50; bands, \$3.15½ to \$3.53; hoop steel, \$3.15½; cold-rolled steel, \$2.55 to \$4.05; tor. calk steel, \$8; refined iron, \$2.55½, per 100 lb. base; best refined iron, \$4.25; Wayne iron, \$5.50; Norway iron, \$5.50; No. 10 blue-annealed sheets, \$3.48 per 100 lb. base; No. 28 black sheets \$1.50; No. 28 galvanized sheets, \$5.50.

Finished Iron and Steel.—The Boston & Albany Railroad has purchased \$50,000 to \$55,000 worth of frogs and switches, 5,000 kegs of spikes, 2,700 kegs of track bolts and a miscellaneous lot of maintenance equipment. No sizable tonnages of structural steel were placed this week, but prospects are more numerous and large awards are expected within the next fortnight. On one 400-ton Boston job, as low as \$55 delivered on the work, was bid, but a change in specifications has delayed an award. At least one mill has accepted small shape business at 1.45c. Pittsburgh base, and bars have been sold in this territory as low as 1.45c., but generally speaking mills are maintaining 1.50c., and occasionally securing a little better. Rail business from the smaller New England railroads is expected shortly.

The Worcester, Mass., works American Steel & Wire Co., production is 55 to 60 per cent of normal, or 15 to 20 per cent above the 1921 average. Approximately 5,000 are employed.

Coke.—More small consumers of by-product foundry coke have contracted for first half requirements at price ruling on date of shipment, but actual shipments from New England ovens show little, if any, improvement, because of the low operating ratio of the average foundry in this territory. Both the New England Coal & Coke Co. and the Providence Gas Co. are quoting foundry coke on a basis of \$10.40 delivered where the local freight does not exceed \$3.40.

Old Material.—The Crompton & Knowles Loom Works, Worcester, Mass., is in the market for 2,000 tons No. 1 machinery cast for second, third and fourth quarter delivery at or about \$18 delivered, and will pay spot cash. Because of limited supplies, few dealers want to sell for delivery so far ahead. One 100-ton lot of No. 1 machinery, prompt delivery, sold this week at \$18.25 delivered Massachusetts point. Most owners of textile machinery scrap want \$18.50 to \$19 delivered. Dealers continue to report more or less invisible buying of machinery cast by foundries from local or nearby yards, but the big market is quiet. Eastern Pennsylvania interests are in the market for a round tonnage of skeleton scrap at \$9.75 delivered, but has had no offers, and efforts to buy forge fire scrap and stove plate, eastern Pennsylvania delivery, at prices under those quoted here, have been unavailing. Dealers are offering \$8.10, including tax, f.o.b. New England shipping point, for chemical cast iron borings, but securing little. In fact, both kinds of cast iron borings are in limited supply and the strongest thing in the old material price list to-day.

The following prices are for gross ton lots delivered commencing points:

No. 1 machinery cast	\$17.50 to \$18.50
No. 2 machinery cast	15.50 to 16.50
Stove plate	15.00
Railroad malleable	13.00 to 13.50

The following prices are offered per gross ton lots f.o.b. Boston rate shipping points:

No. 1 heavy melting steel	\$8.00 to \$8.25
No. 1 railroad wrought	10.50 to 11.00
No. 1 yard wrought	9.50 to 10.00
Wrought pipe (1-in. in diam. over 2 ft. long)	7.00 to 7.25
Machine shop turnings	3.50 to 4.00
Cast iron borings, rolling mill	7.00 to 7.50
Cast iron borings, chemical	7.50 to 8.00
Blast furnace borings and turnings	3.50 to 3.75
Forged scrap and bundled skeleton	1.50 to 5.00
Street car axles and shafting	10.50 to 11.00
Car wheels	11.50 to 12.00
Re-rolling rails	10.00 to 10.50

Cincinnati

CINCINNATI, Jan. 17.

Pig Iron.—There was very little change in the market during the week but the prospects, in the opinion of most sellers, are more promising. In the southern section, on very little activity, the price has receded another 50c. a ton, and is now generally quoted at \$16, Birmingham. One Southern furnace, with a freight advantage over Birmingham, is quoting \$16, furnace, making the delivered price in Cincinnati \$20.12. This can hardly be considered the market on Southern iron, however. There are evidences that Southern prices are firming up, as last week furnaces were turning down without consideration all offers under \$16. The feature of the market is undoubtedly the inquiry of the American Brake Shoe Co., which operates one of its plants near Cincinnati, for 2500 tons a month for 20 months, delivery to commence May 1. A Cincinnati melter is inquiring for 1000 tons of foundry iron for first half shipment and a Louisville melter is in the market for 500. A Dayton melter is inquiring for 250 and the American Car & Foundry Co. a similar amount for its Huntington, W. Va., plant. A car wheel manufacturer is inquiring for 200 tons of charcoal for its Louisville plant. Other inquiries are mostly for carload lots, though occasionally 100 tons are specified. Sales include 250 tons of Southern iron to a Southern Railroad, and a similar tonnage to an Indiana manufacturer, both at \$16, Birmingham. A local melter bought 150 tons, another 100 tons, and a nearby melter 100 tons of mal-

leable. Some sales of ferroalloys were also reported at regular schedules. Several hundred tons of Southern iron, in small lots, were disposed of by the furnace mentioned above, on the basis of \$15.60, Birmingham.

Based on freight rates of \$4.50 from Birmingham and \$2.52 from Ironton, we quote f.o.b. Cincinnati:

Southern coke, sil. 1.75 to 2.25 (base)	\$20.50
Southern coke, sil. 2.25 to 2.75 (No. 2 soft)	21.00
Ohio silvery, 8 per cent sil.	32.02
Southern Ohio coke, sil. 1.75 to 2.25 (No. 2)	22.02
Basic, Northern	22.02
Malleable	22.52

Finished Material.—There has been little improvement in the market for finished material since the first of the year, although from reports being received the indications are that fair business will develop around Feb. 1, when inventories will be completed and jobbers and manufacturers will have a chance to see how their stocks stand. The largest order reported during the week was one for 600 tons of structural shapes for a highway bridge being erected in the Cincinnati district. Several orders for 100 tons of reinforcing bars were also booked, but with these exceptions most business was confined to carload lots. The sheet market is quiet, although there is one inquiry out for 150 tons of galvanized, which is expected to close this week. The L. & N. Railroad will close during the week on 3500 tons of splice bars and 11,300 kegs of track spikes. Competition for this order is reported to have been very keen and it is expected that some low prices will develop. There have been no changes in prices of steel. Bars, shapes, and plates are still quoted at 1.50c. and black and galvanized sheets at 3c. and 4c. respectively. The structural field is looking up nicely and a number of new projects will come up shortly. The National Biscuit Co. has acquired property on Hunt Street, Cincinnati, on which will be erected a seven-story steel building, estimated to cost with equipment, \$2,500,000. Plans for this building are now being completed by John P. Zimmerman, New York, architect for the company. The directors of the Cincinnati Terminal Warehouse Co., which has an option on the plant of the Fay & Egan Co., decided at a meeting recently, to notify the Fay & Egan Co. to vacate the premises, as it is the intention to tear down the buildings preparatory to the construction of a terminal warehouse to cost \$2,500,000. Taking up of the option on this property is expected to hasten the erection of the new plant of the Fay & Egan Co., plans for which are now being prepared. The county commissioners of Hamilton and Claremont counties, have decided to build a suspension bridge over the Little Miami River near Cincinnati, in which 300 tons of steel will be involved. A new hotel is also proposed for Columbus, Ohio, to have 1000 rooms and a motion picture theatre. An addition to the Longview Hospital for the Insane will likely go ahead this spring, plans having been posted by Elzner & Anderson, who will receive bids up to Feb. 13. The addition will be, of course, concrete and will cost approximately \$300,000. The Pollak Steel Co. is asking bids on an addition to its Chicago plant involving 200 tons of structural steel. Plans for the Indianapolis Athletic Club, which it was expected would be ready by Jan. 16, will be sent out about Feb. 1. R. C. Daggett, Indianapolis, is the architect. The plans for the Wilde Bank Building, Indianapolis, have not been completed, but will be out shortly. There will be very little change in plant operations during the week. The jobbing mills of the American Rolling Mill Co. will be idle, although the Eastside works will be running at about 60 per cent. The Zanesville Works are continuing on a 50 per cent basis. Whitaker-Glessner Works at Portsmouth, is on a 40 per cent basis and improvement is being shown at the plant of the Newport Rolling Mill Co. at Newport, Ky., where a strike is in progress. The Louisville & Nashville Railroad has closed for 11,700 kegs of spikes with a Pittsburgh mill at \$2.15 per keg.

Warehouse Business.—During the past few days, local jobbers report a very healthy improvement in business and the sales made are entirely satisfactory. Local jobbers have reduced prices on steel bars, shapes, plates, cold rolled, and hoops and bands, \$3 a ton. Prices on sheets remain unchanged. Prices on wire

products were recently reduced \$3 a ton. The new prices follow:

Iron and steel bars, 2.75c. base; hoops and bands, 3.35c. base; shapes and plates, 2.85c. base; reinforcing bars, 2.82 1/2c. base; cold rolled rounds, 1 1/2 in. and larger, 3.50c. base; under 1 1/2 in. and flats, squares and hexagons, 4c. No. 10 blue annealed sheets, 3.60c.; No. 28 black sheets, 4.25c.; No. 28 galvanized sheets, 5.25c.; wire nails, \$3.00 per keg base; No. 9 annealed wire, \$2.85 per 100 lb.

Coke.—Some activity in the coke market was reported and some contracting is going on, but usually in small amounts. A local sales agent booked one order for 2000 tons, one for 1500, and one for 1200, for delivery during the year. Prices are unchanged.

Old Material.—Very little activity is reported in the scrap market. A pipe company in this district is reported to have bought some cast scrap at the current market, but with this exception the market was quiet, and ruling quotations are unchanged.

We quote dealers' buying prices, f.o.b. cars

Per Gross Ton	
Bundled sheets	\$3.50 to \$4.00
Iron rails	12.00 to 12.50
Relaying rails, 50 lb. and up	25.00 to 26.00
Re-rolling steel rails	10.50 to 11.00
Heavy molting steel	9.00 to 9.50
Steel rails for molting	9.00 to 9.50
Car wheels	12.00 to 13.00
Per Net Ton	
No. 1 railroad wrought	8.50 to 9.50
Cast borings	3.00 to 3.50
Steel turnings	2.00 to 2.50
Railroad cast	12.00 to 12.50
No. 1 machinery	13.50 to 14.50
Burnt scrap	7.00 to 8.00
Iron axles	15.50 to 16.50
Locomotive tires (smooth inside)	9.50 to 10.00
Pipes and flues	4.00 to 4.50

Philadelphia

PHILADELPHIA, Jan. 17.

A slight improvement in demand for steel and pig iron has developed within the past week, but the change for the better is so small that it is yet too early to say whether it is the beginning of a gradually broadening business. Singularly, the betterment has been noted mostly in plates, which have suffered from lack of demand more than any steel product. One Eastern plate mill last week did the best business in many weeks. The Alan Wood Iron & Steel Co. is able this week to start its plate mill, which has been idle for some time, on a two or three weeks' schedule. In pig iron the better demand is not notable, but is indicated chiefly by a larger number of small inquiries. The tendency of all consumers to buy in very meager lots is probably due partly to the imminence of the Interstate Commerce Commission hearings on iron and steel freight rates, scheduled to be held next Saturday and Monday in Washington. That a possible reduction in freight rates is not considered by all buyers, however, is shown by a few inquiries which have come out for second quarter iron requirements. In fact, one or two second quarter sales have been made.

Although pig iron prices remain firm, steel business is being done very largely at the expense of prices. Some of the Eastern steel companies are adhering rigidly to 1.50c., Pittsburgh, on plates, shapes and bars, but 1.40c., Pittsburgh, has been done on plates, when the tonnages were attractive, and 1.45c. is comparatively easy on all three products. Bar iron is also offered now at 1.45c., Pittsburgh, a reduction of \$1 a ton. Shafting and screw stock is weak at 1.90c., Pittsburgh, with reports of sales as low as 1.75c. Sheets are holding firmly, except that some plate mills are offering heavier gages of blue annealed at \$1 or \$2 a ton below the 2.25c. quotation of regular blue-annealed makers.

The Interstate Commerce Commission has ordered an increase of 20c. per net ton in the freight rate on finished steel from Pittsburgh to Philadelphia, the new rate being 0.36c. instead of 0.35c. per lb. The Baltimore rate, which was 0.335c. per lb., is increased to 0.35c. The change is made to re-establish the relationship which existed in rates from Pittsburgh to Eastern points prior to the 40 per cent rate advance in August, 1919.

Pig Iron.—A few inquiries for foundry iron for second quarter constitute the only new feature of the

local pig iron market. While some furnaces are still averse to selling that far ahead, others are willing to quote, and have done so, their prices being practically the same as those for first quarter. A different situation exists, however, in regard to quoting on 75,000 tons of iron required for the cast iron segments for the New York-New Jersey vehicular tunnel. Practically all of the Eastern furnaces have been asked by various contractors to bid on the iron, but with one or two exceptions the furnaces are not willing to do so, at least not on a basis that would be satisfactory to the bidding contractors. The deliveries will extend over two years, at about 3000 tons a month, and some furnace operators fear they are standing too great a chance of loss to take business over such a long period at to-day's prices. Furnaces in this district are adhering to \$20, furnace, for No. 2 plain, \$20.50 for No. 2X and \$21 for No. 1X, except that concessions of about 50c. a ton have been made in some instances to equalize freight rates, the same furnaces, however, quoting their regular prices where they encounter no freight rate disadvantage. A northern New Jersey melter bought 500 tons of No. 2X at \$21, delivered, but the freight rate was only 70c. A New England melter is reported to have bought 1000 tons from an eastern Pennsylvania furnace for second quarter shipment. An inquiry for 800 tons of foundry grades for second quarter is in the market, also an inquiry for 250 to 500 tons of gray forge. Most of the current inquiries are for small lots, but the number of these inquiries is greater than in the week previous.

The following quotations are, with the exception of those on low phosphorus iron, for delivery at Philadelphia, and include freight rates varying from 84 cents to \$1.01 per gross ton:

East Pa. No. 2 plain, 1.75 to 2.25 sil.	\$20.84 to \$21.26
East Pa. No. 2X, 2.25 to 2.75 sil.	21.31 to 21.76
Virginia No. 2 plain, 1.75 to 2.25 sil.	21.21 to 21.71
Virginia No. 2X, 2.25 to 2.75 sil.	21.71 to 22.21
Basic delivery eastern Pa.	20.25
Gray forge	20.50 to 21.00
Malleable	23.00 to 24.00
Standard low phosph. (f.o.b. furnace)	30.00
Copper bearing low phosph. (f.o.b. furnace)	28.00

Ferroalloys.—The Jones & Laughlin Steel Co., Pittsburgh, has bought 20,000 tons of Brazilian manganese ore at 22c. per unit, Atlantic seaboard, and will make its own ferromanganese. This is the first important sale of manganese ore in some time. Ferromanganese is still quoted by Eastern producers and the British selling agents at \$58.35, seaboard. A steel company in the Chicago district imported British alloy at \$58.35, New Orleans, the delivered price at its mill being below the Steel Corporation quotation of \$60, Pittsburgh. Spiegeleisen is quoted at \$25, furnace, and some sales have been made below that figure.

Rails.—The Southern Railway will receive bids up to Friday, Jan. 20, on 26,600 tons of 85-lb. rail and 8500 tons of 100-lb. rail; also on 18,000 rail joints.

Billets.—Open-hearth re-rolling billets are now quoted freely at \$28, Pittsburgh, and forging billets at \$32, Pittsburgh. There are few sales.

Plates.—Boiler manufacturers on the Great Lakes have placed orders in the past week for boiler plate for stock, it probably being their intention to build boilers now for the spring fitting out of lake vessels. This business has helped out one Eastern plate mill to a considerable extent, the company counting its last week's business as the best in some time. Plate prices are weak, and though most of the mills quote 1.50c., Pittsburgh, some adhering rigidly to this price, others have accepted attractive lots as low as 1.40c., while 1.45c. is rather a common figure on current business. The Cramp shipyard has inquired for about 6000 tons of plates.

Structural Material.—The largest structural job awarded in Philadelphia recently is the Museum of Art building, requiring 2700 tons of steel, which was awarded to the American Bridge Co. Plain material is quoted at 1.50c., Pittsburgh, but this price is sometimes shaded \$1 or \$2 a ton on attractive business.

Bars.—To meet quotations of 1.45c. on steel bars, now a rather common figure, iron bar makers have also reduced their price to 1.45c., Pittsburgh. A slightly better demand for steel bars has been noted in the

past week. Cold-finished bars are quoted at 1.90c., Pittsburgh, but this has been shaded, it is reported, as much as \$3 a ton.

Sheets.—Except for slight cutting by plate mills on heavy blue annealed sheets, the sheet prices appear to be held firmly. The concessions on blue annealed are usually \$1 or \$2 a ton. Regular makers of blue annealed adhere to 2.25c., Pittsburgh, and black and galvanized are firm at 3c. and 4c., respectively, base, Pittsburgh.

Bolts, Nuts and Rivets.—About 45,000 kegs of bolts will be required for the New York-New Jersey vehicular tunnel. Bids have been asked for by contractors who are submitting tenders on the work. The Cramp shipyard is inquiring for 325 tons of rivets and 330 tons of high tensile steel material. The Philadelphia & Reading Railroad has bought 500 kegs of structural rivets at 2.05c., Pittsburgh, a new low figure. It also bought 300 kegs of hot-pressed nuts and is in the market for a quantity of bolts.

Warehouse Business.—We quote steel out of stock from Philadelphia warehouses as follows, prices including delivery within the city of Philadelphia.

Soft steel bars and small shapes, 2.50c.; iron bars (except bands), 2.90c.; round edge iron, 2.80c.; round edge steel, iron finish, $1\frac{1}{2}$ x $\frac{1}{2}$ in., 2.95c.; round edge steel finished, 3.70c.; tank steel plates, $\frac{1}{4}$ -in. and heavier, 2.75c.; tank steel plates, $\frac{3}{16}$ -in., 2.925c.; blue annealed steel sheets, No. 10 gage, 3.50c.; light black sheets, No. 28 gage, 4c.; galvanized sheets, No. 28 gage, 5c.; square twisted and deformed steel bars, 2.65c.; structural shapes, 2.60c.; diamond pattern plates, $\frac{1}{4}$ -in., 4.60c.; $\frac{3}{16}$ -in., 4.785c.; 1-in., 4.90c.; spring steel, 4.10c.; round cold-rolled steel, 3.25c.; squares and hexagons, cold rolled steel, 3.75c.; steel hoops, No. 13 gage and lighter, 3.25c.; steel bands, No. 12 gage to $\frac{3}{16}$ in., inclusive, 3.10c.; iron bands, 3.90c.; rails, 2.75c.; tool steel, No. 1, Norway iron, 5c.; toe steel, 4.50c.

Old Material.—Scrap prices are largely nominal, there being few transactions. An eastern Pennsylvania steel company has bought 1000 tons of heavy melting steel at \$11.50, delivered, and another plant has taken 500 tons of a slightly better quality at \$12, delivered. A Delaware steel plant has bought 500 tons or more of cast iron borings at \$12.50, delivered. We quote re-rolling rails at \$15.50 to \$16, delivered. Quotations for delivery at consumers' works in this district are as follows:

No. 1 heavy melting steel.....	\$11.50 to \$12.00
Scrap rail	11.50 to 12.00
Steel rails, re-rolling	15.50 to 16.00
No. 1 low phos., heavy (0.01 and under)	17.00 to 18.00
Car wheels	16.50 to 17.00
No. 1 railroad wrought	14.50 to 15.00
No. 1 yard wrought	12.00 to 12.50
No. 1 forge fire	10.00 to 10.50
Bundled sheets (for steel works)	9.50 to 10.00
No. 1 busheling	11.00 to 12.00
No. 2 busheling	9.00 to 10.00
Turnings (short shoveling grade for blast furnace use)	9.00 to 9.50
Mixed borings and turnings (for blast furnace use)	9.00 to 9.50
Machine-shop turnings (for rolling mill and steel works use)	9.00 to 9.50
Heavy axle turnings (or equivalent)	9.50 to 10.00
Cast borings (for steel works and rolling mills)	12.00 to 12.50
Cast borings (for chemical plants)	13.50 to 14.00
No. 1 cast	16.50 to 17.00
Railroad grate bars	14.00 to 14.50
Stove plate (for steel plant use)	14.00 to 14.50
Railroad malleable	13.50 to 14.00
Wrought iron and soft steel pipes and tubes (new specifications)	11.50 to 12.00
Iron car axles	No market
Steel car axles	17.00 to 18.00

San Francisco

SAN FRANCISCO, Jan. 11.

Pig Iron.—Since the pre-holiday period, this market has continued dull, and not yet is there an apparent sign of substantial recovery in demand. No new business of any consequence has developed, with the exception of an inquiry for 350 tons of foundry pig iron, which the Southern Pacific Co. has closed. This material is of standard quality, 1.75 to 2.25 silicon. It appears that buyers had pretty liberally stocked during November and December, when prices were attractive, and now with no outstanding demand for fabricated products, have no occasion to purchase iron in conspicuous quantities. A steady business is being done for consumptive purposes, but this involves small amounts. The market appears about steady at prevailing prices, which are in the neighborhood of \$27

to \$30, ex ship, San Francisco, for the various qualities. The steamer Theodore Roosevelt recently delivered about 2000 tons to this port from Belgian shipping points, the iron having been sold some time ago. It is reported that there is a little demand for pig iron at Los Angeles, and Portland is said to be in the market for approximately 1000 tons.

Cast Iron Pipe.—After the period of good activity in November and the early part of December, business in pipe has quieted down, both from municipal and private sources. New business has been very light since Christmas. There has also been a slight softening tendency in prices, the market being estimated at around \$32 base, with lower figures occasionally being reported. The city of Calexico, Cal., is in the market for 70 tons of pipe, and Monterey Park near Los Angeles has voted \$225,000 bonds for a water system in which some pipe will be used. Newport Beach irrigation district will be authorized to call for bids on Jan. 11, to be received later, for the construction of a pipe line 9800 lineal ft. of cast iron 12-in. pipe.

Finished Iron and Steel.—Thus far, the new year has not brought any indications of betterment in the Coast steel business. Possibly it is a little early yet to expect much, as jobbers and consumers are still concerned with inventories. There seems to be a hopeful feeling in the trade, it being the expectation that a few weeks will witness a marked improvement in demand. At the beginning of the year, the larger steel interests announced a 10c. reduction in prices of reinforcing and merchant bars, the former now being quoted at \$2.75, San Francisco, while the latter is held at \$2.65. There has been little interest in other lines, and prices are still unsettled, but appear to be steadying. Galvanized sheets are around 4c., Pittsburgh, and plates range from \$1.70 to \$1.75, tidewater. A few small jobs are pending, which will call for small quantities of mixed materials, and there is also reported a little inquiry for rails, but the most conspicuous prospect is the State Harbor Commission's warehouse to be erected at San Francisco, the bids for materials opening Jan. 12. For the first unit between 800 and 1000 tons of reinforcing bars will be needed.

Coke.—There is a fair business in coke on the Coast at present, the most notable single order coming from the Southern Pacific Co., which has just closed for 600 tons of foundry material. Smelters continue to be steady takers, and it is reported that about 2000 tons are en route from foreign points. Estimates place the delivery of English coke to smelters, covering a past period of three months, at approximately 4500 tons. The current market price on foreign material is ruling about \$18 ex ship, San Francisco.

Old Material.—Cast iron scrap is said to be scarcer and prices have advanced a little, as high as \$23 a net ton, delivered at foundry, being heard. Movement is not considerable, however, the demand being confined to small lots. Heavy melting steel is quite liberally offered at approximately \$10 a gross ton, but there is very little consumptive demand, as rolling mill activity is at a minimum. The supply on the Coast has been augmented somewhat by the scrapping of the cruiser Brooklyn.

The Barrett Adding Machine Co. has sold its business, patents and other assets to the Lanston Monotype Machine Co., Philadelphia. The purchasing company manufactures the monotype, a composing machine for printers. The Barrett machine, it is pointed out, can be manufactured by machines, methods and men identical with those necessary to the manufacture of the monotype keyboard.

The regular monthly meeting of the Cleveland Purchasing Agents' Association will be held Thursday, Jan. 19, at the Hotel Statler, Cleveland. The speakers of the evening will be C. W. Chabot and W. S. Epply of the Hammermill Paper Co., Erie, Pa.

The Pennsylvania Equipment Co., 1420 Chestnut Street, Philadelphia, is in the market for 50 16 to 20-cu. yd. capacity second-hand dump cars.

EXPORT ACTIVITY SPREADS

Inquiries Reported From South America and Mediterranean Markets—Chili Asks Railroad Equipment Bids

NEW YORK, Jan. 17.—Export sales have slightly diminished in volume, but exporters to other markets than the Far East report a renewed interest from South America and Mediterranean countries for finished material. Despite numerous reports to the contrary, German competition is still handicapped by inability to supply the demand for iron and steel, but there are prospects that many German mills may have cleared their books by the second quarter of the year. The New York representative of a large German interest was recently offered an allotment of heavy rails at the rate of 1000 tons per month, beginning with a May shipment. This offer was made with the provision that an export license be obtainable at that time from the government. Rails and equipment are at present greatly needed by the German railroads and the government may not be inclined to permit export shipments of this material. Part of the present congestion of transportation lines in Germany is said to be caused by the large number of empty freight cars distributed over the lines and which cannot be properly handled.

The inability of German agents in the United States to obtain material, except in unusual circumstances, is marked. Recently the representative of a large interest inquired of other German representatives for about 200 tons of billets, but thus far has been unable to obtain them from this source. An extremely satisfactory pipe inquiry from the South is reported to have been lost by several German representatives because of inability to obtain material.

German competition in machine tools and machinery is reported to be stronger and some firms

are seeking representation in the United States. It is reported from Spain that the Minister of War has awarded a contract for machine tools and other equipment for an arsenal to the value of about 40,000,000 pesetas (about \$6,000,000) to German manufacturers. The arsenal is believed to be near Madrid and the equipment is in line with the Spanish Government's intention of prosecuting the Moroccan campaign with renewed vigor. There were some bids submitted by American sellers of machine tools.

The Canadian Pacific Railway, it is said, is considering the appropriation of about \$25,000,000 for road extensions and other improvements during the current year, most of the work to be done on western lines.

The Waterloo Chemical Works, Sydney, New South Wales, will probably establish a plant at Hobart, Tasmania, for the electrolytic manufacture of pigments from scrap iron, according to the trade supplement of the *Times*, London. The removal of the company's plant from Sydney to Hobart, will be undertaken because of the cheap hydroelectric power available at the latter place.

A group of hydroelectric companies is contemplated near St. Etienne and Grenoble in France, the group to operate under the name of the Societe de Transport d'Energie du Centre. Four main lines of transmission will be constructed, two within the next four years. They will be of 50 cycles, 10,000 to 150,000 volts.

The Department de Materiales y Almacenes, Alameda Station, Santiago, Chile, has issued specifications for bids on the following equipment for the Chilean State Railways: Cars (23), boilers, electric machinery, lamps, etc., tin and lead in ingots, bars, iron and steel tubes, bids to be opened Feb. 4, in Santiago. On Feb. 16, bids will be opened in Santiago on a tonnage of fish-plates and chairs for rails. Bids have been placed in the hands of British sellers through the British Legation in Chile and have been issued to American makers through the office of the Chilean State Railways, 141 Broadway, New York.

British Iron and Steel Market

Drastic Price Cuts in Pig Iron and in Steel Have Virtually Stopped Continental Competition —Sheets and Tin Plate Weaker

(By Cable)

LONDON, ENGLAND, Jan. 17.

Cleveland pig iron prices have been reduced. Two additional furnaces have been blown in. The position looks brighter, as there is a fair amount of inquiry for both home and export business. Continental competition has now virtually ceased. Hematite is more active, as Wales and Sheffield are buying. There is some export inquiry, for which iron makers are competing keenly. Prices are falling.

Foreign ore is quiet. Bilbao Rubio is held at 26½s. (\$5.59) ex-ship, Tees. Germany is negotiating for large Newfoundland contracts.

Durham coke is weak.

Cheap sellers of English finished steel have shown an inclination to stiffen prices as their order books fill up. Most English makers of plates and angles refuse concessions. Scottish works, generally, are resuming operations this week.

Continental business is slow, owing to delays in shipments. Belgian merchant bars are quoted at £7 10s. to £7 15s. (1.41 to 1.46c. per lb.) f.o.b., for March and April delivery. Belgian ¼-in. plates are being held at £8 (1.52c. per lb.) f.o.b., March and April. Belgian beams are quoted at £9 14s. (1.83c. per lb.) delivered, Midlands.

German ¼-in. plates are quoted at £7 15s. to £8 (1.46 to 1.52c. per lb.) f.o.b., March and April shipment.

German wire rods are held at £8 15s. (\$36.93) f.o.b., for March and April.

Continental basic pig iron is not quoted. Foundry pig iron is held at 100s. (\$21.10) f.o.b.

Tin plate in prompt position is easier, due to the fall in price of sheet bars. As the demand is not sufficient to absorb current output, some mills have already ceased rolling. There is a fair export business. Japan and the Far East are inquiring. Domestic buyers are purchasing odd sizes.

Galvanized sheets are weaker. There is some demand from India, South America and the Far East, but prices are still above buyers' ideas.

France is buying good quantities of black sheets. The Far East is inquiring, but little business is moving.

We quote per gross ton, except where otherwise stated, f.o.b. maker's works, with American equivalent figured at \$4.22 per £1 as follows:

Durham coke, delivered..	£1 5s. to £1 7s.	\$5.28 to \$5.70
Cleveland No. 1 foundry..	4 15	20.05
Cleveland No. 3 foundry..	4 10	18.99
Cleveland No. 4 foundry..	4 7½	18.46
Cleveland No. 4 forge....	4 10	18.99
Hematite	7 0*	29.54
East Coast mixed.....	4 15 to 4 17½	20.05 to 20.57
Perronmanganose	15 0 & 14 10*	63.30 & 61.19*
Kalls, 60 lb. and up.....	8 0 to 9 10	33.76 to 40.09
Billets	7 10 to 7 15	31.65 to 32.71
Sheet and tin plate bars..	7 5 to 7 7½	30.60 to 31.12
Welsh	4 06 to 4 17	4.06 to 4.17
Tin plate, base box.....	0 19¼ to 0 19½	C. per lb.
Ship plates	9 0 to 10 10	1.70 to 1.98
Boiler plates	12 10 to 14 0	2.35 to 2.64
Tees	9 10 to 11 0	1.79 to 2.07
Channels	8 15 to 10 5	1.65 to 1.93
Beams	8 5 to 10 0	1.55 to 1.88
Round bars, ¼ to 3 in....	10 10	1.98
Galvanized sheets, 24 g..	16 0 to 16 5	3.01 to 3.06
Black sheets	13 0	2.45
Steel hoops	12 0 & 12 5*	2.26 & 2.31*
Cold rolled steel strip, 20 g.	24 5	4.57

*Export price.

PERSONAL

Roland Gerry, a director of the Jones & Laughlin Steel Co., and manager of sales of the cold-rolled department, has been advanced to the position of special



ROLAND GERRY



WILLIAM B. TODD

sales representative of the company for the United States and Canada, effective Feb. 1. Mr. Gerry will be succeeded by William B. Todd, at present vice-president of the Union Drawn Steel Co., Beaver Falls, Pa. Mr. Gerry has been with the company 41 years, rising through the sales department in successive grades to the new and responsible position he is about to occupy. Mr. Todd has been with the Union Drawn Steel Co. for 20 years, having entered its employ through the mill office in 1901 and been advanced through various departments to the vice-presidency. Mr. Todd attended the public schools of Beaver Falls and later Geneva College, a member of the following clubs and associations in Beaver Falls, Pittsburgh, Philadelphia and New York: The Tamaque Club, the Kiwanis Club, the Union Club, the Traffic Club, the Beaver Valley Club, of which he is president; the Society of Automotive Engineers, American Iron and Steel Institute, secretary of the Manufacturers Association of Beaver County and a member of the executive committee of the Pennsylvania Manufacturers Association.

George H. Mueller has become associated with the Pawling & Harnischfeger Co., Milwaukee, Wis., manufacturer of electric cranes, machine tools and excavating machinery. For a time Mr. Mueller will devote his attention to the study of the company's sales promotion and organization problems, after which he will take over the direction of the company's sales department as general sales manager. Mr. Mueller is an engineer and a graduate of Purdue and Cornell universities. For about five years he was identified directly and indirectly with the Link Belt Machinery Co., Chicago, as engineer, salesman, and district representative. In 1906 he became connected with the Jeffrey Mfg. Co., Columbus, Ohio, with which organization he was chief engineer, assistant sales manager, and New York manager, over 11 years. In the early part of 1917 he joined the Curtiss Aeroplane & Motor Corporation, Buffalo, where he served as managing engineer during the war. In 1919 he became identified with the J. I. Case Plow Works Co., Racine, Wis., as manager of service. Just before joining the Pawling & Harnischfeger organization Mr. Mueller was receiver for a plant manufacturing gas engines and gas engine-driven machinery.

F. M. Feiker, who went to Washington eight months ago as assistant to Secretary of Commerce Hoover on leave of absence from the McGraw-Hill Co., New York, has resigned, the Department of Commerce announces. Mr. Feiker has been appointed a special agent of the Bureau of Foreign and Domestic Commerce to continue in a consulting capacity the work that he has been

doing in reorganizing the work of the department in its contacts with business.

O. H. Wharton, vice-president in charge of sales and also a director the Crucible Steel Co. of America, has resigned.

J. N. Klock has been elected president of the Auto Machine Co., Holland, Mich.; W. J. Banyon, vice-president; H. S. Gray, secretary; R. C. Eisley, treasurer and general manager.

C. R. Scarborough, New York, president Home Sewing Machine Co., Orange, Mass., and Harvey S. Dawley, treasurer, have retired, and have been succeeded by DeForest Candee.

C. A. Pfeffer has resigned as president of the Saxon Motor Car Co., Detroit, with which organization he has been connected for three years.

J. R. Blakeslee, president Ajax Mfg. Co., forging machinery, Cleveland, has sailed for Europe on a two months' business trip.

Henry B. Plumb, New York, treasurer Eagle Lock Co., Terryville, Conn., has been elected president of that company to succeed his brother, the late Rollin J. Plumb.

Robert H. Spahr, director of education Winchester Repeating Arms Co., New Haven, Conn., has been made instructor in foremanship of the Springfield, Mass., division, Northeastern University.

John D. Hibbard has resigned as commissioner of the National Metal Trades Association, with headquarters at Chicago. The resignation was accepted by the



HOMER D. SAYRE



JOHN D. HIBBARD

executive committee at the request of Mr. Hibbard, who desired to be relieved of the responsibilities of the office at this time. He has been commissioner since December, 1912, when he succeeded Robert Wuest. During his term of office the membership of the association has grown from 732 to 1013. Mr. Hibbard will continue to be identified with the association in an advisory capacity. Homer D. Sayre, secretary, has been appointed commissioner to succeed Mr. Hibbard. A graduate of the law school of DePaul University, Chicago, Mr. Sayre has been with the National Metal Trades Association in various positions since March, 1907. Louis W. Fischer has been appointed secretary to take the place made vacant by Mr. Sayre's promotion. Mr. Fischer has been with the association for three years and prior to that had both legal and business training. A graduate of the law school of DePaul University, Chicago, he was for six years assistant to the judge of the Appellate Court for the First District of Illinois, at Chicago.

Charles E. Stuart, secretary and treasurer Central Steel Co., Massillon, Ohio, has been elected president of the Massillon Chamber of Commerce. Among other new officers of the chamber are E. H. Nelson, general manager Griscorn-Russell Co., who was named first vice-president, and E. H. Birney, president Peerless Drawn Steel Co., who was elected second vice-president.

C. C. Upham, formerly vice-president Diebold Safe

& Lock Co., Canton, Ohio, has been elected chairman of the board of directors of that company and in his new capacity has assumed active management of the company's affairs.

Roy D. Tyler, a specialist on indoor transportation systems, became associated with the Standard Conveyor Co. of North St. Paul, Minn., recently. For seven years he had been with Montgomery Ward & Co. as engineer of construction and equipment of all plants and general superintendent of the Chicago plant.

H. W. Cross, formerly of the General Electric Co., has assumed management of the New England office at 53 State Street, Boston, of the C. H. Wheeler Mfg. Co., condensers, pumps and cooling towers, Philadelphia.

C. H. Davies has severed his connection with the S. F. Bowser Pump & Tank Co., with whom he has been associated for 16 years. For many years he was advertising manager and was editor of its house organ. Until recently he was in charge of the promotion of factory sales, with headquarters in Chicago. Mr. Davies has already taken up his new duties with the Citrus Products Co., Chicago, and will be in charge of advertising and marketing.

F. A. Coleman, who has been engaged in the design and manufacture of foundry equipment for the past 17 years, recently resigned as vice-president and general manager of the Foundry Equipment Co., Cleveland. He is now located at 1951 East Fifty-seventh Street, Cleveland.

L. A. de Marrais, who was formerly with J. N. Kinney, 30 Church Street, New York, is now in charge of sales of Ohio locomotive cranes and electric cranes of the Bedford Foundry & Machine Co., for J. N. Kinney.

E. G. Howell, assistant treasurer and assistant to the general manager in the sales department, Briggs & Turivas, Inc., scrap iron and steel broker, Chicago, has resigned to join the sales force of Hickman, Williams & Co., dealers in pig iron, alloys and scrap, Chicago. Mr. Howell was with Briggs & Turivas, Inc., for three and one-half years, and prior to that time was for 14 years connected with the Republic Iron & Steel Co. C. M. Stowe, who recently resigned from the sales force of Hickman, Williams & Co., has become identified with the Holland Furnace Co., Holland, Mich., and will be assigned to that company's Cedar Rapids, Iowa, plant. The position left vacant by Mr. Howell at the Briggs & Turivas offices will be filled by Frank Garrett, who has been connected with the company for five years in an outside capacity.

Zeno D. Barns has been appointed manager of the Cleveland office, 429 Schofield Building, of the Ajax Metal Co., Philadelphia, succeeding the late Louis E. Purnell. The Cleveland office covers the states of Ohio and Michigan. Mr. Barns for some years past has been connected with the Westinghouse Electric & Mfg. Co. and the Westinghouse Air Brake Co.

Edward Francis Carry, president Haskell-Barker Car Co., Michigan City, Ind., recently purchased by the Pullman Co., was made president of the combined concern on Jan. 16. J. S. Runnels, retiring president of the Pullman Co., becomes chairman of the board. Mr. Carry started his car building career at the age of 21, as stenographer for Wells & French.

OBITUARY

THOMAS P. EGAN, president J. A. Fay & Egan Co., manufacturer of woodworking machinery, Cincinnati, died at the Good Samaritan Hospital in that city on Jan. 9, aged 74 years. He was born in Ireland and during his infancy was brought to Canada, where he attended high school. He went to Cincinnati in the early sixties where he obtained employment as a lathe hand in a brass manufacturing concern. Soon he entered the service of Steptoe-MacFarland & Co., who

were at that time the pioneer manufacturers of wood-working machinery in the United States. He had been employed in their shop but two weeks when an accident caused him to lose his left arm and he was then transferred to a position in the office. Later Mr. Egan became a traveling salesman for the company. In 1884 Mr. Egan resigned and, with several associates, engaged in business for himself. The enterprise was successful and the firm soon moved into a plant on Front Street, between Central Avenue and John Street. Several years later the Egan company was organized, with a capital stock of \$150,000, with Mr. Egan as president. In 1893 the Egan company was consolidated with the J. A. Fay Co. with a capitalization of \$2,500,000 and Mr. Egan was elected president of the consolidated companies. The concern grew steadily until now it is considered to be the largest woodworking machinery plant in the world. Mr. Egan was one of the organizers of the National Association of Manufacturers and was its first president. He was signally honored at the meeting of this association held in New York last year. He was also the organizer of the Manufacturers Club of Cincinnati, and was a one-time president of the Chamber of Commerce of Cincinnati. Mr. Egan is survived by his wife and seven children; three sons and four daughters. All of the sons are engaged in the business founded by their father.

JOHN J. CUNNINGHAM, president and general manager Western Foundry Co., Wingham, Ont., died in Toronto recently. The deceased was well known in western Ontario and had been prominent in the manufacture of stoves for a number of years.

T. C. DILL, president T. C. Dill Machine Co., Inc., Philadelphia, died Jan. 6 of heart trouble.

ALBERT B. COATES, Coates & Tweed, Lake Superior iron ore mine owners, died Jan. 10 in Orlando, Fla., at the age of 52. His home was at Virginia, Minn. He was born in Cleveland and early in life became bookkeeper for the Avery Stamping Co., which position he left to go to Minnesota as office head for Frank Rockefeller. Coates & Tweed own mines in the Mesaba, Cuyuna and Gogebic ranges, their ore being marketed through Pickands, Mather & Co., Cleveland.

ARTHUR SEYMOUR BROWN, vice-president Ansonia branch of the American Brass Co., died Jan. 12 at his home of heart failure, at the age of 44 years.

JAMES A. BRADY, founder and until his retirement president and general manager of the James A. Brady Foundry Co., Chicago, died at his home in that city on Jan. 9, following an illness of one month. Mr. Brady was 74 years of age and was born in Jersey City, N. J. He spent his early life in New York, where he was identified with the Tammany organization under the Croker regime. At the age of 25 he became connected with the foundry business at Beaver Falls, Pa. Subsequently he went to Chicago, where for 13 years he was superintendent of the foundry of the Chicago Hardware Mfg. Co., now the Chicago Hardware Foundry Co. After leaving that company he was for seven years superintendent of the Reedy Elevator Works, now the Reedy Foundry Co., Chicago. In March, 1899, he organized the James A. Brady Foundry Co., Chicago, of which he was president and general manager up to the time of his retirement from business some ten years ago.

HENRY BARTON, superintendent of the foundry operated by the Henry E. Pridmore Co., Chicago, manufacturer of molding machines, died at his home in that city on Jan. 4. He was 61 years of age and his death was caused by heart disease.

GEORGE BALDWIN SELDEN, holder of the famous Selden patents covering gasoline propelled vehicles and a pioneer in the present automotive industry, died at Rochester, N. Y., Jan. 17, at the age of 77 years. He was president of the Selden Motor Co., Rochester. He was graduated from Yale University in 1865, studied law and was admitted to the bar in 1871. In 1879 he applied for a patent on his gasoline engine after a few years of experimenting with other fuels.

NON-FERROUS METALS

The Week's Prices

Cents Per Pound for Early Delivery

	Copper	Electro- lytic*	Tin New York	Lead New York	St. Louis	Zinc New York	St. Louis
Jan	Lake						
11	13.87½	13.62½	32.37½	4.70	4.40	5.12½	4.77½
12	13.87½	13.62½	32.00	4.70	4.19	5.10	4.75
13	13.87½	13.62½	33.00	4.70	4.40	5.10	4.75
14	13.87½	13.62½		4.70	4.40	5.10	4.75
15	13.87½	13.62½	32.37½	4.70	4.40	5.12½	4.77½
16	13.87½	13.62½	32.00	4.70	4.40	5.12½	4.77½
17	13.87½	13.62½	32.00	4.70	4.40	5.12½	4.77½

*Refinery quotation

New York

NEW YORK, Jan. 17.

Dullness still pervades all the markets. Buying is light but most quotations are steady. Business in tin continues moderate but prices are slightly higher. There is no change in conditions in the lead market but prices are firm. Demand for zinc is very light with but little change in quotations. Antimony is lower.

Copper.—Interest on the part of consumers is exceedingly light and needs for a large part of the first quarter were fully covered in the latter part of last year. There is some demand for electrolytic copper, but it is confined to the immediate needs of a few consumers here and there. The price situation is generally firm. Quotations of the leading producers are at the minimum of 13.87½c., delivered, or 13.62½c., refinery, for January and first quarter, with 14c., delivered, the minimum asking price of some of the larger producers. There are also some refiners of copper who are out of the market. It is stated that a few dealers are offering electrolytic copper at 13.75c., delivered, or 13.50c., refinery, but the amount available from this source is exceedingly small. Lake copper is quoted at 13.87½c., New York or delivered, with that market also quiet.

Tin.—The market for spot Straits tin is spotty. On Jan. 11 and 12 there was some activity, due to the report that the steamer Sagadahoc, with 1000 tons of Straits tin aboard, had met with an accident and was obliged to put into port for repairs, which would necessitate a delay of a month in its arrival here. This caused some fear of a shortage of tin in January and February, resulting in dealers turning buyers; on those days fairly large sales were made, estimated to amount to between 400 and 600 tons. A little business was done on Jan. 13 and yesterday pressure to sell developed which resulted in an easier market. There were sales of spot and metal on steamers afloat at 32.37½c. and some later deliveries were done at 32.25c. to 32.12½c., the total business amounting to 200 to 250 tons. Today dealers turned buyers and the market was active and firm. On the New York Metal Exchange on Jan. 12, January shipment from the Straits, 25 tons, was sold at 33c. and 25 tons of spot standard at 32.50c. Spot Straits tin to-day was quoted at 32c. New York, and the London market was about £2 per ton lower than a week ago at £163 7s. 6d. for spot standard, £165 for future standard and £165 7s. 6d. for spot Straits, with the market weak. Arrivals thus far this month have been 3015 tons with 5410 tons reported afloat.

Lead.—The market is firm and unchanged at 4.70c., both New York and St. Louis, as the quotation of the leading interest and with 4.40c., St. Louis, and 4.70c. to 4.75c., New York and Eastern points, as that of the outside market. New demand is fair but not large enough to affect prices.

Zinc.—The market is quiet and dull and demand still waits upon developments in the steel market, particularly demand for galvanized sheets. Spot and early delivery for prime Western zinc is quoted at 4.75c. to 4.80c., St. Louis, or 5.10c. to 5.15c., New York, with future business in the first quarter about five points higher for each month involved.

Antimony.—Wholesale lots for early delivery are slightly lower at 4.45c., New York, duty paid.

Aluminum.—The quotation of the leading interest for wholesale lots for early delivery continues unchanged at 19.10c. per lb., f.o.b. plant, for 15-ton lots of virgin metal, 98 to 99 per cent pure, but the same grade is obtainable from importers handling Norwegian, Swiss, British, German and Swedish metal at 17c. to 18c., New York, duty paid. There is an inquiry for 200 tons before the market.

Old Metals.—Business is still dull, but there is a better feeling in the market. Dealers' selling prices are as follows:

	Cents Per Lb.
Copper, heavy and crucible.....	13.25
Copper, heavy and wire.....	12.50
Copper, light and bottoms.....	10.00
Heavy machine composition.....	10.25
Brass, heavy.....	8.00
Brass, light.....	6.00
No. 1 red brass or composition turnings.....	8.25
No. 1 yellow rod brass turnings.....	6.25
Lead, heavy.....	4.25
Lead, tea.....	3.25
Zinc.....	8.00

Chicago

JAN. 17.—No duller week has been seen in years in the metals, with buying practically at zero. Old metals are slightly lower in the absence of trading and dealers find nothing moving. We quote in carload lots: Lake copper, 14c.; tin, 33.50c.; lead, 4.50c.; spelter, 4.80c.; antimony, 6.50c., in less than carload lots. On old metals we quote: Copper wire, crucible shapes and copper clips, 10.50c.; copper bottoms, 8c.; red brass, 8c.; yellow brass, 5.75c.; lead pipe, 3.25c.; zinc, 2.37½c.; pewter, No. 1, 23c.; tin foil, 24c.; block tin, 26c.; all buying prices for less than carload lots.

St. Louis

JAN. 17.—The market for lead and zinc is slightly weaker. We quote lead at 4.38c. to 4.40c., car lots, and slab zinc at 4.75c. to 4.80c. On old metals we quote: Light brass, 3.50c.; heavy red brass and light copper, 7c.; heavy yellow brass, 4c.; heavy copper and copper wire, 7.50c.; zinc, 2c.; pewter, 15c.; tin foil, 16c.; tea lead, 2c.; aluminum, 9c.

Transfer of Jamison Coke Properties

PITTSBURGH, Jan. 16.—Official announcement of the successful conclusion of negotiations for the transfer of the Greensburg, Pa., properties of the Jamison Coal & Coke Co., to the Keystone Coal & Coke Co., was made last Saturday by Harry F. Bovard, general superintendent of the latter. All of the Jamison Coal & Coke Co. holdings in Westmoreland county, except the new mining operations on the Thaw estate at Pleasant Unity, are involved in the transaction, which gives the Keystone company undisputed control of the Greensburg basis, since the company, by the Jamison purchase, controls all the output of the basin except one or two small mines. Besides the Thaw operations retained in Westmoreland county, the Jamison company still owns two mines at Perryopolis, Pa., and 8000 acres of Pittsburgh seam coal near Fairmount, W. Va.

The formal transfer of the properties of the Jamison company will be made on Feb. 1. The principal mines which are involved are the Jamison No. 1 at Luxor, employing 350 men and producing annually 380,000 tons of coal and operating 400 beehive coke ovens; the Jamison No. 2, at Hannastown, employing 600 men and producing 440,000 tons; the Jamison No. 3, at Forbes Road, employing 325 men and producing 370,000 tons; the Jamison No. 4, at Crabtree, employing 663 men and producing 679,000 tons and operating 492 coke ovens; the Jamison No. 5, at Crabtree, employing 700 men and producing 380,000 tons, and the Jamison No. 6, near Greensburg, employing 200 men and producing 130,000 tons. The officers of the Keystone company are: President, Julian B. Huff; general superintendent, Harry F. Bovard, and directors, Messrs. Huff and Bovard, William A. Coulter, W. S. Moorhead, Richard Coulter and E. M. Gross.

Prices Finished Iron and Steel, f.o.b. Pittsburgh

Freight Rates

Freight rates from Pittsburgh on finished iron and steel products, in carload lots, to points named, per 100 lb., are as follows:

Philadelphia, domestic...	\$0.35	Kansas City	\$0.815
Philadelphia, export...	0.265	Kansas City (pipe)...	0.77
Baltimore, domestic...	0.335	St. Paul	0.665
Baltimore, export	0.255	Omaha	0.815
New York, domestic...	0.38	Omaha (pipe)	0.77
New York, export	0.285	Denver	1.35
Boston, domestic	0.415	Denver (wire products)...	1.415
Boston, export	0.285	Pacific Coast	1.665
Buffalo	0.295	Pacific Coast, ship plates	1.335
Cleveland	0.24	Birmingham	0.765
Detroit	0.325	Jacksonville, all rail...	0.555
Cincinnati	0.325	Jacksonville, rail and	
Indianapolis	0.345	water	0.46
Chicago	0.38	New Orleans	0.515
St. Louis	0.475		

The minimum carload to most of the foregoing points is 86,000 lb. To Denver the minimum loading is 40,000 lb., while to the Pacific Coast on all iron and steel products, except structural material, the minimum is 80,000 lb. On the latter item the rate applies to a minimum of 50,000 lb., and there is an extra charge of 9c. per 100 lb. on carloads of a minimum of 40,000 lb. On shipments of wrought iron and steel pipe to Kansas City, St. Paul, Omaha and Denver the minimum carload is 46,000 lb. On iron and steel items not noted above the rates vary somewhat and are given in detail in the regular railroad tariffs.

Rates from Atlantic Coast ports (i.e., New York, Philadelphia and Baltimore) to Pacific Coast ports of call on most steamship lines, via the Panama Canal, are as follows: Pig iron, 55c.; ship plates, 75c.; ingot and muck bars, structural steel, common wire products, including cut or wire nails, spikes and wire hoops, 75c.; sheets and tin plates, 60c. to 75c.; rods, wire rope, cable and strands, 1 1/2 wire fencing, netting and stretchers, 75c.; pipe, not over 8 in. in diameter, 75c.; over 8 in. in diameter, 2 1/2c. per in. or fraction thereof additional. All prices per 100 lb. in carload lots, minimum 40,000 lb.

Structural Material

I-beams, 3 to 15 in.; channels, 3 to 15 in.; angles, 3 to 6 in., on one or both legs, 1/2 in. thick and over, and zees, structural sizes, 1.50c. to 1.60c.

Sheared plates, 1/2 in. and heavier, tank quality, 1.50c.

Wire Products

Wire nails, \$2.50 base per keg; galvanized, 1 in. and longer, including large-head barbed roofing nails, taking an advance over this price of \$1.25 and shorter than 1 in., \$1.75; bright Bessemer and basic wire, \$2.25 per 100 lb.; annealed fence wire, Nos. 6 to 9, \$2.25; galvanized wire, \$2.75; galvanized barbed wire, \$3.15; galvanized fence staples, \$3.15; painted barbed wire, \$2.65; polished fence staples, \$2.65; cement-coated nails, per count keg, \$2.00; these prices being subject to the usual advances for the smaller trade, all f.o.b. Pittsburgh, freight added to point of delivery, terms 60 days, net, less 2 per cent off for cash in 10 days. Discounts on woven-wire fencing are 68 to 70 1/2 per cent off list for carload lots; 67 to 69 1/2 per cent for 1000-rod lots, and 66 to 68 1/2 per cent for small lots, f.o.b. Pittsburgh.

Bolts and Nuts

Machine bolts, small, rolled threads, 70, 10 and 5 to 70, 10 and 7 1/2 per cent off list

Machine bolts, small, cut threads, 70 and 5 to 70 and 10 per cent off list

Machine bolts, larger and longer, 65, 10 and 5 to 70 and 10 per cent off list

Carriage bolts, 1/2 in. x 6 in.: Smaller and shorter rolled threads, 65, 10 and 10 per cent off list

Cut threads 65 and 10 to 70 per cent off list |

Longer and larger sizes 65 and 10 to 70 per cent off list |

Lag bolts 70 and 10 to 70, 10 and 5 per cent off list |

Flow bolts, Nos. 1, 2 and 3 heads 60 and 10 per cent off list |

Other style heads 20 per cent extra |

Machine bolts, c.p.c. and t. nuts, 1/2 in. x 4 in.: Smaller and shorter 65 and 5 per cent off list |

Larger and longer sizes 65 per cent off list |

Hot pressed sq. or hex. blank nuts \$5.50 off list |

Hot pressed nuts, tapped \$5.00 to \$5.25 off list |

C.p.c. and t. sq. or hex. blank nuts \$5.25 off list |

C.p.c. and t. sq. or hex. blank nuts, tapped \$5.00 off list |

Semi-finished hex. nuts: 1/2 in. to 9/16 in. inclusive 80, 10 and 10 per cent off list |

Small sizes S. A. E. 80, 10, 10 and 10 per cent off list |

1/2 in. to 1 in. inclusive, U. S. S. and S. A. E. 70, 10, 10 and 10 per cent off list |

Stove bolts in packages 80, 10 and 5 per cent off list |

Stove bolts in bulk 80, 10 and 7 1/2 per cent off list |

Tire bolts 65, 10 and 10 per cent off list |

Track bolts, carloads 3c. to 3.25c. base |

Track bolts, less than carloads 4c. to 4.25c. |

Upset Square and Hex. Head Cap Screws

1/2 in. and under 80 and 10 per cent off list |

5/16 in. to 3/4 in. 80 and 10 per cent off list |

Upset Set Screws

1/2 in. and under 80, 10 and 5 to 85 per cent off list |

5/16 in. to 3/4 in. 80, 10 and 5 to 85 per cent off list |

Milled Square and Hex. Cap Screws

All sizes 75 and 10 per cent off list |

Milled Set Screws

All sizes 70, 10 and 10 per cent off list |

Rivets

Large structural and ship rivets \$2.25 |

Large boiler rivets 2.85 |

Small rivets 70, 10 and 10 per cent off list |

Wire Rods

No. 5 common basic or Bessemer rods to domestic consumers, \$36 to \$38; chain rods, \$36 to \$38; screw stock rods, \$41 to \$43; rivet and bolt rods and other rods of that character, \$36 to \$38; high carbon rods, \$43 to \$50, depending on carbons.

Railroad Spikes and Track Bolts

Railroad spikes, 9/16-in. and larger, \$2.15 to \$2.20 base per 100 lb. in lots of 200 kegs of 200 lb. each or more, spikes, 1/2-in., 3/4-in. and 7/16-in., \$2.25 to \$2.30 base; 5/16-in., \$2.25 to \$2.30 base. Bolt and barge spikes, \$2.25 to \$2.30 base per 100 lb. in carload lots of 200 kegs or more, f.o.b. Pittsburgh. Track bolts, 3c. to 3.25c. base per 100 lb. The plates, \$2 per 100 lb. Angle bars, \$2.40 per 100 lb.

Terne Plates

Prices of terne plates are as follows: 8-lb. coating, 200 lb., \$9.30 per package, 8-lb. coating, 1 C., \$9.60; 15-lb. coating, 1 C., \$11.80; 30-lb. coating, 1 C., \$13; 25-lb. coating, 1 C., \$11.25; 30-lb. coating, 1 C., \$15.25; 35-lb. coating, 1 C., \$16.25; 40-lb. coating, 1 C., \$17.25 per package, all f.o.b. Pittsburgh, freight added to point of delivery.

Iron and Steel Bars

Steel bars, 1.50c. to 1.60c. from mill. Refined bar iron, 2c. to 2.10c.

Welded Pipe

The following discounts are to jobbers for carload lots on the Pittsburgh basing card:

Steel			Butt Weld			Iron		
Inches	Black	Galv.	Inches	Black	Galv.	Inches	Black	Galv.
1/4	54 1/2	28	1/4 to 3/8	36 1/2	18 1/2	1/4	36 1/2	18 1/2
1/2 to 3/4	60	33 1/2	3/8	42 1/2	27 1/2	1/2	42 1/2	27 1/2
1/2	65	50 1/2	3/4	44 1/2	29 1/2	3/4	44 1/2	29 1/2
3/4	69	56 1/2	1 to 1 1/2	44 1/2	29 1/2	1 to 1 1/2	44 1/2	29 1/2
1 to 3	71	58 1/2						

Lap Weld

2	64	51 1/2	2	39 1/2	25 1/2
2 1/2 to 6	68	55 1/2	2 1/2 to 6	42 1/2	29 1/2
7 to 8	65	51 1/2	7 to 12	40 1/2	27 1/2
9 to 12	64	50 1/2			

Butt Weld, extra strong, plain ends

1/4	50 1/2	33	1/4 to 3/8	36 1/2	23 1/2
1/2 to 3/4	56	38 1/2	3/8	42 1/2	28 1/2
1/2	62	50 1/2	3/4	44 1/2	30 1/2
3/4	67	55 1/2	1 to 1 1/2	44 1/2	30 1/2
1 to 1 1/2	69	57 1/2			
2 to 3	70	58 1/2			

Lap Weld, extra strong, plain ends

2	62	50 1/2	2	40 1/2	27 1/2
2 1/2 to 4	66	54 1/2	2 1/2 to 4	43 1/2	31 1/2
4 1/2 to 6	65	53 1/2	4 1/2 to 6	42 1/2	30 1/2
7 to 8	61	47 1/2	7 to 8	35 1/2	23 1/2
9 to 12	55	41 1/2	9 to 12	30 1/2	18 1/2

To the large jobbing trade the above discounts are increased by one point, with supplementary discounts of 5 and 2 1/2 per cent.

Boiler Tubes

The following are the discounts for carload lots f.o.b. Pittsburgh:

Lap Welded Steel		Charcoal Iron	
1 1/2 in.	26 1/2	1 1/2 in.	5
2 to 2 1/2 in.	41	1 3/4 to 1 1/2 in.	15
2 1/2 to 3 in.	52	2 to 2 1/2 in.	25
3 1/2 to 13 in.	57	2 1/2 to 3 in.	30
		3 1/2 to 4 1/2 in.	32

Standard Commercial Seamless Boiler Tubes

New discounts have been adopted on standard commercial seamless boiler tubes, but manufacturers are not yet ready to announce them for publication, and for that reason we publish no discounts this week.

Sheets

Prices for mill shipments on sheets of standard gage in carloads, f.o.b. Pittsburgh, follow:

Blue Annealed		Cents per Lb.	
No. 8 and heavier	2.20	Nos. 11 and 12	2.30
Nos. 9 and 10 (base)	2.25	Nos. 13 and 14	2.35
		Nos. 15 and 16	2.45
Box Annealed, One Pass Cold Rolled		Cents per Lb.	
Nos. 17 to 21	2.80	No. 28 (base)	3.00
Nos. 22 to 24	2.85	No. 29	3.10
Nos. 25 and 26	2.90	No. 30	3.20
No. 27	2.95		
Galvanized		Cents per Lb.	
Nos. 10 and 11	3.00	Nos. 25 and 26	3.70
Nos. 12 to 14	3.10	No. 27	3.85
Nos. 15 and 16	3.25	No. 28 (base)	4.00
Nos. 17 to 21	3.40	No. 29	4.25
Nos. 22 to 24	3.55	No. 30	4.50
Tin-Mill Black Plate		Cents per Lb.	
Nos. 15 and 16	2.80	No. 24 (base)	3.00
Nos. 17 to 21	2.85	No. 29	3.05
Nos. 22 to 24	2.90	No. 30	3.05
Nos. 25 to 27	2.95	Nos. 30 1/2 and 31	3.10

247

Trade Changes

Pneumercator Co., Inc., manufacturer of pneumatic mercury gages for measuring liquid contents of tanks and for indicating ships' draft, will move its factory from Philadelphia to the Sperry Building, 40 Flatbush Avenue Extension, Brooklyn, on Feb. 1. Its general offices will be transferred from 15 Park Row, New York, to the new factory location on that date.

The Reed-Prentice Co. and associate companies, the Becker Milling Machine Co. and the Whitecomb-Blaisdell Machine Tool Co., have removed their New York office, which is under the direction of P. K. Dayton, New York sales manager, from the Grand Central Palace, 489 Lexington Avenue, New York, to room 536, Singer Building, 149 Broadway, New York.

The Harder Furnace & Engineering Corporation announces that the sale of its licenses to use the Harder patents and the services of its engineering department will be conducted hereafter by the Fuels Utilization Corporation, which will have its offices in the Knickerbocker Building, 152 West Forty-second Street, New York. The Harder Furnace & Engineering Corporation has removed to that address and will occupy adjacent offices. The services of this department may be engaged through the Fuels Utilization Corporation for consultation, construction or analysis of any combustion or power plant problems.

H. Freidus & Co., machinery and electric motors, have moved their entire stock of machine tools and office to their new building, 1302 Columbus Avenue, Boston.

After Jan. 15, Joseph J. Simon will furnish engineering and sale service in Southern California, with office in Los Angeles, for manufacturers of mechanical products. He is a mechanical engineer, familiar with engineering sales in connection with street railways, power plants, automotive and manufacturing industries.

Thomas G. Watson, formerly general manager and treasurer, John J. Kelleher, Inc., Brooklyn, scrap iron and steel, has resigned to engage in the scrap iron and steel business at Fifteenth Street and Second Avenue, Brooklyn.

The Green Engineering Co., East Chicago, Ind., manufacturer of chain grate stokers, steam jet ash conveyors, cast-iron hoppers and Scalflex ignition arches, has opened a direct branch sales office in suite 941, Monadnock Building, 53 West Jackson Boulevard, Chicago. The former agency representation has been discontinued in the Chicago district. J. W. Himmelsbach has been appointed district manager with supervision over sales in northern Illinois, northern Indiana, Iowa and Michigan. P. Albert Poppenhusen, president, will maintain an office at the Chicago address. The general sales office will remain at the factory.

The Paragon Tool Co., Seattle, has been appointed warehouse distributor for Deluxe lightweight gray iron pistons, covering the Pacific Northwest.

The Melgs-Powell Co., Milwaukee, organized three years ago to manufacture small tools, precision instruments, jigs, dies, etc., has discontinued business and the corporation has been dissolved. The plant at 522-524 Sixteenth Avenue was badly damaged by fire several months ago. John D. Powell was president; Charles Polachock, vice-president, and Arthur E. Melgs, secretary and treasurer.

The J. W. Paxson Co., foundry machinery and supplies, has occupied its new buildings at Nicetown Avenue and D Street, Philadelphia.

The Acme Fancy Wire Works, Detroit, has changed its name to Acme Wire & Iron Works. When the company started in business in 1899 it made fancy wire products, wire specialties, florist designs, etc., but has since added so largely to its line as to make the new name more appropriate.

The Henry Wels Mfg. Co., Atchison, Kan., steel products, is now being represented in New York by the Philadelphia Fire Retardant Co., 110 West Thirty-fourth Street, telephone Fitzroy 6056. The New York office is in charge of G. S. Nobles, for some years past purchasing agent with the Turner Construction Co., assisted by W. S. Miller, who was superintendent of erection with the Variety Fire Door Co. for more than 15 years.

Reed, Fears & Miller, Inc., room 346 Oliver building, 141 Milk Street, Boston, has moved to the eighth floor of that building, rooms 853-854, into larger quarters.

The Federal Supply Co., East Seventy-ninth Street, Cleveland, has been appointed representative in that territory for the Quigley Furnace Specialties Co., Inc., 26 Cortlandt Street, New York, manufacturer of hyltempite and insulbrix.

Stanton L. Driefus, broker in iron and steel, has removed from the West End Trust Building, South Penn Square, Philadelphia, to the Philadelphia Bank Building, 421 Chestnut Street.

Plans of New Companies

The Helpershausen Corporation, 48 Tompkins Street, New York, has recently been incorporated, taking over the business and property of Helpershausen Brothers, who have been in business for many years manufacturing boilers. The two partners have reached respectively the ages of 79 and 73 and have incorporated so as to give stability to the business of which two of their sons are now officers. The president of the company, Phillip Helpershausen, has invented some new departures in land and marine boilers.

The United Automotive Body Co., Danville, Ill., is a new organization incorporated under the laws of Delaware. It is not connected with the Ohio corporation of the same name with offices at Cleveland.

The Pittsburgh Nipple & Mfg. Co. has been reorganized and incorporated and has moved to 411 South Main Street, Pittsburgh, where it will continue to manufacture nipples and all special pipe threading, being equipped with new and a larger number of machines.

Industrial Finance

Henry W. Walte, president of the Lord Dry Dock Corporation, 105 West Fortieth Street, New York, has been appointed receiver for the company under bond of \$50,000. The company operates a ship repair plant at Weehawken, N. J., and was incorporated under Delaware laws in 1920, with capital of \$10,000,000. It is said to be solvent but short of liquid assets. Following the receivership appointment, brought about by the action of the Cunard Terminal Corporation with claim of \$21,000 against the corporation, a number of other creditors, with claims aggregating over \$16,000, have filed a petition in bankruptcy against the company.

The Sizer Forge Co., 238 Larkin Street, Buffalo, has filed notice of increase in capital from \$300,000 to \$500,000.

The Pneumatic Scale Corporation, Ltd., Quincy, Mass., manufacturer of weighing equipment and devices, has filed notice of increase in capital from \$1,500,000 to \$2,800,000.

The United States Automotive Corporation, Connersville, Ind., operating the Lexington Motor Co., Ansted Spring & Axle Co., Connersville Foundry Corporation, all of Connersville, and other automotive organizations, has disposed of a bond issue of \$1,750,000, the proceeds to be used for financing general operations, etc.

The Strom Steel Ball Co., 621 Harr Place, Oak Park, Chicago, has filed notice of increase in capital from \$150,000 to \$250,000.

David Strouse, 39 Center Street, New Haven, Conn., has been appointed receiver of the American & British Corporation, with plants at Bridgeport, Conn., and Providence, R. I. The company went into the receiver's hands two years ago.

The Atlantic Shipping Co., Stonington, Conn., is to dissolve. The company was organized in 1908, and during its existence constructed 10 vessels.

The Warren Tool & Forge Co., Youngstown, has increased its capitalization to \$1,800,000, and on the basis of appraisal values has absorbed the American Block & Mfg. Co. and the General Malleable Co. properties.

The Noiseless Typewriter Co., Inc., Middletown, Conn., organized as an operating company, has transferred all assets and liabilities to a Delaware corporation of the same name, a holding company, and will shortly file with the secretary of Connecticut a certificate of dissolution. No changes in the personnel of the Middletown plant organization are involved.

A public offering of \$1,750,000 United States Automotive Corporation 8 per cent first mortgage convertible bonds, dated Aug. 31, 1921, and due Sept. 1, 1931, part of an authorized issue of \$3,000,000, was made last week. The company owns a controlling interest in the Ansted Spring & Axle Co., Connersville Foundry Corporation, and other manufacturing units.

The General Electric Co. offers employees the opportunity to subscribe to 7 per cent debenture 15-year bonds dated Nov. 1, 1921, subscriptions being limited to \$1,000 to each person. In addition, \$10 bonds sold only for cash and 50c subscription stamps, both convertible into the larger bonds, are offered. Subscriptions will be received until Jan. 14.

A shortage of electric current due to a protracted drought in the Alpine regions led to the use for driving machinery in the Fiat works, Turin, Italy, of some 150 of the agricultural tractors the company is building. The rating of each tractor engine is 25 to 35 hp. and the statement is made that the power developed by them all totaled more than 5000 hp., indicating the employment of tractor engines on an unusual scale for temporary power purposes.

Machinery Markets and News of the Works

GAIN IN MACHINERY SALES

**January Shows Improvement Over December,
Which Was Best Month in 1921**

**Delaware, Lackawanna & Western Railroad Places
Orders Aggregating About \$100,000—
Other Important Buying**

Evidences of slow but steady improvement in the machine-tool situation multiply. From the Cincinnati district it is reported that the outlook is sufficiently encouraging to bring about the initiation of plans for resumption of work at some machine-tool plants within the next 60 or 90 days.

January business is in fair volume, considering the lean sales figures of the past year. With many sellers December was the best month of 1921, and January seems likely to surpass last month in the volume of orders. Inquiries are unquestionably coming out in greater number, and while the most of them are for single machines or very small lots, there are a number of fair-sized lists before the trade.

Outstanding among purchases of the past week was the placing of orders for about 40 tools by the Delaware, Lackawanna & Western Railroad, the total outlay being about \$100,000. Two large New York houses specializing in railroad shop equipment received the bulk of the business. Other railroad buying is inconsequential, but includes a few additional tools acquired by the Seaboard Air Line and purchases of single tools

by the Erie Railroad and the Santa Fe. The Third Avenue Railway Co., New York, has bought four tools.

A New England manufacturer of screw machines has received an order for \$50,000 worth of tools from a Middle Western automobile manufacturer. The General Motors Corporation has bought six large horizontal boring mills for one of its Detroit plants and a like order has been placed by a manufacturer of automatic brakes.

Detroit automobile plants are preparing for 1922 production schedules, and within the past 30 days have inquired for about \$250,000 worth of machine tools. Many of the inquiries are for single machines, but lists up to 25 or 30 tools are being figured on. Actual placing of orders will probably hinge on the automobile buying that develops within the next month or two.

The Western Electric Co., Chicago, has placed a large order for Gisholt special machines; the Hannifin Mfg. Co., Chicago, has bought a small list of miscellaneous equipment; the Board of Education of South Bend, Ind., has bought a list of tools for a vocational training school.

The complete list of the Streets Co., Chicago, consisting of about 40 fabricating machines for steel car work, mentioned briefly last week, is published in this issue under the Chicago heading.

Export business is quiet, but a few orders are being received. A Cincinnati manufacturer of electrical tools has received a large order from Australia, the first of its kind in 16 months, and another good-sized order has been received from Japan.

New York

New York, Jan. 17.

The Delaware, Lackawanna & Western Railroad has placed orders for about \$100,000 worth of machine-shop equipment, a large part of the business going to two companies which specialize in railroad tools. There has been no other important railroad buying, but the Erie Railroad has ordered a Southwark double-end punch. The Third Avenue Railway Co., New York, has bought four machine tools and other repair shop equipment.

The Johns-Manville Co., New York, which was reported last week as having issued an inquiry for about a dozen tools for its plant at Waukegan, Ill., has added several tools to this list.

A considerable number of planers with special attachments will be required for planing the cast iron segments for the New York-New Jersey vehicular tunnel. Bids for the segments close on Feb. 7 and the successful bidder will undoubtedly purchase the necessary tool equipment.

Demand for used machinery is fairly active. A dealer sold \$17,000 worth of tools to a single manufacturer, the purchase including two 7-ft. radial drills, lathes and grinders.

Though December was the best month of 1921 with some machine-tool sellers, it now appears that January sales, in several instances, will show a slight increase over December. Inquiries are slightly more numerous in some lines and there is more of a disposition on the part of buyers to close with a reasonable degree of promptness.

Representatives of crane builders in this district report the past week to have been about as dull as any week last year. Very few new inquiries appeared and practically no

sales were reported. Several old inquiries have been postponed until spring or indefinitely. The Driver Harris Co., Harrison, N. J., has postponed until spring, purchase of the 20-ton electric crane for which it inquired last year. The Thomas Crummins Contracting Co., New York, recently in the market for a locomotive crane has purchased two Bucyrus steam shovels. Both the Lobdell Car Wheel Co., Wilmington, Del., and the American Brake Shoe & Foundry Co., New York, which are among the bidders on the vehicular tunnel to be constructed under the Hudson River, asked for estimates on small cranes a short time ago. The Utah Copper Co., New York, has purchased a 40-ton, 20-ft. 10-in. span electric crane from the Shaw Electric Crane Co. for Magna, Utah. The Barrie Engineering Co. Ltd., 208A St. Nicholas Building, Montreal, Can., has inquired for a 15-ton, 50 ft. boom locomotive crane and five 2-ton electric hoists for coal handling.

The Standard Sanitary Mfg. Co., Bessemer Building, Pittsburgh, has acquired the plant of the Goodyear Tire & Rubber Co., Jackson Avenue and Honeywell Street, Long Island City, consisting of a six story building, totalling about 63,000 sq. ft. of space, and will be used by the new owner as an Eastern branch plant.

The Knickerbocker Ice Co., 41 East Forty-second Street, New York, has awarded contract to the Turner Construction Co., 242 Madison Avenue, for a new two-story ice-manufacturing plant at 148-50 Elizabeth Street, 50 x 100 ft., estimated to cost about \$100,000, including machinery.

M. F. Westergren, Inc., 213 East 144th Street, New York, manufacturer of sheet metal products, has filed plans for a new two-story plant, 28 x 96 ft., on 144th Street.

Motors and other electrical and mechanical equipment will be installed in the new printing plant to be erected by the Board of Directors, Fordham University, Fordham Road, New York, estimated to cost about \$250,000. Plans

will be prepared by R. J. Reilly, 477 Fifth Avenue, architect and engineer.

The New York Edison Co., 130 East Fifteenth Street, New York, will take bids soon for the construction of a two-story and basement power house at 122 East Thirteenth Street. Plans are being drawn by William Whitehill, Forty-first Street and Sixth Avenue.

The Lightolfer Co., 569 Broadway, New York, manufacturer of electric lighting fixtures, has leased the five-story building at 65-67 Wooster Street for a local plant.

Merkel Brothers, Chickadee Avenue, Jamaica, L. I., are having plans prepared for a three-story cold storage and refrigerating plant, 60 x 75 ft., on Chichester Avenue. Louis Altmendinger, 20 Palmetto Street, Brooklyn, is architect.

The Perfect Brick & Hollow Tile Co., 185 Montague Street, Brooklyn, is taking bids for a new one-story plant, 97 x 100 ft., on Grand Street, estimated to cost about \$27,000. Silverstein & Infanger, 190 Montague Street, are architects.

The L. H. Motor Car Co. Long Island City, N. Y., has leased a portion of the building at Vernon and Webster avenues, totaling about 5000 sq. ft. of space, for new works.

The State Hospital Commission, Albany, N. Y., has awarded contract to C. J. Burgess, Marcy, N. Y., for a new cold storage plant at the Marcy State Hospital, estimated to cost about \$131,000 with equipment.

Fire, Jan. 11, destroyed a number of industrial plants at 389-37 Leonard Street and 102-6 Richardson Street, Brooklyn, including the two-story works of the Brooklyn Fireproof Sash & Door Co.; Samuel Solomon, operating a wheelwright shop; Empire Moulding Co., and Samuel Weinstein, manufacturer of sash and doors, with total loss estimated at about \$150,000.

The Computing-Tabulating-Recording Co., 50 Broad Street, New York, manufacturer of calculating machines, has acquired the property and business of the Ticketograph Co., 549 West Washington Street, Chicago, manufacturer of machines for computing piece-work rates in factories, and will operate the company as a subsidiary organization.

The Motor Car Parts Corporation, New York, has leased property at 804 Ninth Avenue for local works.

I. Langner, 700 Trinity Avenue, New York, is preparing plans for a two-story automobile service and repair building, 50 x 60 ft., at Broadway and 185th Street, estimated to cost about \$90,000. John De Hart, 1031 Fox Street, is architect.

The Ingram Motor Co., New York, care of Joseph Ingram, president, 2 Rector Street, will construct by day labor its new automobile manufacturing plant at Norfolk and Atlantic avenues, Egg Harbor, N. J. It will be two and one-half stories, with power plant, totaling 10 x 200 ft. H. B. Perry, company address, is engineer.

The New Jersey Power & Light Co., Dover, N. J., will acquire the Woodbourne Electric Light, Heat & Power Co., operating in Morris County, and will make extensions and improvements in power plant and system.

L. O. Koven & Brother, 154 Ogden Street, Jersey City, N. J., manufacturers of galvanized range boilers, etc., have filed plans for a new one-story factory to cost about \$12,000, exclusive of equipment.

The Board of Education, Broadway, Bayonne, N. J., will soon call for bids for a three-story junior high and vocational school, 200 x 300 ft., at Avenue A and Twenty-ninth Street, estimated to cost about \$400,000. Donald G. Anderson, 28 East Forty-ninth Street, New York, is architect.

The Board of Education, South Broad Street, Elizabeth, N. J., is taking bids until Jan. 26, for a new junior high school, to include vocational department, at First and Second avenues and Loomis Street. It will be two-stories, 150 x 370 ft., and is estimated to cost about \$700,000. C. Godfrey Poggis, 275 Morris Avenue, is architect.

The Lambert Holsting Engine Co., 117 Poinier Street, Newark, N. J., has taken over the property and business of the W. A. Crook & Brothers Co., manufacturer of kindred products, and will merge the works with its present organization. The name will be changed to that of the purchasing company.

Phineas Jones & Co., 305 Market Street, Newark, manufacturers of automobile bodies, wagons, etc., have awarded contract to the Becker Construction Co., 361 Grove Street, for its one-story plant, 50 x 300 ft., on Hillside Avenue, near Newark, estimated to cost about \$300,000, including equipment.

The Board of Education, East Orange, N. J., has authorized the purchase of property at Elmwood Avenue and South Burnett Street, 256 x 701 ft., for the erection of a new

junior high school, to include a vocational department. Plans will be placed under way at an early date.

The Board of Education, Newark, is considering a request from Superintendent of Schools Corson for an appropriation of \$108,000 for the purchase of equipment for the new Seymour vocational school, now nearing completion.

Philadelphia

PHILADELPHIA, Jan. 16.

The Jacques Mfg. Co., Smick Street and Green Lane, Philadelphia, manufacturer of automobile bodies, has acquired the two-story factory at Seventh and Rockland streets, totaling about 40,000 sq. ft. for a new plant. Operations will be concentrated at this location. The company has acquired, also, an adjoining tract of land, aggregating 2 acres.

The United States Cooperage Co., Philadelphia, has leased the three-story machine shop at 3103-7 Grays Ferry Road, and will operate at this location. The property is owned by the Lutz Co., machinist, which previously occupied it.

The Fanning-Schuett Engineering Co., 502 Ruscomb Street, Philadelphia, manufacturer of engineering products, has awarded contract to Hollenback, Inc., 1804 Brandywine Street, for a two-story machine shop on property recently acquired at Third and Cayuga streets.

J. M. White, 1116 Olive Street, Philadelphia, operating a wire manufacturing and wire-bradling plant, has acquired adjoining property, 60 x 64 ft., and will use the site for the erection of an addition.

The city purchasing agent, A. Lincoln Acker, room 312, City Hall, Philadelphia, will receive bids until Jan. 23, for conveyor chains and parts, firebrick and other materials.

The Emergency Fleet Corporation, Philadelphia, is asking for bids until Feb. 7, for the purchase of the stiff leg derricks at the Hog Island Shipyard, including 350 5-ton double-mast derricks; 40 5-ton, single-mast; 44 12-ton, single-mast, and derrick operating machinery, including hoists, motors, controllers, etc.

The Board of Education, Scranton, Pa., has selected Edward Langley, architect, Scranton Life Building, to prepare plans for a new central high school addition, to include a vocational department estimated to cost about \$175,000. J. H. Williams is president of the board.

Fire, Jan. 13, destroyed a portion of the plant of the Cochrane Corporation, Earnest, Pa., manufacturer of boilers, etc., with loss estimated at about \$100,000. Under normal conditions the company gave employment to about 200 operatives.

The Wyoming Valley Water Supply Co., Hazleton, Pa., is planning the construction of an electric light and power house at Hudsonale, Pa., to be operated in connection with its pumping plant.

The Nilco Lamps Works, Inc., St. Marys, Pa., recently organized to manufacture electric lamps, has acquired the local plant of the General Electric Co., as well as the similar factory of this organization at Emporium. Arrangements are being made for immediate operations and both plants will be placed in service. B. G. Erskine is president, and J. C. Wortman, vice-president.

Directors of the Boll Brothers' Mfg. Co., Fourteenth and Howard streets, Harrisburg, Pa., manufacturer of metal beds and springs, have voted to rebuild the plant, recently partially destroyed by fire with loss estimated at about \$30,000.

The Board of Education, Harrisburg, Pa., has awarded contract to S. W. Shoemaker & Son, Harrisburg, for the second unit of the new senior co-educational high school, at a cost of \$208,680. The structure will include the vocational shops, with machine and electrical shops, automobile and wood-working departments, etc. A bond issue has been arranged for \$300,000 to finance the construction and equipment.

Officials of the Reading Machinery Exchange, 437 Washington Street, Reading, Pa., have organized the Reading Machine & Tool Co., to succeed to the present business and expand operations.

A power house will be constructed in connection with the new shop and warehouse to be erected at Franklin and Fourth streets, Williamsport, Pa., by H. A. Moore, 114 Elm Street, Milton, Pa., estimated to cost about \$50,000.

Electric motors and other power equipment will be installed in the three-story and basement printing plant to be erected by the Easton Daily Express Co., 26 North Fourth Street, Easton, Pa., estimated to cost about \$150,000. A. D. Childsey, Jr., 341 Northampton Street, is architect.

Fire, Jan. 7, destroyed the plant and equipment of the Standard Slag Co., Sharpsville, Pa., with loss estimated at about \$75,000.

The Vulcaweld Rubber Co., Pottstown, Pa., will expend about \$200,000 for building and equipping its new plant on property recently acquired. The works will consist of a two-story factory, 60 x 260 ft., with power house and garage. Plans are being drawn. E. W. Smith is head.

The Harrisburg Stanley Spring Co., Harrisburg, Pa., has commenced the erection of its new one-story plant, 50 x 100 ft., and expects to have the structure ready for occupancy prior to March 1, for the installation of equipment to manufacture automobile springs. Harry D. Delmotte, Twelfth and Herr streets, is secretary.

The United Ice & Coal Co., Harrisburg, Pa., has acquired property at Seventh and Schuylkill streets, and will use a portion of the site for a new ice-manufacturing plant, with initial daily capacity of 100 tons. Plans have been drawn and it is proposed to have the works ready for service in June. The company is now operating a similar plant at Forster and Cowden streets which will be continued. Mahlon Miller heads the company.

Horace T. Potts & Co., 316 North Third Street, Philadelphia, will not build a foundry at Erie Avenue and D Street, Philadelphia, as recently stated in THE IRON AGE, but a steel warehouse. Work on the latter will begin some time in the near future.

Buffalo

BUFFALO, Jan. 16

The Buffalo, Rochester & Pittsburgh Railroad Co., Rochester, N. Y., has tentative plans for a new car and locomotive repair shop in the vicinity of DuBois, Pa., to be one and one-half stories, 135 x 230 ft., and estimated to cost close to \$175,000.

The Board of Education, West Genesee Street, Syracuse, N. Y., will soon call for bids for a two-story junior high school, 175 x 250 ft., at Brighton and Midland avenues, to include a vocational department. Gordon Wright, City Bank Building, is architect. E. M. Tooke is president of the board.

Fire, Jan. 9, destroyed the steel car repair shop of the Pennsylvania Railroad Co., Sixth and Wayne streets, Olean, N. Y., 50 x 175 ft., with loss estimated at about \$20,000.

The St. Lawrence Transmission Co., Potsdam, N. Y., has been granted permission to build a new power plant at Colton, St. Lawrence County, for service in this section.

The Hornell Repair & Construction Co., Hornell, N. Y., operating the local shops of the Erie Railroad under lease for about two years, has concluded arrangements with the company for the operation of its locomotive and car repair shops at Susquehanna, Pa., under a similar agreement, effective Jan. 15.

The State Hospital Commission, Albany, N. Y., is taking bids until Jan. 25 for the installation of new electrical equipment at the State Hospital, Binghamton. L. F. Pilcher, Capitol Building, Albany, is state architect. L. M. Farrington is secretary of the commission.

A vocational department will be installed in the school to be erected by the Board of Education, Tonawanda, N. Y., to cost about \$100,000.

The Franklin Automobile Co., Syracuse, N. Y., will equip a portion of its plant for the manufacture of a four-cylinder, air-cooled motor, automobile, weighing about 1000 lb., and designed to be sold for \$1,000. It is proposed to develop an output of 100 cars per day. H. H. Franklin is president.

The service station of the Hall Motor Co., Brayton and West Utica streets, Buffalo, was partially destroyed by fire Dec. 21, with a loss of \$50,000. It will be rebuilt at once.

The American Radiator Co., 1807 Elmwood Avenue, Buffalo, will erect an addition to a compressor house, 50 x 80 ft., to cost \$8,000.

Pittsburgh

PITTSBURGH, Jan. 16

The machine tool trade at present finds chief encouragement from inquiries rather than orders. Dealers and manufacturers' representatives are figuring against a number of inquiries and are hopeful of getting orders before long. One firm recently sold a 5-hp. motor-driven United States heavy floor grinder and a Fay & Egan joiner. Others also are selling individual tools, but there is a dearth of sales of more than one tool to a buyer. Railroad inquiry is lacking and the steel and associated industries are moving slowly. In the crane market much interest centers in the 10-ton, with 5-ton auxiliary which the United Engineer-

ing & Foundry Co. is expected to place with one of three companies probably this week. A crane of similar capacity also is wanted by the Ellwood City Forge Co. Ellwood City, Pa. The National Tube Co. is likely to close before long for a 15-ton overhead for its Christy Park works, McKeesport, Pa. The Morgan Engineering Co., Alliance, Ohio, was the successful bidder for 75-span bucket crane for the Diamond Portland Cement Co., Middle Branch, Ohio, the bucket being of 2-cu. yd. capacity and to be furnished by the Blaw-Knox Co., Pittsburgh. The Shepard Electric Crane & Hoist Co., Montour Falls, N. Y., has been awarded a 5-ton ore bridge hoist with a lift of 100-ft. by the Cambria Steel Co., Johnstown, Pa. a 2-motor, 3-ton hoist for the Edgar Thomson works, and two 2-ton hoists for the Duquesne works of the Carnegie Steel Co. Inquiries for hoists are numerous, the local office of one leading maker having bids out on a total of 125. Bids recently went in against a blooming mill for the Steubenville, Ohio, works of the Wheeling Steel Corporation.

The Standard Sanitary Mfg. Co., Bessemer Building, Pittsburgh, manufacturer of sanitary fixtures, etc., has awarded a contract to the R. A. Groh Construction Co., 847 West North Avenue, for a one-story addition to its plant on Preble Avenue, 115 x 130 ft., to be used as a plating works.

The Oil Well Supply Co., Oil City, Pa., manufacturer of oil well equipment, will build two additions to its plant. One will be equipped with an electric furnace and auxiliary apparatus.

A vocational department will be installed in the new junior high school to be erected by the Board of Education, Oil City, Pa., estimated to cost about \$350,000. Plans will be prepared at once.

The Board of Education, Pittsburgh, has filed plans for a new high school at Chartiers and Hulton Avenues, to include a vocational department, estimated to cost about \$700,000. A list of equipment has been prepared for the vocational department in the high school on Howard Street, East Pittsburgh.

A one-story and basement repair and service shop, 25 x 40 ft., will be erected by the Mutual Telephone Co., 19-21 East Ninth Street, Erie, Pa., plans for which have been prepared by Cody, Hicks & Davidson, Ariel Building.

Machinery valued at \$50,000 was destroyed by fire, Jan. 11, at the Avella mine of the Pittsburgh & Meadowlands Coal Co., Avella, near Washington, Pa. Plans are under way for the immediate replacement.

Freight-handling machinery, etc., will be installed in the new five-story warehouse to be constructed on Maple Avenue, Johnstown, Pa., by the Johnstown Terminal Warehouse Co. now being organized. It will be 130 x 250 ft., and is estimated to cost about \$450,000. William Steele & Sons, Sixteenth and Arch streets, Philadelphia, are the architects and engineers.

The Board of Education, Brackenridge, Pa., has acquired property at Natrona Heights, for a new union high school, including vocational department, for Brackenridge and Harrison townships. It is estimated to cost about \$300,000.

The Clarion River Power Co., Foxburg, Pa., is completing surveys and will soon prepare plans for its proposed new hydroelectric generating plant on the Clarion River. It is proposed to build two main power plants in the vicinity of Clarion and Foxburg, respectively. The project is estimated to cost close to \$2,000,000.

Fire, Dec. 31, destroyed a portion of the plant at Mine No. 1 of the Ellsworth Colliery Co., Ellsworth, Pa., with loss estimated at about \$30,000, including equipment. It will be rebuilt.

The Resistant Alloy Casting Co., New Cumberland, W. Va., recently organized, has acquired the local foundry of the Davis Price Co., and will begin immediate operations. An extensive capacity will be developed.

The Chesapeake & Ohio Railroad Co., Baltimore, has tentative plans under way for its new repair shops at Huntington, W. Va.

The Bond Motor Co., Bluefield, W. Va., will break ground at once for a three-story automobile service and repair building estimated to cost close to \$50,000. Garry & Sheffy, Bluefield, are architects.

The Board of Education of the Glenville District, Linn, W. Va., is arranging a list of equipment for installation in the vocational department at the new two-story high school at Sand Fork, near Linn. J. A. Radcliffe is president of the board.

The Berkeley Garage Co., West Race Street, Martinsburg, W. Va., M. Doland, head, has awarded contract to the Cox Construction Co., 606 West King Street, for a new three-story automobile service and repair building, 90 x 115 ft., estimated to cost about \$50,000.

New England

Boston, Jan. 16.

A manufacturer of automatic screw machines has secured a \$50,000 order from a Middle Western maker of automobiles, a Maine paper mill has purchased a new 14 in. x 6 ft. lathe, while a 21-in upright drill, 15-in. shaper, and a fairly large air compressor, all used equipment, were purchased by local companies and gear cutting equipment by a Boston manufacturer of gears. These sales constitute practically all the business reported the past week. Users of machine tools and dealers are devoting most of their activities to inventories which partially explains the inactivity of the market.

The accumulation of prospective business continues, however, and has assumed proportions to warrant optimism. No large lists have developed, but there has been a noticeable increase in those involving from one to three or four tools, especially from manufacturers in the southern section of this territory. Much encouragement is derived from the fact that inquiries come from a wide range of manufacturers and concern a variety of equipment, generally conceded a sign of a general industrial revival in the making. Opinions as to when prospects in hand will develop vary considerably, but a majority of dealers are inclined to look for a fair resumption of bookings the latter part of this month or early in February. The press market possibly holds more promise than others, but practically all inquiries are for used equipment. Among new inquiries is one for a 10 ft. used shear from the Miles Mfg. Co., Plymouth, Mass., and for a 11-in x 6 ft. used lathe from the Hopkins Garage, Wilton, N. H.

No changes in prices for machine tools are reported. Some manufacturers of lathes are inclined to tighten up on prices. That is, they are making no changes in new discounts on the lathes, but discounts on the attachments appear to be growing smaller, which pulls down the average discount for the equipment complete.

Contract has been awarded for extensive changes in the foundry of the Union Metallic Cartridge Co., Bridgeport, Conn.

Plans have been revised for a plant, 60 x 116 ft., to be erected by the National Biscuit Co., North Liberty Street, Waterbury, Conn. A can department is included.

The Exchange Worsted Co., Uxbridge, Mass., will erect a coal handling plant. Carver, Macomber & West, Boston, are the engineers.

The Mohawk Mfg. Co., Waterbury, Conn., sheet brass goods, will move to 56-66 Hamlin Street, Middletown, Conn., about April 1 where property has been purchased to which a 50 x 50 ft. addition will be built.

The H. L. Judd Co., 42 South Cherry Street, Wallingford, Conn., metal products, has about completed plans for a five-story 80 x 100 ft. addition.

The plant of A. L. Adams, 307 Center Street, Bridgeport, Conn., cloth cutting and binding machinery manufacturer has been purchased by J. J. Musante, and others of Bridgeport, from the A. L. Adams Estate. A company will be organized to operate the works.

The Department of Public Works, Hartford, Conn., plans to remodel its property on Wells Street into a garage and repair shop. Paul Mason is superintendent.

Herchman & Levine, 223 Main Street, Hartford, Conn., are planning the construction of a two-story 85 x 190 ft. garage, service station and repair shop. F. C. Walz, 407 Trumbull Street, Hartford, is architect and bids will be called for shortly.

Julius Reibert, Mountain Road, East Hartford, Conn., has had plans completed for a one-story 55 x 220 ft. brick and concrete garage and repair shop on Park Street.

A vocational department will be installed in the new high school to be erected at Hartford, Conn., at a cost of over \$1,000,000. Bids will be taken soon.

Dr. M. H. Davitt, 525 North Main Street, Palmer, Mass., is contemplating the construction of a public garage and service station on North Main Street.

The Windham Mfg. Co., South Windham, Me., is having plans drawn for a hydroelectric generating plant at its textile mills.

The S. H. Wheeler Estate, 1188 Main Street, Bridgeport, Conn., is having revised plans prepared by C. F. Baron, architect, 79 Sage Street, for a three-story brick and reinforced concrete garage, service and repair shop, 100 x 120 ft., at a cost of \$100,000.

The American Hardware Corporation, New Britain, Conn., has acquired the factory of the New Britain Machine Co., used during the war for large gun assembling work. The new owner will use the building as an extension.

Bird & Son, Walpole, Mass., manufacturers of roofing,

will build a one-story addition, 80 x 220 ft. Charles T. Main, 201 Devonshire Street, Boston, is architect.

The Board of Education, Quincy, Mass., is taking bids for a new three-story high school, with two-story vocational school adjoining, and power house, estimated to cost about \$750,000. Cram & Ferguson, 248 Boylston Street, Boston, are architects.

Fire, Jan. 10, destroyed a portion of the plant of the Angier Mills, Ashland, Mass., manufacturer of waterproof paper products, including machinery, transmission apparatus and other equipment, with loss estimated at about \$200,000.

The Stanley-Boston Co., Boston, recently organized to represent the Stanley Motor Carriage Co., Newton, Mass., will operate a complete machine and repair works at 620 Commonwealth Avenue, with equipment for handling aluminum body work, engines, parts production, etc. Francis W. Bellows and G. H. McNear head the company.

The United Illuminating Co., New Haven, Conn., has had plans prepared for an addition to its power plant on Grand Avenue, including improvements in the present building. Westcott & Mapes, Inc., New Haven, are architects.

The Southern Berkshire Power & Electric Co., Rockdale, Mass., has work under way on a new hydroelectric power plant, with initial capacity of about 600-hp.

A vocational department will be installed in the new high school to be erected by the Board of Education, Revere, Mass., estimated to cost about \$250,000. E. I. Wilson, Beach Street, is architect.

Fire, Jan. 8, destroyed the plant of the Graphite Mines Corporation, Cranston, R. I., with loss estimated at about \$100,000, including equipment and stock.

The New England Power Co., Worcester, Mass., has completed plans and will commence the immediate erection of its new hydroelectric generating plant at Whittington, Vt., estimated to cost approximately \$1,000,000.

A vocational department will be installed in the new high school to be erected by the School Commission, Westfield, Mass., estimated to cost about \$200,000. Preliminary plans are being prepared by M. B. Harding, 83 Elm Street, architect.

Chicago

CHICAGO, Jan. 16.

While it cannot be said that buying is brisk, it is notable that numerous inquiries which have been hanging fire for some time are now coming to a head and some have already resulted in orders. One prominent dealer reports that if bookings should continue throughout the year at the rate of the first two weeks of 1922, his house would have no complaint to make. Much of the current inquiry is for machines desired to reduce production costs, or to enable the buyer to branch into new lines of manufacture.

The Santa Fe has purchased a 36-in. engine lathe in addition to the tools reported in this column as bought a week ago. Otherwise the local railroads have taken no further action on their lists. The Board of Education, South Bend, Ind., has made additional purchases for a junior high school. The orders include a 24-in. x 24-in. x 6-ft. planer, a 16-in. shaper, a No. 2 universal milling machine and a 16-in. x 10-ft. engine lathe. The Western Electric Co., Chicago, has placed a large order for special purpose machines with the Gisholt Machine Co., Madison, Wis. The Hannafin Mfg. Co., Chicago, recently bought miscellaneous equipment, including a broaching machine, engine lathe and a grinder. The Chicago Bridge & Iron Works has bought a 20-in. crank shaper. The list of the Streets Co., Chicago, mentioned in this column a week ago, was put out primarily to secure prices for estimating the cost of equipping its plant for the manufacture and repair of steel railroad cars. It is improbable that the company will take immediate action on the inquiry, but in view of the active buying of rolling stock by the railroads at the present time, machinery dealers are hopeful that the list will eventually be bought. The list follows in full:

One single end punch 60-in. throat with triple gag socket, 1 x 1 in.

One single end multiple punch with sufficient depth throat and hand operated spacing table and provided with gag sockets, for punching long angles, cover plates, etc., and motor.

One heavy bulldozer and motor, with sufficient capacity to form diaphragms and other parts of heavy car material, capacity approximately 300 tons; 1-in. stroke.

One plate shear and motor, for shearing and squaring plates used in steel car construction, approximately 5/8 x 144 in.

One 12-ft. x $\frac{1}{2}$ -in. bending brake and motor, for flanging steel car floor plates, end plates, etc.

One horizontal punch and motor, 15-in. throat, capacity 1 x 1 in.

One heavy-duty punch and shear and motor, capacity $2\frac{1}{2}$ x $1\frac{1}{2}$ in.

One multiple punch and motor, capacity 600 tons.

One 300-ton hydraulic press.

Two overhead electric traveling cranes, 10 tons capacity, 90-ft. span.

One 3-in. single head threading machine and motor.

One bulldozer and motor, face of cross head approximately 16 in. x 70 in., capacity, 390,000 lb.

One heavy duty drill press and motor, for drilling heavy material, capacity approximately $2\frac{1}{2}$ -in. to 3-in. hole.

Two single end punches and motors, provided with triple gag sockets, 15-in. throat, capacity $1\frac{1}{2}$ x 1 in., for punching I-beams, channels, etc.

One 16-in. engine lathe and motor.

One 300-ton car wheel and axle press and motor.

Two double end car axle lathes and motors.

Two 2-in. triple head bolt cutters and motors.

One 2-in. six-spindle nut tapper and motor.

One large blower and motor sufficient to take care of six blacksmith fires.

One $2\frac{1}{2}$ -in. upsetting, or forging, machine and motor.

One $\frac{1}{2}$ -in. bolt header and motor.

One $1\frac{1}{2}$ -in. bolt header and motor.

Two 200-lb. Bradley helve hammers and motors.

One eye bender and motor, to take stock $1\frac{1}{2}$ -in. diameter bent hot around a $2\frac{1}{2}$ -in. mandrel.

Two single head or single spindle drill presses and motors, to drill all sizes of holes up to 2 in. in diameter inclusive.

One 4-spindle drill press and motor to drill all sizes of holes up to 2 in. in diameter inclusive, also suitable for drilling arch bars.

One shaper and motor for handling tools used in steel car work, medium size.

One 1500-lb. steam hammer.

One standard size grindstone and motor.

Two emery wheel stands and motors, suitable for universal grinding.

One double end punch and shear and motor, 24-in. throats to punch $1\frac{1}{4}$ -in. hole in 1-in. material and for shearing long flats and rounds, 2-in. diameter and 6 x 1-in. flats. Shear blades placed lengthwise of machine.

One single end punch and shear and motor, 48-in. throat, to punch 2-in. hole in 1-in. material and for shearing $2\frac{1}{2}$ -in. rounds and 8 x 1-in. flat bars. Shear blades placed lengthwise of machine.

One automatic hack saw and motor, to cut all sizes of material up to 7 in. x 8 in.

One 10-ton electric overhead traveling crane with magnet; 50 ft. long center to center of crane rails; for runway over stripping tracks.

One alligator shear for scrap dock, for shearing scrap metal parts, approximately 8 x $1\frac{1}{2}$ -in. flats and 3-in. rounds.

No further changes in prices have been announced, except a reduction of about 20 per cent on precision bench lathes by the S. A. Potter Tool & Machine Works, New York.

C. Schults, 7251 Vernon Avenue, Chicago, has let contract for a one-story machine shop, 50 x 147 ft., at 6916-6918 Cottage Grove Avenue, to cost \$14,500.

The Big Four Artificial Ice Co. has had plans prepared by Frans Roy, 7817 South Shore Avenue, Chicago, for a one-story plant, triangular in shape, 134 x 152 x 488 ft., at 1917-1923 North Springfield Avenue, to cost \$35,000.

The Cicero Chicago Corrugated Co., 1542 South Fifty-first Court, Cicero, Ill., will reconstruct at once its one-story plant which was destroyed by fire on Jan. 7.

The Grigsby-Grunow-Hinds Co., 1900-1906 West Lake Street, Chicago, recently incorporated with \$150,000 capital stock, has leased 10,000 sq. ft. of floor space in the building at the address given and has purchased most of the equipment for the manufacture of electrical devices and automobile accessories. The officers include: President and general manager, B. J. Grigsby; vice-president, O. E. Grigsby; secretary and treasurer, W. C. Grunow; and assistant secretary and treasurer, O. Q. Hinds.

Waldo G. Gerhardt of the Bendix Engineering Co., South Bend, Ind., has secured a patent on a high compression motor which, it is said, can be successfully operated by any kind of oil. Plans are under way to organize a company and set up a plant in South Bend to manufacture the motor.

O. F. Chaffield, Escanaba, Mich., is negotiating for the purchase of the old electric light plant at Iron Mountain, which he proposes to remodel into a brass foundry.

The American Foundry & Mfg. Co., Kansas City, Mo., is being organized by Henry H. Akers to manufacture stoves, furnaces, hardware specialties and oil burners and has purchased a site of three acres, lying between Seventeenth Street, Eighteenth Street, Manchester Avenue and the Kansas City Southern Railroad tracks. Contract has been awarded for the erection of the first unit of the plant, 90 x 140 ft., to cost \$30,000. Directors of the company include: H. H. Akers, president and general manager; John T. Sullivan, president Kansas City Foundry Co.; Charles J. Klassen and William L. Krenzer, owners of the Central Pattern Works; Dallas Cooley, secretary-treasurer Kansas City Foundry Co.; H. Richter and O. S. Barrows, all of Kansas City.

Davenport, Iowa, is expected to call a special referendum on the proposed issuance of bonds to cover the cost of the erection of a municipal electric light and power plant. Alvord & Swazey, engineers, Chicago, have been retained to make a survey of the possibilities of the project.

The Board of Education, Peoria, Ill., has awarded contract to William M. Allen Sons & Co., 929 Jefferson Building, for an addition to the high school for manual training and vocational work. Dr. George Mitchell is president of the board.

The National Stamping & Electric Co., 424 South Clinton Street, Chicago, has acquired the plant and business of the Lindstrom-Smith Co., 3212-38 West Lake Street, manufacturer of electrical products, with adjoining site. An addition will be built and operations concentrated at this point, to include the manufacture of a combination stove, toaster and electric iron and other appliances.

A vocational department will be installed in the new two-story and basement junior high school to be erected at Clear Lake, Wis., estimated to cost about \$100,000. Plans are being prepared by Edwins & Edwins, 911 Northwestern Building, Minneapolis, Minn., architects.

The Great Western Railroad Co., Minneapolis, Minn., has tentative plans under way for new locomotive and car repair shops at Winona, Minn., estimated to cost \$200,000, including machinery.

The Board of Education, Shelby, Iowa, has rejected bids for its two-story and basement high school, 120 x 190 ft., to include vocational department, and will call for new bids in the spring. It is estimated to cost about \$150,000. John Latenson & Sons, 632 Peters Trust Building, Omaha, Neb., are architects. Roy F. Freeman is secretary of the board.

The Common Council, Naperville, Ill., has plans under way for its municipal electric light and power plant addition to cost about \$50,000.

A vocational department will be installed in the two-story and basement high school to be erected at Olivia, Minn., estimated to cost about \$160,000. W. L. Alban, Endicott Building, St. Paul, Minn., is architect. George E. Peterson is clerk of the board.

Baltimore

BALTIMORE, Jan. 16.

The American Concrete Tile & Products Co., 305 Gaither Building, Baltimore, recently organized with a capital of \$250,000, has plans under way for new works, estimated to cost about \$55,000. The machinery will cost approximately \$25,000. Work will commence at an early date. John E. Springer is president, and John W. Ritter, secretary and treasurer.

The Market Mfg. Co., 1021 Cathedral Street, Baltimore, will soon take bids for a machine shop and automobile service works, 50 x 85 ft., estimated to cost about \$22,000.

An ice-manufacturing plant will be constructed by the Southern Maryland Co-Operative Creamery Association, Waldorf, Md., recently organized, plans for which are being prepared by J. E. Withnall, architect, Waldorf. James P. Ryan is president.

The Revenue Department, Baltimore, Charles H. Holtzman, collector of the port, will install electric weighing machinery and other equipment, estimated to cost about \$100,000, at the new plant of the American Sugar Refining Co., now nearing completion, for Government inspection work. It is announced that the plant will be ready for operation on March 15.

The Yingling Auto & Carriage Works, Lee Street, Hagerstown, Md., has construction in progress on a one-story shop, 50 x 120 ft., at 237-43 Frederick Street. Harry Yingling is head.

The Veterans' Bureau, Washington, Col. Charles R. Forbes, director, will operate a large automobile instruction school at Camp Holabird, Md. The present Government automotive plant at this place will be utilized, with departments for every feature of car and motor truck work.

including parts manufacture, assembling, repairs, etc. It is expected to have accommodations for about 500 students.

The Red Ash Fuel Co., 315 Wyoming Street, Bluefield, W. Va., will install electrically-operated mining machinery, mechanical draft equipment, mine cars and other machinery at its properties at Red Ash, Va., estimated to cost in excess of \$150,000. Bids will be asked within a few weeks. D. C. Yates is president and manager.

Fire, Jan. 2, destroyed the mechanical department and equipment at the plant of the Electric City Brick Co., Augusta, Ga., with loss estimated at about \$25,000.

The Jarvis Storage Battery Co., 229 South Liberty Street, Winston-Salem, N. C., has awarded a contract to the E. E. Kinnoman Co., Winston-Salem, for a one-story plant, 70 x 100 ft. G. C. Jarvis is president.

The Board of Education, Commercial Building, Charlotte, N. C., will build a new two-story vocational school, estimated to cost about \$100,000. The Northeastern Construction Co., Charlotte, is contractor; C. C. Hook, Trust Building, is architect.

The City Council, Danville, Va., is planning for the installation of new machinery at the municipal power plant, including turbine, boilers and auxiliary operating equipment.

The Universal Heater & Mfg. Co., Waynesboro, Pa., C. W. Sexton, president, manufacturer of heating equipment, sheet metal products, etc., will establish a branch plant at 201 North College Street, Charlotte, N. C. Operations will commence at an early date.

The Cullowhee Normal & Industrial School, Cullowhee, N. C., is having plans prepared for a two-story and basement school, 50 x 200 ft., estimated to cost about \$100,000. Nelson & Cooper, Commercial Bank Building, Raleigh, N. C., are architects. A. C. Reynolds is president in charge.

The Hackney Brothers' Co., Wilson, N. C., will rebuild its automobile body and wagon plant, recently destroyed by fire with loss estimated at about \$350,000. T. J. Hackney is manager.

The State Board of Prison Control, Baltimore, Md., Robert D. Case, secretary, has asked bids for the erection of a workshop at the Maryland House of Correction to cost about \$40,000.

Plans are being considered by the city officials, Baltimore, Md., for the establishment of a central machine shop for repair work. Henry G. Perring, City Hall, is chief engineer.

Cleveland

CLEVELAND, Jan. 16.

The volume of machine-tool business and inquiries shows an improvement over December, but few orders are being placed for more than single machines. There is more activity in the Detroit market where the General Motors Corporation has placed six large horizontal boring mills, and a like number of machines have been purchased by a manufacturer of automatic brakes. A local machinery house reports that during the past 30 days it has received from the Detroit territory, mainly from the automotive industry, inquiries for machine tools aggregating approximately \$250,000, ranging from single machines up to one lot of 25 to 30 tools. While these are regarded as live inquiries, no reliable estimate can be made as to how much of the prospective business will be placed. Reports from Detroit indicate that some dealers are offering unusually liberal terms of payment to effect sales. The Toledo Metal Furniture Co., Toledo, Ohio, is inquiring for two punch presses.

The crane market continues quiet. The National Supply Co., Toledo, has an inquiry out for two 5-ton traveling cranes.

The Sterling Brass Co., 4612 St. Clair Avenue, Cleveland, maker of plumbers' brass goods, will erect a new one and two-story plant at 9600 St. Catherine's Avenue which will include a foundry and machine shop providing 40,000 sq. ft. of floor space. The company advises that it will purchase about \$50,000 worth of machinery, including foundry equipment and brass working machine tools.

The VisMe Pump Co., which has been operating a temporary plant at Ft. Wayne, Ind., will locate in Findlay, Ohio, where it will occupy a portion of the former Grant motor car plant. It is expected that operations will begin about Feb. 1. F. B. Rohrer is president and a number of Findlay and Ft. Wayne men are interested.

The Lima, Iron & Brass Foundry Co., Lima, Ohio, has under consideration plans for enlarging its plant and adding a malleable iron foundry. It also has under consideration a proposal to remove its plant to St. Marys, Ohio.

It is reported from Akron, Ohio, that Fred Claus and

Fred Meyers, formerly general manager and factory superintendent respectively, of the Cleveland Welding Division of the Hydraulic Pressed Steel Co., are planning to establish a plant in that city to manufacture steel bases for solid automobile tires and detachable and demountable rims for pneumatic tires.

The Pacific Tractor & Machinery Co., Bucyrus, Ohio, has been incorporated as a preliminary step to the formation of its sales organization for marketing a caterpillar type of tractor truck for small tractors, designed by C. A. Henneuse, formerly president Henneuse Tractor Co., Sacramento, Cal. The truck assembly or tractor truck is being made by the Hadfield-Penfield Steel Co., Bucyrus.

Fire recently destroyed the plant of the Canton Rim Co., Louisville, Ohio, causing a loss estimated at \$100,000.

Detroit

DETROIT, Jan. 16.

The Ford Motor Co., Detroit, has awarded contract to Everitt Winters, 742 Book Building, for one-story addition at River Rouge, 68 x 484 ft., with lean-to extension, 60 x 230 ft.

The Willys-Overland Co., Toledo, Ohio, will concentrate operations at the plant of the Wilson Foundry & Machine Co., Pontiac, Mich., a subsidiary, for the manufacture of motors for the Willys-Knight automobiles. The plant will be enlarged and considerable equipment removed from the Willys-Overland works at Elyria, Ohio, for installation. It is expected to adopt the increased operating schedule early in February. The Willys company will utilize two of the buildings of the former Flanders automobile plant at Pontiac for the assembling of Willys-Knight motors, and equipment for this purpose will be provided.

The Board of Education, City Hall, Grand Rapids, Mich., is taking bids until Jan. 30, for the erection of the first unit of its proposed new vocational training school, to be four-story, 100 x 175 ft., and estimated to cost about \$275,000. Williamson, Crow & Proctor, 511 Guilbert Building, are architects; W. W. Bradfield, Michigan Trust Building, is mechanical engineer. H. N. Morrill is business manager for the board.

The Champion Ignition Co., Flint, Mich., manufacturer of spark plugs and other ignition equipment, is planning to devote a portion of its plant to the manufacture of speedometers and parts, and complete precision machinery will be provided for this purpose. Albert Champion is president.

The Gagnier Stereotype Co., 525 Howard Street, Detroit, is having plans drawn for the erection of a new one-story foundry, 30 x 100 ft., on McKinstry Street, near Plumer Street, estimated to cost about \$60,000. Kasurin Brothers, 512 Empire Building, are the architects. Edmond Gagnier is president.

The Kalamazoo Sanitary Mfg. Co., Factory and Alcott streets, Kalamazoo, Mich., has completed plans for the erection of its proposed plant addition, but work will be held in temporary abeyance. The factory will be two stories, 122 x 400 ft., and is estimated to cost about \$200,000, including equipment.

The Oakland Motor Car Co., Pontiac, Mich., has just completed an addition to the motor plant at a cost of approximately \$500,000. This addition has added 200,000 ft. of floor space for manufacturing purposes. In all the plants of the Oakland Motor Car Co. there is a total of 1,270,500 sq. ft. of floor space. This area composes the entire floor space of the eight plants of the company at Pontiac and extends over a plot of land of approximately 28 acres.

Indiana

INDIANAPOLIS, Jan. 16.

The Reliance Foundry Co., Richmond, Ind., is having plans drawn for a new one-story foundry, 85 x 110 ft., estimated to cost \$80,000. J. Mueller & Co., Palladium Building, are architects.

The Board of Education, New Castle, Ind., will take bids about Feb. 1, for a two-story high school, 190 x 420 ft., to include a vocational department, estimated to cost \$200,000. Herbert Foltz, 843 Lemcke Annex, Indianapolis, is architect. Martin L. Koons is president of the board.

The Terre Haute, Indianapolis & Eastern Traction Co., Indianapolis, has tentative plans under way for an addition to its electric power plant, with installation to include two 30,000 kw. generators and auxiliary operating machinery. The expansion is estimated to cost \$1,000,000. The company has commenced the construction of an addition to its plant at Terre Haute, and a 10,000 kw. generating

unit will be installed at this station, with other machinery to bring the expenditure up to about \$400,000.

The Peille Co., Richmond, Ind., manufacturer of metal fireproof doors, etc., has awarded contract to the C. C. Heinemann & Sons Co., Marion, Ind., for a new two-story plant, 250 x 500 ft., estimated to cost in excess of \$150,000, including equipment.

The J. H. Krelpe Tin & Sheet Iron Works, 512 West Franklin Street, Indianapolis, is having plans drawn for a one-story building, 85 x 80 ft. Anderson & Stingle, 110 Upper Fourth Street, are architects.

The Board of Works, Hammond, Ind., will call for bids early in the spring for a new electrically-operated pumping plant, estimated to cost about \$90,000 with machinery. W. F. Bridge, Rimbach Block, is engineer. A. G. Kinert is city clerk.

The American Car & Foundry Co., Terre Haute, Ind., will build a new one-story power house, 50 x 70 ft.

The Board of Education, Plymouth, Ind., has commissioned Ernest W. Young, 512 Dean Building, South Bend, Ind., architect, to prepare plans for a new two-story junior and senior high school, including vocational department, estimated to cost about \$300,000. Jacob Schlosser is president of the board.

The Board of Sanitary Commissioners, City Hall, Indianapolis, has preliminary plans under way for a one-story power house, in connection with a new sewerage disposal plant, with total cost estimated at \$300,000. Charles H. Hurd, 1405 Merchants' Bank Building, is engineer.

The D. V. Reedy Elevator Co., Indianapolis manufacturer of passenger elevators, will erect a new plant at 520-522 South New Jersey Street, two-stories, 44 x 202 ft. A steel hoisting crane will be part of the equipment.

The Peerless Metal Products Co., Chicago, manufacturer of metal articles, has leased space at 109 West Tenth Street, Indianapolis, and expects to have it in operation within a month. A. E. Shirley, of Shirley Brothers, Indianapolis, is president of the company; J. A. Spahn, vice-president and Joseph P. Hanley, secretary-treasurer.

Cincinnati

CINCINNATI, Jan. 16.

There have been few developments in the machinery market the past week. While the number of orders booked has been small, an undercurrent of optimism exists among manufacturers and dealers regarding the immediate future, and it is expected that before the winter is over a larger operation of plants will be seen. Most of the orders booked are for single machines and come from widely scattered points. The Delaware, Lackawanna & Western is understood to have closed on its list of 40 tools. The Seaboard Air Line has bought some tools in addition to the list closed several weeks ago. A local manufacturer reports the receipt of a large order from Australia for small electrical tools. This is the first from this source in 16 months. The same firm also received a substantial order for Japan. General export business, however, is very quiet, although a local manufacturer recently booked an order from France. No new inquiries of consequence have been noted the past week, although a prospect in the immediate future will be the William Powell Co., valve manufacturer, Cincinnati. It has not yet made up its machinery requirements, but is expected to be in the market shortly for miscellaneous machines.

The William Powell Co., Cincinnati, valve manufacturer, has purchased the former plant of the Cincinnati Grinder Co. on Colerain Avenue, and will, after alterations are completed, equip it for the manufacture of iron valves. The present plant will be devoted entirely to the manufacture of brass valves and fittings. The property acquired contains 86,000 sq. ft. of floor space and the purchase also includes a number of cranes now installed for the handling of heavy material. Eventually the directors contemplate building a foundry to manufacture their own castings.

Seattle

SEATTLE, Jan. 9.

The City Council, McMinville, Ore., has preliminary plans under way for a hydroelectric generating plant on the Nestuoca River. It will consist of two units and is estimated to cost about \$250,000.

The Tacoma Ice & Refrigerating Co., South Twenty-sixth Street, Tacoma, Wash., is arranging for the erection of a new five-story ice-manufacturing and refrigerating plant at South Twenty-sixth and Holgate streets, estimated to cost about \$350,000, including machinery.

The Pacific Syringe Corporation, Toledo, Ore., will soon

begin operations at the former Government lumber mill in this section, recently acquired, and has plans under consideration for an addition to be equipped as a box factory and general planing mill.

Electric motors and other power equipment will be installed in the three-story printing plant, 100 x 100 ft., to be erected by the Telegram Publishing Co., Washington and Park streets, Portland, Ore. It is estimated to cost about \$160,000. Rasmussen & Grace, Chamber of Commerce Building, are architects and engineers.

The Columbia Wood Products Co., Rainier, Ore., recently organized with a capital of \$250,000, has acquired a local site for new works, estimated to cost \$100,000, with machinery. Plans for the initial unit have been completed.

J. H. Johnson, Tillamook and Hancock streets, Portland, Ore., has made application for permission to build a one-story machine shop and automobile repair works.

The Central South

ST. LOUIS, Jan. 16.

The Cape Girardeau Portland Cement Co., Cape Girardeau, Mo., will make extensions and improvements in its plant, including the installation of new power equipment, estimated to cost close to \$150,000. New grinding machinery and other equipment will be installed in the cement mill. Charles L. Harrison is president.

The Harper Oil & Refining Co., Henryetta, Okla., recently organized, with a capital of \$200,000, has concluded negotiations with the Chamber of Commerce for the purchase of 10 acres in the western section of the city for a new refinery, estimated to cost about \$100,000. Plans have been prepared and work will commence soon.

The Board of Education, Marshall, Mo., has selected Owen, Payson & Carswell, architects, 505 Interstate Building, Kansas City, Mo., to prepare plans for a new high school, to include vocational department, estimated to cost about \$250,000.

The Muskogee Vitrified Brick Co., Muskogee, Okla., has plans under way for a new plant, 60 x 150 ft., to replace its works recently destroyed by fire. It is estimated to cost about \$35,000. Frank A. Nicholson is president and manager.

The Nance Mfg. Co., Dederick Building, Knoxville, Tenn., is considering the establishment of a new factory to manufacture stamped metal products.

The St. Louis & San Francisco Railroad Co., St. Louis, is planning for extensions and improvements in its repair shops at Enid, Okla.

The City Council, Bristol, Tenn., has preliminary plans under way for a municipal hydroelectric generating plant on the Holston River. W. H. Rouse, mayor, is in charge.

The Belknap Hardware & Mfg. Co., Second and Washington streets, Louisville, is completing plans and will soon commence the erection of a building at its works, estimated to cost in excess of \$1,000,000. Graham, Anderson, Probst & White, Railway Exchange Building, Chicago, are architects.

The Board of Education, Eighth and Chestnut streets, Louisville, has selected D. X. Murphy & Brothers, architects, Louisville Trust Building, to prepare plans for an addition to the local vocational school, estimated to cost about \$50,000. J. N. Bloom is president of the board.

The Knoxville Cement Products Corporation, Knoxville, Tenn., recently organized, has acquired buildings and will install equipment for the manufacture of brick, blocks, tile and kindred products. C. P. Koehn is president and general manager.

Cosden & Co., 120 Broadway, New York, are planning for additions to their oil refinery at Tulsa, Okla., estimated to cost in excess of \$1,000,000, including equipment.

The Profit-Sharing Ice Co., Chattanooga, Tenn., will build a new one-story ice-manufacturing plant with capacity of about 50 tons per day. Bowdre Brown is president.

The Common Council, Okeene, Okla., is perfecting plans for enlargement of the municipal electric light and power plant, to include the installation of new equipment, estimated to cost about \$40,000. Louis Vogt is mayor.

The Pine Bluff Compress & Warehouse Co., Pine Bluff, Ark., has awarded contract to M. M. Redman, Pine Bluff, for an addition to its plant to cost about \$50,000.

The Doe River Sand Co., 208 Main Street, Johnson City, Tenn., is planning for the installation of machinery at its properties on the Doe River, including washing and screening equipment, elevator and hoist, power equipment, cars, etc. The company was incorporated recently. R. N. Campbell is president.

The Missouri & Pacific Railroad Co., St. Louis, has

awarded contract to T. S. Leake & Co., 606 South Dearborn Street, Chicago, for a new engine house and shop at Holsington, Kan.

The Board of Education, Independence, Kan., is taking new bids on revised plans for a two-story and basement junior high school, with vocational department, 150 x 200 ft., estimated to cost approximately \$200,000. N. S. Spencer & Son, 39 West Van Buren Street, Chicago, are architects.

The National Hardwood Co., 618 Bryant Building, Kansas City, Mo., has awarded contract for a new plant, 40 x 160 ft., to include band saw, finishing machinery and other wood-working equipment. J. W. Hoffman is president.

Peers & McGlone, Pine Bluff, Ark., manufacturer of automobile spokes, have had plans prepared for an addition to develop a daily capacity of about 30,000 spokes. Work will commence at once.

The Atoka Public Service Co., Atoka, Okla., is considering plans for a new one-story ice-manufacturing works, estimated to cost about \$50,000.

Henry Pilcher's Sons, Louisville, Ky., manufacturers of pipe organs, are in the market for universal swing boring machine, with a radius of 7 ft., the drill head to be equipped with a positive stop and steady enough that it may be used for counter sinking.

Milwaukee

MILWAUKEE, Jan. 16.

Although neither inquiry nor buying has assumed proportions that ordinarily would give the machine-tool market a tone of activity, a recovery from the low point reached during the holidays has set in. The situation the past week was better than that through December, and is reminiscent of the comparatively active days of October and November. It is confidently believed that from now until spring there will be slow but steady betterment, judging by the scope of requirements already in prospect, but probably not yet apparent on the surface. Boot and shoe industries and makers of textile machinery and equipment are seeking some tools. Automotive industries have not yet resumed buying, but inquiry is increasing due to the good results growing out of the national expositions in the way of distribution of 1922 production. One of the most encouraging features is the return of optimism to the agricultural implement trade, which is expected to develop some new tool requirements within a short time.

The Allis-Chalmers Mfg. Co., Milwaukee, has booked an order for a turbine and generator unit, involving about \$250,000, from the Daido Hydro-Electric Co., Nagoya, Japan.

The Bullard Mfg. Co., Madison, Wis., has been incorporated with a capital stock of \$25,000 by Earl J. Bullard, Jessie M. Bullard and Lucille E. Brown, to manufacture patented mechanical specialties designed by Mr. Bullard, especially a piston ring. It is intended to establish a plant eventually, although for the present production will be effected under contract. Offices have been established at 219-220 Washington Building.

The Raymond Mfg. Co., Milwaukee, a new \$80,000 corporation, organized to manufacture automotive accessories and parts and mechanical specialties, has acquired a site on Richards Street, near the northern city limits, and will build a one-story brick machine shop, 40 x 80 ft., which will require a small complement of machinery, with individual electric motor-drive, served by purchased current. Charles A. Raymond, 77 Cawker Building, is president.

The Hartford Tool & Machine Co., Hartford, Wis., has plans for a new one-story machine shop, 50 x 90 ft., which will be built early in the spring to replace the one destroyed by fire recently. The investment will be about \$25,000, including equipment. Fred F. Jordan is proprietor.

M. R. Carpenter, 105 North Clark Street, Chicago, architect and engineer, is preparing plans for an artificial ice plant, 50 x 100 ft., one-story, to be erected at Beloit, Wis., for an unidentified local interest. The cost will be \$40,000.

The New-Way Mfg. Co., Eau Claire, Wis., manufacturer of concrete mixers and other building and construction equipment, has decided to move to Chippewa Falls, Wis., where a site has been acquired for a new machine and assembling shop, 50 x 100 ft. The contract for erecting the shop has been let to Tschopp, Durch & Camastral, local contractors. For the present only a small list of additional equipment will be purchased. A. H. Behrens is vice-president and general manager.

The Board of Education, District No. 2, West DePere, Wis., will take bids about Feb. 10 for a new high school and vocational training institute, 76 x 130 and 80 x 135 ft., two stories and basement, designed by Foeller, Schober & Benton, architects, Green Bay, Wis. The cost is estimated at \$210,000, including all equipment. James J. Hughes is secretary of the board.

The Board of Education, Eau Claire, Wis., will proceed with the erection of a new high school, to contain manual training and domestic science facilities. Competitive plans are being asked from architects. The appropriation amounts to \$500,000. Miss Emma Schroeder is clerk of the board.

The Board of Education, Birchwood, Wis., has let the general contract to Schaefer & Olson, Chippewa Falls, Wis., for a new high school and vocational training institute to cost about \$175,000. The architect is Edward Tough, Madison, Wis.

The Farmers Produce Co., Chippewa Falls, Wis., will build a \$80,000 addition to its store and warehouse, to be used principally for cold storage purposes. It will be four stories and basement, 30 x 132 ft., and will require an artificial ice producing unit, new boilers, etc. Fred Anderson, 15 West Central Street, is general manager.

California

SAN FRANCISCO, Jan. 9.

The Durant Motors Co., Oakland, Cal., a subsidiary of Durant Motors, Inc., New York, is awarding a number of sub-contracts for its new two-story plant, at East Fourteenth Street and the city limits, 800 x 800 ft., including four wings. Work is under way. It is estimated to cost about \$750,000, including machinery. The P. J. Walker Co., Monadnock Building, San Francisco, has the general contract. H. J. Brunnier, Sharon Building, San Francisco, is engineer.

A. B. Atkinson, head of the Oak Park Lumber Co., Sacramento, Cal., is organizing a company to build and operate an ice and cold storage plant. Plans have been prepared for a building, estimated to cost about \$80,000, including machinery.

The American Aluminum-Metal Products Co., Los Angeles, is taking bids through Richard D. King, architect, 519 Van Nuys Building, for its new plant at Burbank. It will consist of seven buildings and is estimated to cost in excess of \$100,000.

The Union Ice Co., 354 Pine Street, San Francisco, is completing arrangements for a one-story ice-manufacturing plant at Napa, Cal., estimated to cost about \$50,000. W. H. Toepke, 943 Market Street, San Francisco, is architect.

The Washington Iron Works, 1446 Sacramento Street, Los Angeles, has awarded a contract to John F. Kuhns, 810 Federa Street, for a one-story building, 135 x 187 ft., at Eighth and Mateo streets, estimated to cost about \$26,000.

The Industrial Mfg. Co., Lodi, Cal., recently organized with a capital of \$300,000, is planning for the establishment of a works to manufacture pumping machinery and parts. Dean H. Thompson and William C. Allen, both of Lodi, head the company.

The George H. Dorrman Steel Co., Monadnock Building, San Francisco, has leased a building on Adeline Street, Oakland, Cal., totaling about 15,000 sq. ft., for extensions.

The Pacific Fruit Express Co., 65 Market Street, San Francisco, a subsidiary of the Southern Pacific Railroad Co., will commence the immediate erection of a new ice-manufacturing and railroad car precooling plant at Calwa, Cal., estimated to cost about \$85,000.

The Merced Irrigation District, Merced, Cal., has commissioned R. C. Starr, engineer of the San Joaquin Light & Power Corporation, Fresno, Cal., to prepare plans for its hydroelectric generating plant on the Merced River, estimated to cost in excess of \$1,500,000.

The Westinghouse Electric & Mfg. Co., Los Angeles, is having plans prepared for a six-story, reinforced-concrete distributing building, 170 x 289 ft., at Fifth and San Pedro streets, estimated to cost about \$700,000, with equipment, which will include five traveling cranes, eight elevators, trucks and other material-handling and conveying equipment. Noerenberg & Johnson, Los Angeles Railway Building, are architects.

The Gulf States

BIRMINGHAM, Jan. 16.

The Chickasaw Shipbuilding & Car Co., Mobile, Ala., a subsidiary of the United States Steel Corporation, is arranging to discontinue shipbuilding work and will devote the entire plant to the manufacture of railroad cars. The initial work will be 2000 cars for the Seaboard Air Line.

The Southwestern Gas & Electric Co., Shreveport, La., will install a new generating unit and auxiliary operating equipment. The work is estimated to cost \$150,000.

The Valley Tile & Concrete Co., San Benito, Tex., recently organized, has acquired a site and will establish a plant for the manufacture of tile and concrete products. Machinery

will be installed at an early date. G. W. Wilkerson is president.

The Texas Automotive Co., Dallas, Tex., will operate a machine and repair department for heavy work on the third floor of the building now occupied. J. R. Roach is president.

At a special election, Jan. 3, citizens of Vernon, Tex., approved a bond issue of \$100,000 for an electric light and power plant.

The Orange Water, Ice & Light Co., Orange, Tex., will commence work immediately on the enlargement of its electric power plant with the installation of new machinery estimated to cost about \$50,000.

The City Council, Orlando, Fla., has preliminary plans in preparation for additions and improvements in the municipal electric light and power plant, estimated to cost in excess of \$100,000.

The Common Council, Wellington, Tex., has plans nearing completion for the erection of a municipal electric light and power plant to cost about \$50,000. Bonds for this amount recently were approved.

The Stacy Co., Dallas, Tex., is considering the purchase of a site for the erection of a new plant for the manufacture of cotton cleaning machinery and parts. The company recently increased its capital to \$50,000.

The Osceola Cypress Co., Osceola, Fla., is planning for the purchase of a 10-ton locomotive crane.

A vocational training department will be installed in the new high school to be erected by the Board of Education, Orlando, Fla. Preliminary plans are being prepared.

Crescent City, Fla., is planning for the erection of an addition to the municipal electric power plant. A. B. Harbison is chairman of board of trustees.

The Atchison, Topeka & Santa Fe Railroad is reported to be planning for additions and improvements in its repair shops at Cleburne, Tex.

The Edna Light, Ice & Water Co., Edna, Tex., has plans nearing completion for extensions in its local electric power plant, to include new engine, generator, switchboard and other electrical equipment. Rudolph Linnarts is secretary and manager.

Faria, Tex., is planning for the installation of a complete waterworks plant and system to cost about \$1,000,000. It will include an electrically-operated pumping plant and purification works, with capacity of 3,000,000 gal.; water tank and tower with capacity of 4,000,000 gal.; and about 4½ miles of cast iron pipe of various sizes. John B. Hawley, Calton Exchange Building, Fort Worth, Tex., is consulting engineer for the project.

Canada

TORONTO, Jan. 16.

The machine tool market in this section is slowly reviving after the period of stagnation during the past month. While sales are still confined to one or two tools, buyers are beginning to enter the market in larger numbers. The chief buying, however, is for replacement purposes. Industrial interests which are preparing to establish plants in the Dominion have not advanced far enough with their programs to enable them to enter the market and as a consequence equipment buying is being deferred, but these interests are sending out inquiries and are receiving such data as will enable them to buy when the time comes. The Canadian National Railways is entering the market from time to time with small lots, but has not resumed buying on a large scale. A limited amount of equipment is also going to automobile plants for renewal purposes, and while it is a fact that several large automobile works are underway in Ontario and Quebec they have not entered the market or placed orders for the machinery which will be required. The demand for small tools is making some headway and while consumers are not buying in large quantities, they are entering the market frequently for small lots.

The Town Council, Wlarton, Ont., plans the installation of an electric pump and engine for the waterworks plant to cost \$10,000.

J. D. Best, Glencoe, Ont., is in the market for equipment for drilling oil wells.

Gropp Brothers, Penetanguishene, Ont., are in the market for sawmill machinery, boiler, engine, etc.

W. W. Avey, Norwich, Ont., is in the market for equipment for a planing mill, including engine, boiler, etc.

IRON AND INDUSTRIAL STOCKS

Values in General Have Improved During the Past Week

Iron and security values in general have improved the past week on a resumption of moderate investment buying. Renewed investment confidence evidently is based on something beyond further increases in idle freight cars, the many price adjustments on manufactured iron, steel and cotton products, the continued lack of commodities buying in volume, the late developments in international affairs, and the other straws that point to the fact that domestic industrial affairs are still in a very mixed and uncertain condition. That something apparently is based on the money market. Time and commercial paper money rates in the East have dropped below the 5 per cent level for the first time in more than four years, and Federal Bank discounts also are lower in the East. All of which means frozen credits are nearing the vanishing point, and idle money is growing more and more a problem with Eastern bankers. Nothing breeds good business more quickly than surplus funds in banks. Sooner or later, the easier money will spread from East to West.

The range of prices on active iron and industrial stocks from Monday of last week to Monday of this week was as follows:

Allis-Chal. com.. 38½-39%	Int. Har. com... 79½-83
Allis-Chal. pf... 88-90	Int. Har. pf... -106
Am. Can com... 32½-34%	Lack. Steel... 44½-46%
Am. Can pf... 94½-97½	Midvale Steel... 28½-30%
Am. C. & F. com.. 141-146	Nat.-Acme... 10½-11½
Am. Loco. com.. 102½-105%	Nat. E. & S. com. 30%-34%
Am. Loco. pf... 112-113	Nova Scotia Stl. 23½-24%
Am. Rad. com.. 83½-84	Press. Steel com. 63-64
Am. Stl. F. com. 31%-33	Rty. S. Spg. com. 94-98½
Am. Stl. F. pf... -96½	Replote Steel... 26½-28½
Bald. Loco. com. 92%-96½	Republic com.. 51½-53½
Bald. Loco. pf. 104-104½	Republic pf... -85
Beth. Steel com.. 51-52	Sloss com... 26-36½
Beth. Stl. Cl. B.. 55½-58½	Superior Steel... -26½
Beth. Stl. 8% pf. 105-106	Un. Alloy Steel... 25-26½
Chic. Pneu. Tool 60-60%	U. S. Pipe com.. 16½-16%
Colo. Fuel... 24-25½	U. S. Pipe pf... 50-51
Cruc. Steel com.. 59%-65	U. S. Steel com. 82%-84%
Cruc. Steel pf... 80½-82	U. S. Steel pf... 115-118
Gen. Elec. 136-141	Vanadium Steel. 30½-31%
Ill. No. Ore Cert. 31½-32	Va. I. C. & C... 86-87½
Gulf States Steel 44%-51%	Westhouse Elec. 49½-50%

Wire Goods Co. Increases Capital

Notification has been made to the Massachusetts commissioner of corporations by the Wire Goods Co., Worcester, Mass., of an increase in the capital stock from \$125,000 to \$1,000,000, by an issue of 8750 new shares, par \$100. Of the new stock, 4836 shares will be issued as a stock dividend.

The increase in capitalization primarily is for the purpose of absorbing the stock capitalization of the Cassidy, Fairbanks Co., Chicago, the Andrews Wire & Iron Works, Rockford, Ill., and the Andrews Wire Works, Ltd., Walford, Ont. Final action on the merger of these three companies with the Wire Goods Co. will be taken this week, upon the return of Reginald Washburn, president Wire Goods Co., from the West. The Washburn interests for some time have been credited with owning a substantial interest in the involved three companies. Present plans call for the operation of the four plants under a Massachusetts charter.

Industrial Finance

The plant of the Franklin Tractor Co., Greenville, Ohio, in liquidation, will be sold at public auction on Jan. 24, this decision having been come to at a meeting of the creditors of the company. The entire plants will be sold, including buildings and equipment.

The Federal Court, Detroit, has issued an order authorizing the receivers for the Lincoln Motor Corporation, Detroit, manufacturer of automobiles, to offer the plant at Warren and Livernois streets and property of the company at auction on Feb. 4. The court has placed a minimum price of \$8,000,000 on the assets.

The Peninsular Milled Screw Co., of Detroit, has increased its capitalization from \$35,000 to \$400,000.

The H. S. Lee Foundry & Machine Co., of Plymouth, Mich., has increased its capitalization from \$50,000 to \$100,000.

Altamus & Prindle, steel and iron products, ores and ferroalloys, Grand Central Terminal, New York, have been appointed eastern representatives of the Steel Plate Products Co., Pottstown, Pa.

Current Metal Prices

On Small Lots, Delivered from Merchants' Stocks, New York City

The following quotations are made by New York City warehouses.

As there are many consumers whose requirements are not sufficiently heavy to warrant their placing orders with manufacturers for shipment in carload lots from mills, these prices are given for their convenience.

On a number of articles the base price only is given, it being impossible to name every size.

The wholesale prices at which large lots are sold by manufacturers for direct shipment from mills are given in the market reports appearing in a preceding part of THE IRON AGE under the general heading of "Iron and Steel Markets" and "Non-ferrous Metals."

Iron and Soft Steel Bars and Shapes

Bars:	Per Lb.
Refined bars, base price	2.53c.
Swedish bars, base price	10.00c.
Soft steel bars, base price	2.53c.
Hoops, base price	3.38c.
Bands, base price	3.13c.
Beams and channels, angles and tees	
3 in. x ¼ in. and larger, base	2.63c.
Channels, angles and tees under 3 in. x ¼ in., base	2.53c.

Merchant Steel

	Per Lb.
Tire, 1½ x ½ in. and larger	2.50c.
(Smooth finish, 1 to 2½ x ¼ in. and larger)	2.70c.
Toe calk, ½ x ½ in. and larger	3.20c.
Cold-rolled strip, soft and quarter hard	6.25c. to 7.25c.
Open-hearth spring steel	3.55c. to 6c.
Shafting and Screw Stock:	
Rounds	3.45c.
Squares, flats and hex.	3.95c.
Standard cast steel, base price	12.00c.
Extra cast steel	17.00c.
Special cast steel	22.00c.

Tank Plates—Steel

¼ in. and heavier	2.63c.
-------------------	--------

Sheets

Blue Annealed

	Per Lb.
No. 10	3.28c. to 3.53c.
No. 12	3.33c. to 3.58c.
No. 14	3.38c. to 3.63c.
No. 16	3.48c. to 3.73c.

Box Annealed—Black

	Soft Steel C. R. One Pass Per Lb.	Blued Stove Pipe Sheet, Per Lb.
Nos. 18 to 20	3.65c. to 3.80c.	
Nos. 22 and 24	3.70c. to 3.85c.	4.10c.
No. 26	3.75c. to 3.90c.	4.15c.
No. 28	3.85c. to 4.00c.	4.25c.
No. 30	3.10c. to 4.25c.	
No. 28 and lighter, 36 in. wide, 10c. higher.		

Galvanized

	Per Lb.
No. 14	3.95c. to 4.10c.
No. 16	4.10c. to 4.25c.
Nos. 18 and 20	4.25c. to 4.40c.
Nos. 22 and 24	4.40c. to 4.55c.
No. 26	4.55c. to 4.70c.
No. 27	4.70c. to 4.85c.
No. 28	4.85c. to 5.00c.
No. 30	5.35c. to 5.50c.
No. 28 and lighter, 36 in. wide, 20c. higher.	

Welded Pipe

Standard Steel

	Black Galv.	Wrought Iron	Black Galv.
½ in. Butt...	—56 —40	¾ in. Butt...	—30 —13
¾ in. Butt...	—61 —47	1½ in. Butt...	—32 —15
1-3 in. Butt...	—63 —49	2 in. Lap...	—27 —10
3½-6 in. Lap...	—60 —46	2½-6 in. Lap...	—30 —15
7-8 in. Lap...	—58 —34	7-12 in. Lap...	—23 —7
9-12 in. Lap...	—55 —33		

Steel Wire

BASED PRICE* ON NO. 9 GAGE AND COARSE

	Per Lb.
Bright basic	3.50c. to 3.75c.
Annealed soft	3.50c. to 3.75c.
Galvanized annealed	4.25c. to 4.50c.
Coppered basic	4.00c. to 4.25c.
Tinned soft Bessemer	5.50c. to 5.75c.

*Regular extras for lighter gage.

Brass Sheet, Rod, Tube and Wire

BASE PRICE

High brass sheet	17¼c. to 17½c.
High brass wire	17¼c. to 17½c.
Brass rod	14¼c. to 15 c.
Brass tube, brazed	26 c. to 27½c.
Brass tube, seamless	18¼c. to 19 c.
Copper tube, seamless	21¼c.

Copper Sheets

Sheet copper, hot rolled, 24 oz., 21¼c. per lb. base.	
Cold rolled, 14 oz. and heavier, 2c. per lb. advance over hot rolled.	

Tin Plates

Bright Tin	Grade	Grade	Coke—14-20	Primes	Wasters
	"AAA"	"A"			
	Charcoal	Charcoal			
	14x20	14x20			
IC	\$10.00	\$8.50	80 lb...	\$6.05	\$5.80
IX	11.25	10.00	90 lb...	6.15	5.90
IXX	13.00	11.50	100 lb...	6.25	6.00
IXXX	14.75	13.25	IC	6.40	6.15
IXXXX	16.25	15.00	IX	7.40	7.15
			IXX	8.40	8.15
			IXXX	9.40	9.15
			IXXXX	10.40	10.15

Terne Plates

8-lb. Coating 14 x 20

100 lb.	\$7.00
IC	7.25
IX	7.50
Fire door stock	10.00

Tin

Straits, pig	85c.
Bar	40c. to 45c.

Copper

Lake ingot	16 c.
Electrolytic	15¼c.
Casting	15¼c.

Spelter and Sheet Zinc

Western spelter	6¼c. to 7c.
Sheet zinc, No. 9 base, casks	10¼c. open 11c.

Lead and Solder*

American pig lead	5¼c. to 5½c.
Bar lead	6¼c. to 7½c.
Solder, ½ and ¾ guaranteed	27c.
No. 1 solder	25c.
Refined solder	21c.

*Prices of solder indicated by private brand vary according to composition.

Babbitt Metal

Best grade, per lb.	85c.
Commercial grade, per lb.	80c.
Grade D, per lb.	85c.

Antimony

Asiatic	5¼c. to 6¼c.
---------	--------------

Aluminum

No. 1 aluminum (guaranteed over 99 per cent pure), in ingots for remelting, per lb.	26c. to 28c.
---	--------------

Old Metals

The market is quiet with a strong undertone. Dealers' buying prices are nominally as follows:

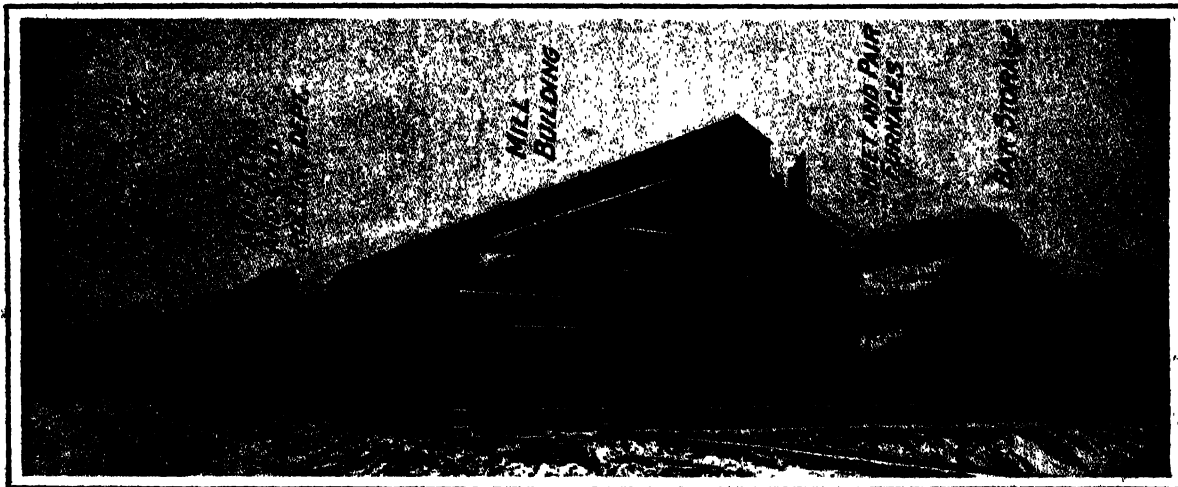
	Cents Per Lb.
Copper, heavy crucible	11.25
Copper, heavy wire	10.75
Copper, light and bottoms	8.25
Brass, heavy	5.50
Brass, light	4.50
Heavy machine composition	3.00
No. 1 yellow brass turnings	5.50
No. 1 red brass or composition turnings	7.25
Lead, heavy	3.75
Lead, tin	2.50
Spent	2.50

THE IRON AGE

New York, January 26, 1922

ESTABLISHED 1855

VOL. 109, No. 4



Sheet Mill of the Otis Steel Company

Features Include Staggered Arrangement of Furnaces—Powdered Coal Used—Plant Notable for Its Applications of Modern Equipment and Design

THE new sheet mill plant of the Otis Steel Co., Cleveland, built as an extension of its Riverside Works, has a number of distinctive features. Among the most prominent is the arrangement for the convenient handling of material, and consequently, the economy in operation. The bar storage department is located at the side of the furnace and mill departments directly back of the furnaces, which reduces the amount of handling of raw material. Sheet bars in storage under roof are taken to the bar shear as required and on leaving the shear the crane places them back of the pair furnaces. Rolled sheets go from the hot mills to the squaring shears on the opposite side of the mill building, and from there to the shear bay back of the shears where ample storeroom is provided, so they can be left in storage until they are wanted in the cold rolling and annealing department. The plant is entirely electrically operated.

The excellent lighting of the plant is another important feature. The buildings are arranged and the roof designed so that more daylight is admitted than in mill buildings of the more common design. Although there are four adjoining buildings, making virtually one building 231 ft. wide, considerable wall surface is provided for continuous window sections along the connecting sides of the buildings. The daylight thus admitted supplements that which enters through the continuous windows in the outer side walls.

The plant is a flexible one designed for making all kinds of sheets and in all finishes, its product including full finished sheets for the automobile trade. With this new sheet mill as an addition to its other plants, the company is equipped to make a line of mill products

extending from heavy plates down to sheets in the lightest gages.

The new plant is an eight hot mill plant with the mills arranged in two trains with separate drives and each finishing mill has its own roughing stand. Powdered coal is used for fuel both in the sheet and pair furnaces and in the annealing furnaces. With the plant arrangement back travel of material is avoided and the amount of handling required in the movement of sheets up to the time they reach the shipping platform appears to have been reduced to a minimum. From the squaring shears sheets are carried in a straight line to the adjoining cold rolling and annealing building, which is virtually an extension of the shear and mill buildings. On one side of the annealing building is the pickling department close to the mills. The annealing furnaces extend along the building beyond the pickling department and are a considerable distance from the hot mills. Connected to the annealing department on the opposite side is the warehouse. The shipping platform as well as the bar storage department are under cover.

The main mill building is 90 ft. wide. On one side is the bar storage building, 75 ft. wide, and connecting the two is a lean-to 26 ft. wide in which are located the sheet and pair furnaces. Adjoining the mill building on the opposite side is the shear department, 40 ft. wide. These connected buildings are 456 ft. in length.

Extending from the lower end of the shear and mill building, to which it is connected, is the annealing and cold rolling department, that occupies a building 80 x 500 ft. On one side of this is a lean-to 31 ft. 6 in. x 240 ft., in which the annealing furnaces are located,

and attached on the same side is the pickling department, 50 x 120 ft. The warehouse adjoining the annealing department on the opposite side is 75 x 380 ft.

Sheet bars are brought into the bar storage department on a depressed railroad track that extends the length of this building on the outer side. The building is served by a 10-ton traveling crane. Near the center is a United Engineering & Foundry Co. bar shear driven by a 25-hp. motor. Sheet bars are delivered to an inclined skid table 36 ft. long, from which they are moved to an adjoining roller table that serves the bar shear. Back of the shears is a cradle in which the sheared bars are piled, a man with a hook arranging these in four stacks as they pass from the shear to

with the finishing and roughing stands alternating. Each train is composed of 35 to 55-in. mills, all rolls being 30 in. in diameter. This gives a capacity for rolling sheets up to 48 in. in width. Two of the roughing mills have top rolls balanced with electrically operated screw downs operated by 50-hp. motors. These stands are used for rolling sheets in the heavier gages. All mills were supplied by the Mackintosh-Hemphill Co., Pittsburgh, except the rolls, which were made by the Otis company.

Each mill train is driven by an Allis-Chalmers 1000-hp. induction motor operating at 250 r.p.m. and located in the center of the mill train. The speed of the rolls is reduced to 32 r.p.m. through a Falk her-



The Charging End of One of the Double Continuous Pair Furnaces and the Electrically Operated Charging Device. Back of the column at the left is one of the sheet furnaces and the fuel supply line that connects to this furnace. Above is one of the powdered coal bins

the cradle. The cradle has a capacity of approximately 250 bars. When the cradle is full a chain or rope is swung around the packs and the crane places them in front of the furnaces. This cradle is a temporary arrangement, as it is being replaced with three piler cradles and three cars on which the cradles will be pushed when loaded so that there will be no interruption of the shear. A sheet bar pickling tank will also be installed in the storage building.

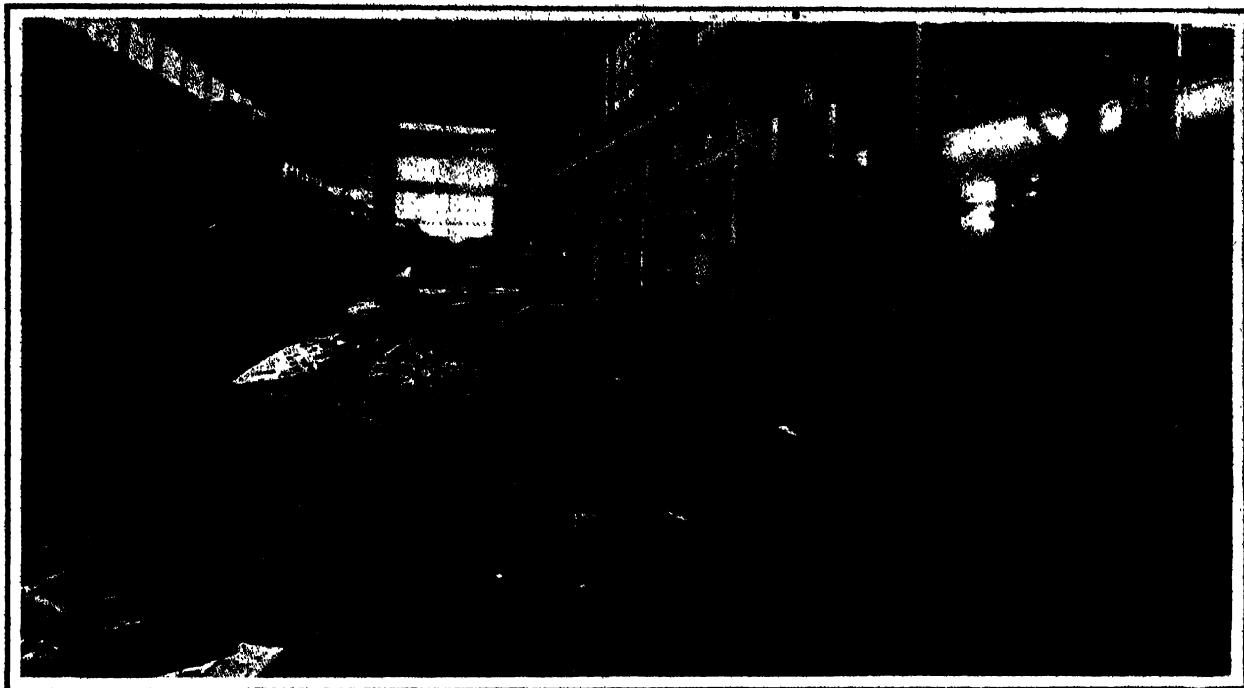
Instead of having combination furnaces, the plant has separate sheet and pair furnaces. There are four double continuous pair furnaces and eight sheet furnaces. The furnaces are placed in a staggered position, the sheet furnaces being close to the mill trains and the pair furnaces set several feet back, between the sheet furnaces and close to the bar yard. The furnaces are of a standard type supplied by the Geo. J. Hagan Co., Pittsburgh. The pair furnaces are charged with electrically operated pushers supplied by the Hagan company.

The hot mills consist of eight finishing and eight roughing stands, eight stands in each duplicate train,

ringbone gear with a reduction of approximately 8 to 1. Connected to the reduction gear shaft are two 29,000-lb. flywheels.

An interesting feature of the motor installation is the adoption of two types of motor control. One motor has the Westinghouse notch back system of control, and the other, the Allis-Chalmers liquid slip regulator. This gives an opportunity for comparing the two types of control under exactly similar operating conditions. In this connection, it might be mentioned that in the old plant the company is using the General Electric notch back relay control, so that it has the three types of motor control at its Riverside Works. The controls are inclosed in separate brick houses located between the sheet furnaces, where they are protected from dirt and rattle. The electric current is supplied from the power house at the old plant, being carried to the new plant in underground conduits. The steam for the picklers and doublers and the compressed air supply also come from this power house.

To provide for the comfort of the men, water-cooled standings of the Baird type are located beneath the



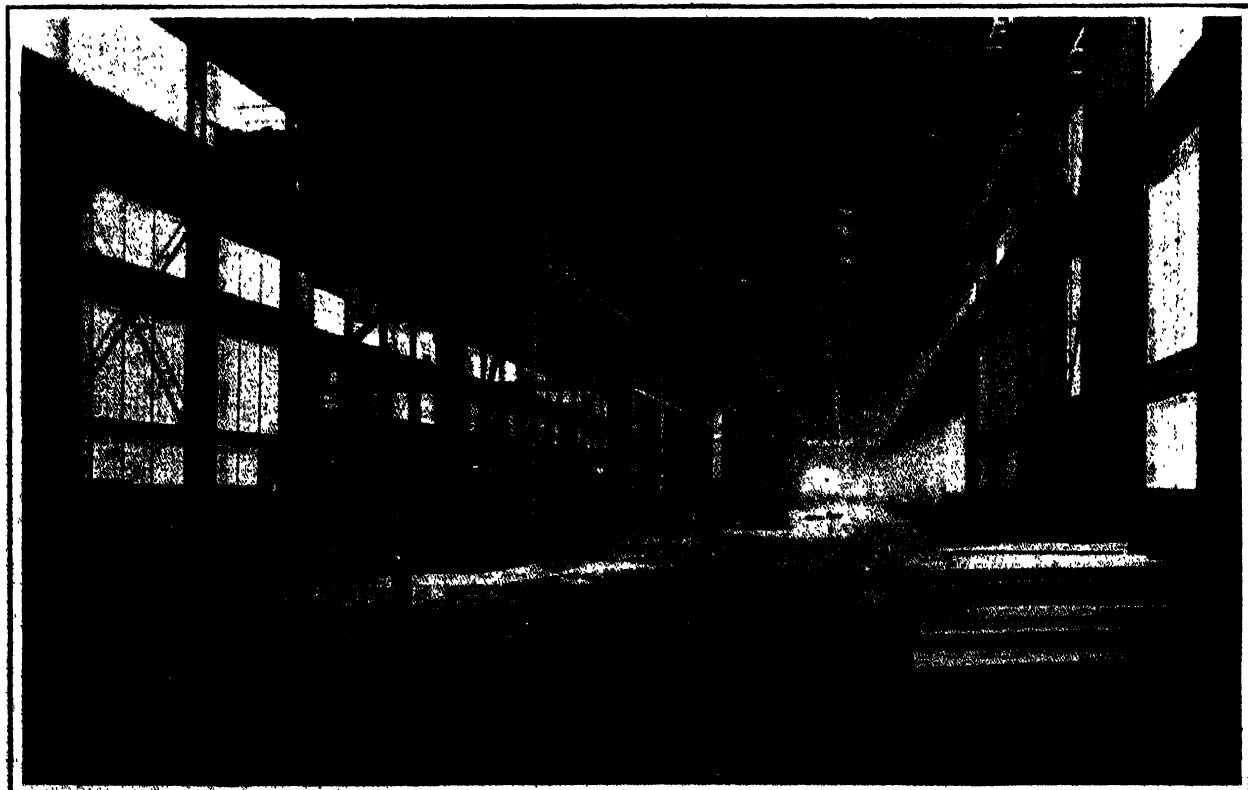
The Furnaces Are Located in a Leanto Adjoining the Mill Building. This picture shows the staggered position of the furnaces, the double pair furnace at the right being several feet further back than the sheet furnaces. The two roughing mill stands at the left adjoining one of the drives, not shown, have electrically operated screw-downs. This picture shows some of the steam operated doublers

floor between the furnaces and hot mill stands. Between the mills and furnaces are steam operated doublers, one for each pair of mills. These were supplied by the United Engineering & Foundry Co., Pittsburgh.

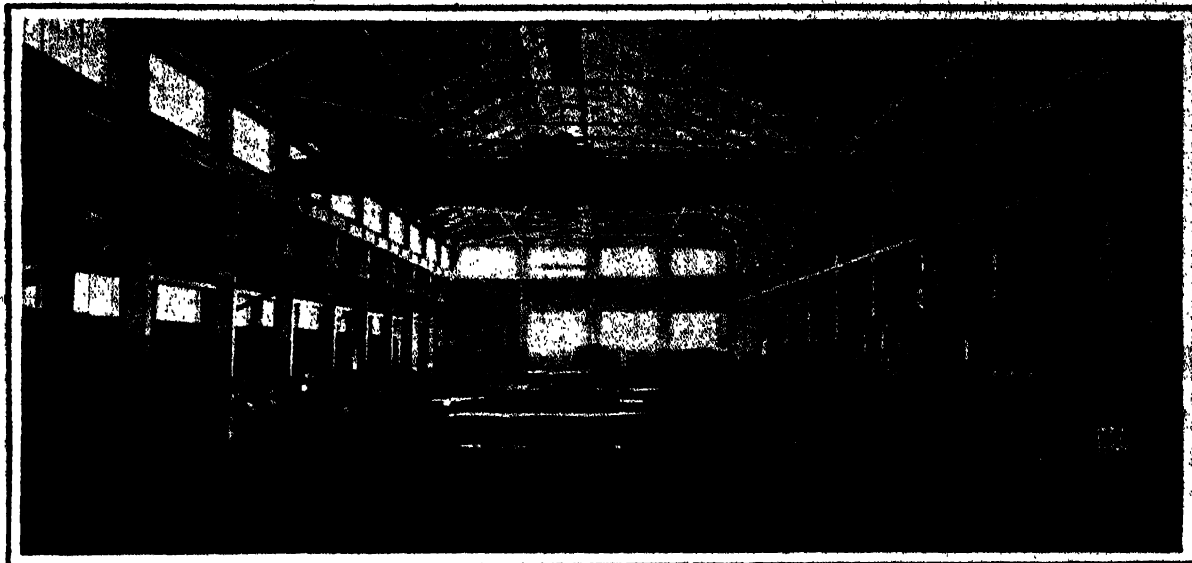
Four 150-in. squaring shears, one for two mills, are located back of the finishing mills on the opposite side of the mill building. Sheets pass from the back of the shears into the adjoining shear building. With the shears in the mill building, the entire 40-ft. bay of the

shear building is left free for the handling of stock. The shears are driven by 15-hp. motors. They were supplied by the Erie Foundry Co., Erie, Pa. The mill building is served by a 40-ton crane and the shear building by a 10-ton crane.

Scrap is bundled in a hydraulic baler supplied by the Galland-Henning Mfg. Co., Milwaukee, located at the lower end of the shear building. The bundles of compressed scrap are handled with the overhead crane. A drag type of conveyor will be installed for carrying



View from the End of Cold Rolling and Annealing Department Looking into the Shear Building at the Right and the Mill Building at the Left. The squaring shears are located along the columns in the mill building. A wide shear building permits the storage of sheets in this bay until needed in the annealing and cold rolling department. The shear department crane runway extends into the annealing department under the crane in that department, for convenience in handling stock



The Inclosed Shipping Platform of the Warehouse Is Shown at the Left

the bales of scrap from the baler to railroad cars outside of the building. Sheets pass down the shear department in one direction and the scrap goes in the opposite direction. This routing arrangement is found to be very convenient.

A 15-ton Fairbanks scale is located in the shear building and a 10-ton scale in the bar storage building. All bars are weighed after shearing and before being charged into the pair furnaces and the sheets are weighed after leaving the squaring shears. This gives a check on the amount of scrap.

The annealing and cold rolling building, as previously mentioned, connects to the shear and mill buildings and is practically a continuation of the latter buildings. This department is served by a 40-ton crane for handling annealing boxes and a 10-ton crane for handling sheets. The crane runway of the shear building extends 40 ft. into the annealing department, providing an overlapping of crane runways, the runway in the annealing department being 15 ft. higher than that in the shearing department. With this crane arrangement, trucking is avoided and hand labor is reduced to a minimum in delivering sheets from the shear department to the annealing department.

There are five stands of cold rolls in one train set at right angles to the length of the building. These have 28-in. rolls. Two of the cold rolls and their drive were supplied by the Fawcett Machine Co., Pittsburgh, and the others were made by the Otis company. They are driven by a 200-hp. motor.

There are six double annealing Hagan furnaces of single box length located in the leanto adjoining the annealing floor. Annealing furnace temperatures are taken with Brown pyrometers, temperature recording charts being located in the mill office. There are also temperature indicators at all the furnaces. The pyrometers are expected to prove particularly useful in connection with the annealing furnaces when special heats are required.

The annealing boxes are in two sizes, 160 in. long, 46 in. wide and 48 in. high and 182 x 42 x 66 in. The common method of rolling the boxes into the furnaces on cast iron balls is followed.

The pickling department, located in a building at the side of the annealing department, is equipped with two Mesta four-arm steam operated automatic pickling machines. A special coke fired drying machine designed and built by the Otis company is provided for drying high finished sheets after pickling. These sheets pass between rubber rolls on to a motor operated conveyor that carries them through the drying chamber

about 18 ft. in length. The conveyor is operated by a variable speed motor. This machine is brick inclosed. At present only one 54-in. galvanizing pot has been installed.

The warehouse and shipping department is a hot water heated brick building with wood block floor. This is conveniently located, sheets being taken into the warehouse through two doors that connect with the adjoining cold rolling and annealing department. Sheets are hauled to the warehouse on roller bearing trucks built by the Ohio Galvanizing & Equipment Co. and by Lakewood Engineering tractors as well as with hand trucks. The warehouse is served by a 10-ton crane. The shipping platform is located in a leanto 16 ft. 6 in. wide that extends the length of the warehouse on the side opposite the annealing department. A depressed railroad track extends the length of the platform and all loading is done under cover. Sheets in the warehouse are kept on trucks as far as possible in order to obviate the labor of re-handling as well as to avoid the scratching of finished sheets in re-handling.

The warehouse equipment includes two Erie Foundry Co. 156-in. squaring and other shears, two Walker & Elliot and a Hillis & Jones roller leveler, an edging machine made by the Otis company, a Strelne corrugating machine, a Globe Foundry & Machine Co. patent leveling and stretching machine, a painting machine, a Standard and a Fairbanks bundling scale and a Fairbanks beam registering shipping scale.

The powdered coal plant occupying a building conveniently located in respect to the heating and annealing furnaces was installed by the Quigley Furnace Specialties Co., now the Hardinge Mill Co., New York. Coal is dumped from cars into a track hopper and is crushed by a 18 x 18-in. Jeffery single roll crusher. Then it is elevated to a 55-ton bin, from which it is discharged into a Higgins-Cole dryer. From the dryer it is again elevated to a storage bin over a Raymond five-roller impact pulverizer, which delivers it to a 3-ton blow tank on the floor of the building. This tank is located on the platform of a hollow dial scale. The scale shows when the amount of fuel required has been delivered to any service bin.

The sheet and pile furnaces are served by four 8-ton steel bins, two bins for four furnaces, and the annealing furnaces by three 7-ton bins, one bin for two furnaces. The bins are located in the rear of the furnaces, being set back at a sufficient distance to avoid danger of the fuel catching on fire in the bins. The powdered coal is carried from the blow tank to the service bins in a 4-in. overhead conduit under air pressure supplied

by an Ingersoll-Rand motor-driven air compressor with a capacity of 265 cu. ft. per minute. From the bottom of the bins the fuel passes through a screw feeder and drops into a siphon, from which it is delivered to the furnace burners by means of a primary air system, one fan serving the sheet and pair furnaces and another the annealing furnaces.

The supply lines from the bins to the furnaces are 2½ in. in diameter for the shorter lines and 3 in. in diameter where longer lines are required. At the furnaces the fuel is mixed with air from a secondary air system that supplies air for combustion purposes. Four fans are provided for supplying air for the primary and secondary systems, one for each system in connection with the sheet and pair furnaces and the other two supplying similar service for the annealing furnace air systems. The primary system fan for the sheet and pair furnaces is driven by a 7½-hp. motor and the primary system fan for the annealing furnaces is driven by a 10-hp. motor. Both the fans for the secondary system are driven by 25-hp. motors. The fans were supplied by the Clarage Fan Co. A cyclone dust collector is located above each supply bin, these being above the roof of the sheet and pair furnace leanto and beneath the roof in the annealing furnace room.

All construction work on the plant outside of the erection of the buildings and furnaces, including even the wiring and piping, was done by the Otis company. The buildings were designed by the company and erected by the American Bridge Co. With the exception of a brick wall extending 6 ft. from the ground, the sidewalls of the mill buildings are of corrugated steel and continuous factory ribbed glass windows in Lupton and Fenestra steel sash with continuous ventilating sections. The roof is of corrugated steel. The warehouse roof is of 1½-in. sheathing covered with four-ply asbestos roofing. The building and mill foundations are set on Raymond concrete piles. All the crane equipment was supplied by the Cleveland Crane

& Engineering Co. with the exception of one of the 40-ton cranes, which was built by the Alliance Machine Co. The electric motors outside of the two mill motors were furnished by the General Electric Co.

Gear guards, safety ladders and other safety devices are provided for the safety of the men. Shower baths, lavatories, lockers and other conveniences for the men will be provided in a separate building that is to be erected.

Canada's Pig Iron and Steel Output in 1921

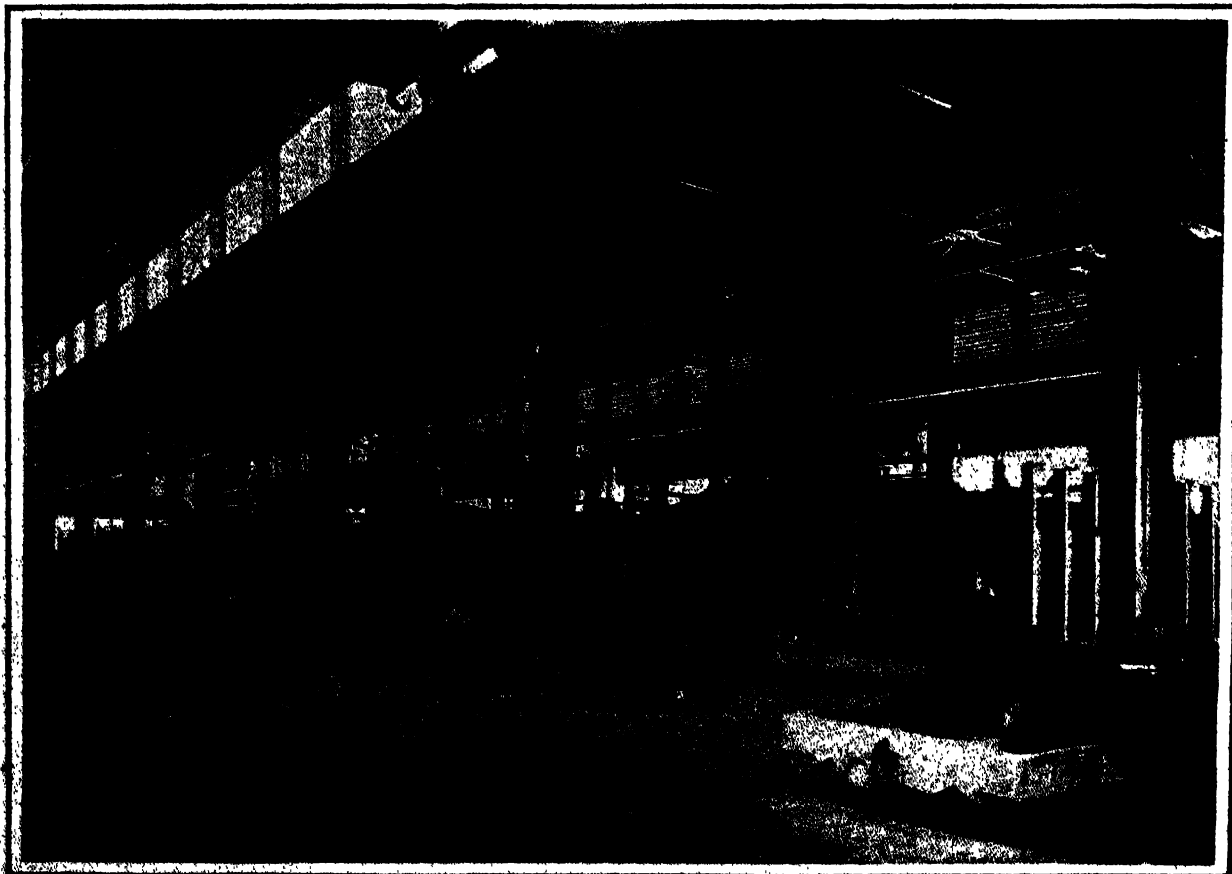
The pig iron and steel output of Canada in 1921 was as follows, according to data issued by the Dominion Bureau of Statistics:

Pig Iron:		Gross Tons
Basic	.....	461,578
Foundry	.....	97,304
Malleable	.....	35,084
Castings	.....	888
Total	.....	594,854
Ferrous alloys	.....	22,493
Steel Ingots and Castings:		
	Ingots	Castings
Open-hearth, basic	641,882	6,531
Open-hearth, acid	239	256
Bessemer	94	1,638
Electric	2,860	13,984
Total	645,075	22,409

The 1920 production of pig iron was 974,000 tons, and that of steel ingots and castings 1,109,000 tons.

Of the 1921 pig iron output 610 tons was made in electric furnaces, and out of a total of 20 furnaces, 18 were idle at the end of December.

The absorption of the Haskell & Barker Car Co. by the Pullman Co., Chicago, has been effected and Edward F. Carry, president of the former Haskell & Barker Car Co., has been elected president of the Pullman Co. The new Pullman organization also includes as directors D. A. Crawford and C. A. Liddle, respectively treasurer and vice-president of the Haskell & Barker Car Co.

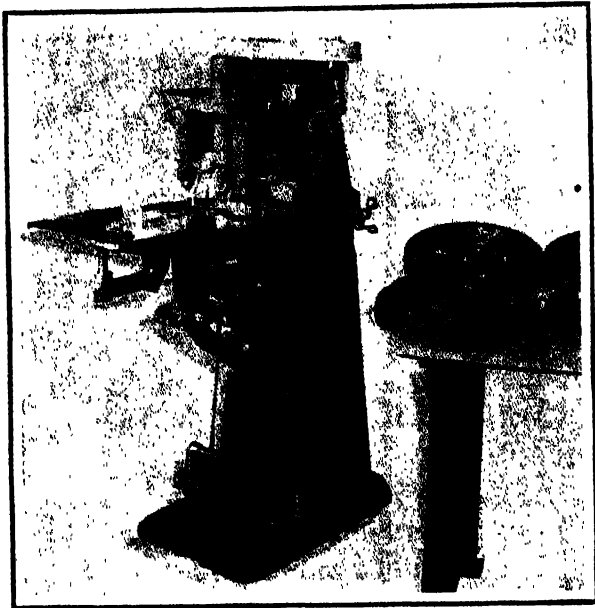


The Annealing Furnaces Are Located in a Leanto Building Adjoining the Annealing Department. The picture shows the fuel storage bins, dust collectors and the primary and secondary air supply lines

Multiple Tapping Machine with Dial Feed

A multiple-spindle tapping machine equipped with dial feed and eliminating the use of clutches for reversing the rotation of the spindles has been brought out by the Anderson Die Machine Co., Bridgeport. It is intended for large quantity production of small brass and steel pieces, such as enter into the construction of electrical appliances. It can be used also to advantage, it is said, in tapping nuts and other small pieces.

This machine is intended to overcome the limitations of designs using some form of clutch for reversing the direction of spindle rotation, which designs usually have but a single spindle and employ a geared head in cases where more than one hole is to be tapped. It is



The Spindles Are Driven in Alternate Directions by Means of a Gear-Tooth Segment and Train of Gears

also intended to provide greater production capacity than afforded by machines having dial feed which necessitate rotating the dial by hand and leaving one hand free for inserting the work. The production of the latter type, it is pointed out, is limited to the speed of the operator in rotating and advancing, as well as feeding, and the fact that the clutches must be reversed by hand or foot.

The machine is shown in the accompanying illustration and is similar in operation to the dial-fed punch press. The spindles are driven in alternate directions by means of a gear-tooth segment and train of gears, the segment being controlled by a crank disk at the upper end of the vertical shaft extending through the central part of the main frame. Cams for indexing the dial and locking it in its proper position are secured to the vertical shaft. A ratchet arrangement controls the dial and has regularly 18 teeth, leaving 18 openings in the dial. The dial is of relatively thin material and has openings to fit the particular pieces to be operated upon. Pieces with one, two or three holes can be tapped at one passing, and the construction of the chuck spindles permits of three taps of entirely different leads being used simultaneously.

The tap spindles on each side of the fixed central spindle are adjustable to take care of any combination or location of the three holes. The dials are made to suit the primary or central spindle, which is not adjustable. The dial is then located or rotated to bring the one hole in register with the fixed spindle; then the two auxiliary spindles are adjusted to suit the location of either of the other two holes.

As to production, the machine for the general tap sizes used in electrical work (Nos. 4 to 10), the tap is run at a speed of 56 strokes per min., which is readily fed into the dial. This would give, it is claimed, an hourly production of 8300 pieces with either 1, 2 or 3 holes. On pieces where only 1 hole is tapped, it is said

to be possible to double up the output by doubling the number of slots in the dial, and so adjust one of the auxiliary spindles as to tap the staggered opening in the dial. This, it is claimed, would result in about 112 pieces per min. on single-hole tapping.

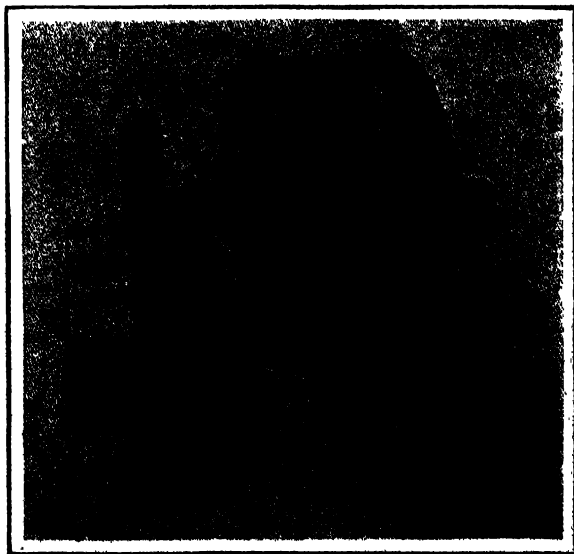
A cam and slide which will work in conjunction with the dial to enable round pieces to be tapped without difficulty can be supplied. It is understood, of course, that with the particular form of drive employed in this machine it is possible to time the various movements accurately and without danger of the time being upset for any reason. Spindles running at relatively high speed are mounted in ball bearings.

Work-Holding Burnishing Barrel

A burnishing barrel in which the work is held stationary to the inside of the barrel body and is carried by it through a mixture of balls, soap and water has been developed recently by the Abbott Ball Co., Hartford. The object of this design is to permit work to be finished without the danger of one piece coming in contact with another and bruising or scratching it.

The barrel body is eight-sided, each side having a hinged hand-hole cover. The opening into the barrel body is beveled to provide a tight fit for an inside cover plate which sets into this opening, and is held in place by the hinged cover coming against two flat springs mounted on the back of the inside plate. The springs are used as handles when the plate is lifted out. The hinged cover has packing around it so that when it is clamped the openings are watertight.

The work is held by fixtures which are fastened to the face of the cover plate. As the machines are primarily for finishing large quantities of one or more classes of work, two or three sets of cover plates and work-holding fixtures are used to advantage. Thus



The Work Is Mounted on a Fixture and Held Stationary

while unloading and loading one set of fixtures the machine would be operating on a set in the barrel. When the work is finished, instead of dumping the balls from the barrel, it is merely necessary to open the top cover, lift out the fixtures, replace it with another, close the hinged cover, bring the next hole up to the top and repeat the operation until all of the finished work is out of the barrel and the new batch is.

On work to be plated three sets of fixtures can be used. In this case, when the work comes out of the barrel it is left on the fixtures, put through the plating operation and brought back to the burnishing barrel for its final finishing. This is done with one loading of the fixture.

The barrel may be cleaned without removing the balls by means of a special strainer cover placed over one of the openings. The barrel is opened, filled with water and the machine operated until the rinsing is complete.

Motor Driven Horning Press

A special horning press, equipped with direct motor drive and guarded wheel, as shown, has been brought out by the Ferracuta Machine Co., Bridgeton, N. J.

The motor rests on a shelf that is bolted to a tablet cast in the frame and a rawhide pinion on the motor meshes with teeth cut in the flywheel. The direct drive thus effected dispenses with belt connection and economizes space. The wheel is not only entirely surrounded with a guard, but has also a wire mesh cast between the flywheel spokes, a feature intended to provide a thorough safeguard against accidents when the wheel is in motion.

The horn hole in the frame is $7\frac{1}{2}$ in. in diameter and 43 in. from the floor, a rather unusual height for



Horning Press Equipped with Direct Motor Drive and Special Flywheel Safeguard

special work. The horizontal distance from center of the ram to the planed front of the frame is 11 in. The guides in the vertical front are planed to enable an adjustable bed to be affixed at various heights, square with the bottom of ram, the connections being made by means of large bolts and dowels. Parallelism between the bed and ram surfaces is thereby assured.

The wide variation in the distance between the bed and the ram, together with the facilities for horning and the unusual height of the press, are intended to provide for a greater latitude of work than is customary. The press shown is the fourth in a series of five sizes.

Crucibles from Domestic Clays and Graphites

Early in 1918 the Columbus (Ohio) station of the Bureau of Mines began an investigation of American bond clays and graphites to determine their crucible-making properties in comparison with foreign clays and graphites. Work on the bond clays, which was completed in the fiscal year 1920, showed that better crucibles could be made from domestic clay than from imported clays. The testing of graphites on which some preliminary work had been done was then undertaken by the Bureau of Mines. Samples of seven graphites, from Ceylon, Madagascar, Canada, New York, Alaska, Texas, and Montana, of 400 pounds each were obtained. Ten crucibles of No. 70 size were made from each graphite for brass melting purposes, and six crucibles of No. 60 size for testing under steel melting practice. These crucibles were made in the plant of the Vesuvius Crucible Co., Swissvale, Pa. The brass melting crucibles were shipped to the plant of the Detroit Lubricator Co., Detroit, where they were tested under regular brass melting practice.

Arrangements were made for testing the steel melting crucibles in the plant of the Simonds Mfg. Co.,

Lockport, N. Y., but when the crucibles were ready for shipment word was received that the pit furnaces of the Simonds steel plant were not in operation, and as they have not been in operation since that time, it has been impossible to test the steel melting crucibles.

In the brass melting tests, the average number of heats of the crucibles shown by the different graphites are as follows: Alabama, 13.09; Madagascar, 12.44; Ceylon, 10.50; New York, 9.60; Texas, 6.80; Montana, 6.11; Canadian, 5.80. These results indicate that good brass-melting crucibles can be made from Alabama graphite, and agree with the findings of previous work.

Automatic Stoker Companies Merged

A merger has been effected of the Combustion Engineering Corporation of New York, the Underfeed Stoker Co., London, England, Lupulco Systems, Inc., International Pulverized Fuel Corporation and the Combustion Engineering Building, Inc. The new company has been incorporated as the International Combustion Engineering Corporation. One third of the capital stock of the Societe Anonyme des Foyers Automatiques of France has been acquired. Automatic stokers and accessories are the principal articles manufactured by the companies entering the consolidation. Officers of the new company are George E. Learnard, president; W. R. Wood, J. Scott Skelly, Joseph V. Santry, Charles J. Peabody, vice-president; George H. Hansel, secretary and treasurer, and Benjamin Harrison, assistant secretary.

Growth in Chicago Industries, 1914-19

According to census figures given out at Washington, the number of factories in Chicago increased only 4.2 per cent between 1914 and 1919, but the capital, wages and value of output were more than doubled:

	1919	1914
Number of establishments.....	10,538	10,115
Persons engaged in manufacturing.....	502,303	387,319
Proprietors and firm members.....	8,182	8,184
Salaried employees.....	90,064	65,425
Wage-earners, average number.....	404,057	313,710
Primary horsepower.....	826,420	681,114
Capital.....	\$2,076,194,000	\$1,190,069,000
Salaries.....	188,448,000	90,295,000
Wages.....	508,276,000	213,737,000
Materials.....	2,380,025,000	901,933,000
*Value added by manufacturers.....	1,278,715,000	581,565,000

*Value of products less cost of materials.

Helical-Flute Expansion Hand Reamer

A helical-flute expansion hand reamer in sizes up to $2\frac{1}{2}$ in. in diameter has been placed on the market by the Millersburg Reamer & Tool Co., Inc., Millersburg, Pa.

The helical flutes permit the production of clean-cut



Helical Flute Expansion Hand Reamer

holes, accurate as to size, which is due to the smooth, shearing action of blades of this design. The blades may be expanded to compensate for wear and re-sharpening, thus maintaining the original size of the tool. It is claimed that this tool gives 80 to 40 per cent more production than a similar tool of the straight-fluted type.

The Department of Commerce announces that moving pictures are to be used extensively to promote foreign trade. Some remarkable industrial pictures have been taken by the United States Bureau of Mines and other agencies, particularly of the manufacture of certain steel products and of mining operations. Some that have been exhibited at technical conventions have been good substitutes for plant visitation. The plan contemplates that the cost of the films be borne by the company whose product is shown.

Automatic Machine for Production Drilling and Reaming

A special machine for drilling, reaming, facing, countersinking and other operations on comparatively small pieces produced in quantity, has been brought out by H. Edsall Barr, Erie, Pa. Rapid production and simplicity of construction are the features emphasized by the maker.

From the accompanying illustration it may be seen that there are two spindles on the face of the column, each spindle rotating in a square guide block. The two spindles rotate in a right hand direction and are driven by noiseless gears at the upper end which mesh into a central drive gear. At the rear of the machine there is a cam shaft, operating at 20 r.p.m., which carries three duplicate sets of cams, one set each side of the center line. Each large middle cam operates a lever arm through a steel roller which is kept against the cam by a heavy coil spring. The lever arm is fulcrumed on the column and its end toward the spindle is cut as a gear segment; this meshing with a rack on the rear side of the square spindle guide block.

Thus the rise of the middle cams move the respective spindle automatically downward, while the spindles are rotated by the upper shaft driving a short middle shaft through the bevel gears shown. The cams for each side of the machine are set so that the spindles, etc., operate alternately. The middle cams have a uniform rise, giving a steady feed to the spindle; and a quick drop, giving rapid return of the spindle after completion of the cutting stroke. The cams may be changed to give less than maximum spindle travel, as in drilling or reaming thinner material. The cams may also be replaced by others of different contour to allow a dwell at the end of the feed stroke as in facing or countersinking.

The cam shaft is driven from the cone pulley through gearing which provides the proper reduction of speed and by the use of the cone pulley various rates of spindle feed are obtainable. The lower ends of the spindles are regularly equipped to hold a high-speed tool by a set screw, inasmuch as the machine is intended for continuous or at least extensive runs on the same piece and quick or frequent change of the tool is not required. However, the spindle can be provided with a taper socket if required.

A rotatable fixture head having inserted steel pockets to receive the work to be machined is located beneath the spindles, as shown. There are four pockets in each head, and the head rotates 1/4 turn after each rise of the respective spindle. The head is rotated by an internal cam on the rear shaft, which pulls the side rod toward the rear, the side rod rotating the head by a lever loosely mounted on the head spindle and provided with a steel dog which engages slots in the fixed collar of the head spindle. The backward or reverse movement of the side rod is then without effect on the fixture head, this motion simply placing the dog in position to rotate the head another quarter of a turn at the proper time. Outside cams on the rear shaft operate a side arm which in turn moves a tapered pin into engagement with holes in a fixed collar on the head spindle. This occurs after the head has been rotated to a new quarter and is designed to lock the head in

accurate position as to alignment with the spindle holding the tool.

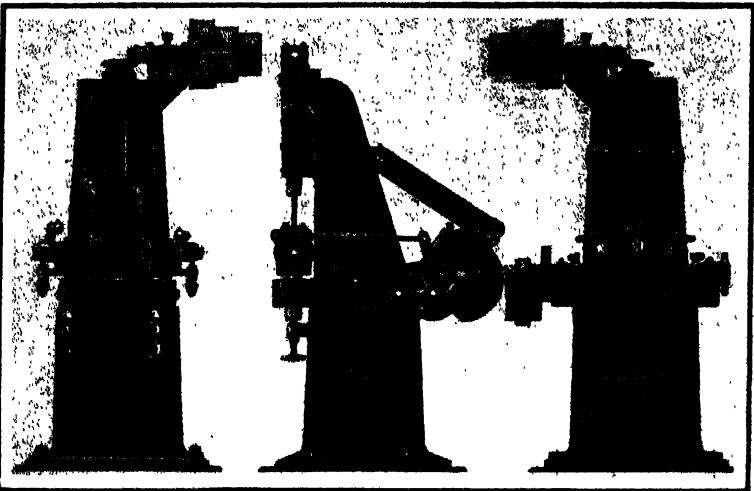
The operator sits facing the spindles and from a sheet-metal container fastened across the machine he picks the pieces to be worked on, placing them in the pocket facing him, first in the left hand and then in the right hand head. All the motions of the machine continue without attention from the operator and the finished pieces fall into chutes and from thence into metal tote boxes, located at the rear and off the floor, as shown.

The cone pulley driving the spindle allows variation of rotative tool speed independently of the feed. The fixture heads are movable up or down by the hand wheels beneath the turned column of the fixture head.

The machine is designed to take drills or reamers up to 5/8 in. As an indication of the capacity, pieces of

gray iron 1/4 in. thick, having a 1/2-in. cored hole, not previously drilled, are reamed at the rate of 40 pieces per min. The machine may be used with both spindles on one operation or, as in the case of drilling and reaming the same piece, and where the quantity of work does not require two machines, the drilling may be done on the left spindle and the reaming on the right spindle of the same machine. In working on steel parts of some thickness, requiring

greater time between head rotations, one operator can feed two machines. Suitable safeguards are provided for gears and other moving parts.



Front, Side and Rear View of Automatic Machine for Drilling, Reaming and Other Operations on Small Pieces. It is intended for quantity production and for continuous runs on same piece

Coal and Coke in 1921

Bituminous coal produced from April 1 to Dec. 31, 1921, according to the United States Geological Survey, amounted to 306,552,000 net tons, an average of 1,331,000 tons per day, compared with 419,996,000 tons in the same period of 1920, an average of 1,821,000 tons per day. For the calendar year 1921, production was 408,065,000 net tons, compared with 556,563,000 tons in 1920, with 458,063,000 tons in 1919, and 579,386,000 tons in 1918. The average, from 1913 to 1920 inclusive, was 499,011,000 tons. Production up to Jan. 14 (the coal year begins April 1) of the past five years shows this year to be one of great depression, thus:

Years of Activity		Years of Depression	
1917-18.....	434,686,000	1919-20.....	375,517,000
1918-19.....	485,110,000	1921-22.....	322,370,000
1920-21.....	440,695,000		

By-product coke, in December, reached a figure about equivalent to the average of 1917, but beehive coke showed less than 20 per cent of the 1917 average.

Output of By-Product and Beehive Coke in the United States (Net Tons)

	By-product Coke	Beehive Coke	Total	Total Coal Consumed
1917 monthly average	1,370,000	2,734,000	4,104,000	5,979,000
1918 monthly average	2,165,000	2,540,000	4,705,000	7,032,000
1919 monthly average	2,055,000	1,587,000	3,642,000	5,468,000
1920 monthly average	2,345,000	1,738,000	4,083,000	5,845,000
September, 1921.....	1,433,000	335,000	1,768,000	2,569,000
October, 1921.....	1,734,000	416,000	2,150,000	3,147,000
November, 1921.....	1,734,000	477,000	2,211,000	3,399,000
December, 1921.....	1,850,000	514,000	2,364,000	3,453,000

A blow-out in the bottom of the furnace of the Detroit Iron & Steel Co., Detroit, Jan. 14, caused the death of two men and the injury of a third. The operation of the furnace was resumed in about 48 hours.

Cold Rolled Strip Steel Calculations

Formulas for Determining Pounds Output and Piece-Work Rates in the Manufacture of Cold Rolled Strip Steel

BY S. T. HILLIARD

FOR determining quickly and accurately the output of rolling mills and of apparatus having a constant speed take-up in the manufacture of cold rolled strip steel, and to figure piece-work rates per 100-lb. to be applied to the work, the following formulas have been computed. Time study is eliminated, except for that required to find the amount of time during which the machine is idle, or the time lost between passes. As all other factors are known, output and rates can be solved by a mathematical equation. Long observation and rough approximation are thus eliminated.

The weight of steel is taken as 490 lb. per cu. ft. In case of high carbon steel, 489 lb. per cu. ft. would need to be used. A slide rule should be employed in the computation. The legend is as follows:

A—base rate in dollars
B—number of take-ups, or mills
C—number coils rolled
D—total weight rolled
E—per cent efficiency
F—ft. per hr. of stock
L—weight of coil in lb.
M—minutes between passes
N—number of passes
P—lb. per hr. at 100 per cent efficiency
R—radius of take-ups in inches
R₁—outside radius of coil
S—r.p.m. of take-up
T—thickness in inches
W—width of stock in inches

The output of a mill in lb. per hr., at 100 per cent efficiency, can be determined by the following:

$$P = \frac{WTF}{144} \times 490 = \frac{WTF}{0.294} = 3.4 \times WTF$$

The length in feet of a coil of weight L is:

$$\text{Feet} = \frac{0.294 L}{WT}$$

An equivalent thickness for any number of passes can be found by the following:

$$T = \frac{\text{1st pass}}{1 + \frac{\text{1st pass}}{\text{2nd pass}} + \frac{\text{1st pass}}{\text{3rd pass}} \text{ etc.}}$$

In the denominator, 1st pass, 2nd pass, etc., are taken as whole numbers. Thus, if four passes are 0.010—0.008—0.006—0.004 in.,

$$T = \frac{0.010}{1 + \frac{10}{8} + \frac{10}{6} + \frac{10}{4}} = 0.00156 \text{ in.}$$

Problem: $F = 6000$ ft. $W = 1\frac{1}{2}$ in. Passes, the same as above. Required, the output per hour at 100 per cent efficiency.

$$P = \frac{WTF}{0.294} = \frac{1\frac{1}{2} \times 0.00156 \times 6000}{0.294} = 47.7 \text{ lb.}$$

The following, and perhaps more simple, method of getting the same result, calls for the use of a table. The first method can be readily remembered.

Thick- ness, in.	Running Ft. per Lb. 1 in. Wide	Thick- ness, in.	Running Ft. per Lb. 1 in. Wide	Thick- ness, in.	Running Ft. per Lb. 1 in. Wide
0.004	72.5	0.020	14.7	0.036	8.17
0.005	55.8	0.021	14.0	0.037	7.95
0.006	49.0	0.022	13.4	0.038	7.74
0.007	42.0	0.023	12.8	0.039	7.54
0.008	36.75	0.024	12.25	0.040	7.35
0.009	32.7	0.025	11.75	0.041	7.17
0.010	29.4	0.026	11.3	0.042	7.0
0.011	26.7	0.027	10.9	0.043	6.85
0.012	24.5	0.028	10.5	0.044	6.68
0.013	22.6	0.029	10.1	0.045	6.52
0.014	21.0	0.030	9.8	0.046	6.4
0.015	19.6	0.031	9.5	0.047	6.26
0.016	18.4	0.032	9.2	0.048	6.13
0.017	17.3	0.033	8.9	0.049	6.0
0.018	16.3	0.034	8.65	0.050	5.88
0.019	15.5	0.035	8.4		

Formula for ft. per lb. of stock 1 in. wide
0.294

Thus, flat wire = 0.018 in. thick,
 $\frac{0.294}{0.018} = 16.33$ ft. per lb.

Method of Use

Divide the ft. per hr. of the mills by the sum of the ft. per lb. of the passes, and multiply by the width in inches. The result is the lb. per hr. output of the mill or mills at 100 per cent efficiency.

Illustration: Use the same problem as above.

$$29.4 + 36.75 + 49 + 73.5 = 188.65$$

$$\frac{6000}{188.65} \times 1\frac{1}{2} = 47.7 \text{ lb. per hr., as before.}$$

To find the per cent efficiency, E, when the time lost between passes is known, use the following formula:

$$E = \frac{60}{N \times P \times M \times C} \times \frac{D \times B}{60}$$

$$\text{Rate per 100 lb. in dollars} = \frac{A}{E \times P} \times \frac{100 A}{E \times P}$$

$$= \frac{100 A}{60 P} \times \left(\frac{N M P C}{D B} + 60 \right)$$

$$\text{But } P = \frac{WTF}{0.294}$$

$$\text{Therefore Rate} = A \left(\frac{5 N M C}{3 D B} + \frac{29.4}{WTF} \right)$$

The formula in this form would be used to determine the rate after the work is done, as it contains the factors $\frac{C}{D}$ which give the exact average weight of coils.

This would probably entail too much clerical work, so that a weight of coil would be assumed as in the case of a table of rates. Then L is substituted for $\frac{D}{C}$ and $N = 1$, whence

$$\text{Rate} = A \left(\frac{5 M}{3 L B} + \frac{29.4}{WTF} \right)$$

Illustration: Assume $M = 2$ min., $L = 70$ lb., $B = 2$ mills, $F = 12,000$ ft. (2 mills), $W = 1\frac{1}{2}$ in., $T = 0.020$ in., Base Rate = \$0.60 per hr.

$$\text{Rate} = \$0.60 \left(\frac{5 \times 2}{3 \times 70 \times 2} + \frac{29.4}{1\frac{1}{2} \times 0.020 \times 12,000} \right) = \$0.0633 \text{ per 100 lb.}$$

It is seen that all but W and T become constants, so that the amount of computation is really small. A table of rates can thus be quickly and accurately made up.

Formulae for lb. per hour of a constant-speed take-up and rate per 100 lb. for it:

R₁ = outside radius of coil in inches

S = r.p.m. of take up

$$\text{mean circumference of coil in feet} = \frac{\pi (R_1 + R)}{12}$$

$$= 0.262 (R_1 + R)$$

$$F = B \times S \times 0.262 (R_1 + R) 60 = 15.7 B S (R_1 + R)$$

$$\text{Cu. ins. in coil} = \frac{L}{490} \times 1728 = 3.527 L$$

Also cu. ins. in coil = $\pi W (R_1^2 - R^2)$
 $\therefore 3.527 L = \pi W (R_1^2 - R^2)$

Solve for R_1 :

$$R_1 = \sqrt{\frac{1.123 L}{W} + R^2}$$

$$\text{Then } F = 15.7 BS \left(\sqrt{\frac{1.123 L}{W} + R^2} + R \right)$$

$$\text{But rate} = A \left(\frac{5M}{3LB} + \frac{29.4}{WTF} \right) \quad (\text{Substitute for } F)$$

$$= A \left[\frac{5M}{3LB} + \frac{29.4}{15.7 W T B S \left(\sqrt{\frac{1.123 L}{W} + R^2} + R \right)} \right]$$

$$= \frac{A}{B} \left[\frac{5M}{3L} + \frac{1.87}{W T S \left(\sqrt{\frac{1.123 L}{W} + R^2} + R \right)} \right]$$

In a specific case, factors A , B , M , L , S and R are constant, so that the only variables are T and W . Thus $A = \$0.60$, $B = 2$, $M = 2$ min., $L = 70$ lb., $W = 1\frac{1}{2}$ in., $T = 0.010$ in., $S = 50$ r.p.m., $R = 6$ in.

$$\text{Piece-work rate per 100 lb.} = \frac{0.60}{2} \left[\frac{5 \times 2}{3 \times 70} + \frac{1.87}{W T S} \right]$$

$$1\frac{1}{2} \times 0.010 \times 50 \left(\sqrt{\frac{1.123 \times 70}{1\frac{1}{2}}} + 36 + 6 \right) = \$0.06286$$

In making a table of rates for these mills, for coils of 70 lb., T and W would be left in the formula. It would then be written:

$$\text{Rate per 100 lb.} = 0.014286 + \frac{0.01122}{TW} \left(\sqrt{\frac{78.61}{W}} + 36 + 6 \right)$$

Any width can now be substituted and a rate for any thickness, of that width, is found by one division and one addition.

The formula would read, when $W = 1\frac{1}{2}$ in.

$$\text{Rate per 100 lb.} = 0.014286 + \frac{0.000486}{T}$$

Pounds per hour for a constant-speed take up is found by

$$P = 53.4 WTBS \left(\sqrt{\frac{1.123 L}{W} + R^2} + R \right)$$

The outside radius of a coil is:

$$R_1 = \sqrt{\frac{1.123 L}{W} + R^2}$$

The inside radius of a coil is:

$$R = \sqrt{R_1^2 - \frac{1.123 L}{W}}$$

If E per cent efficiency is assumed, the piece-work rate per 100 lb. contains the factor:

For a constant-speed take up =

$$\frac{1.87 A}{E \times WTBS \left(\sqrt{\frac{1.123 L}{W} + R^2} + R \right)}$$

For wire moving at a fixed speed =

$$\frac{29.4 A}{E \times WTF}$$

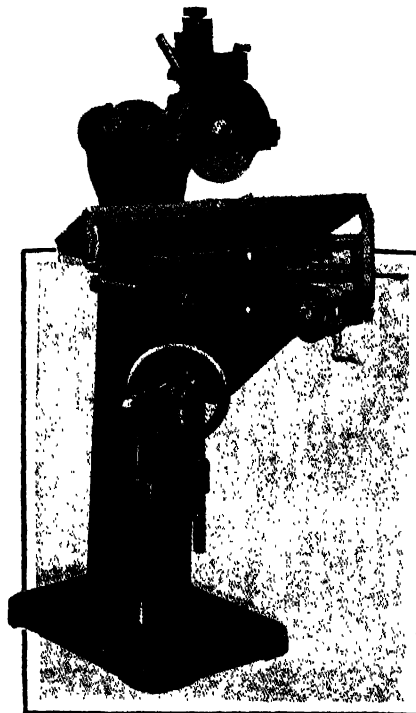
A self-supporting stack to take care of the hot blast stoves has been built for the blast furnace at Girard, Ohio, of the A. M. Byers Co., Pittsburgh. At the bottom the stack is 14 ft. in inside diameter, tapering in 45 ft. to 8 ft. $\frac{1}{2}$ in. in diameter and continuing at this diameter for 180 ft. for a total height of 225 ft. It is provided with a coping ring on top for keeping the moisture off the brick lining, also with a ladder and safety cage of such construction that the workman climbs between the ladder and the stack. In other words, there is a bar frame work extending from the ladder to the stack, creating a cage; ordinarily, there is a space between the ladder and the stack, and the safety cage is on the outside of the ladder.

The 16 foundation bolts are 3 in. in diameter, and they extend through a U shaped bracket forged from one solid piece of $\frac{1}{2}$ -in. plate. These brackets are 4 ft. high. The stack was built by the Sharpsville Boiler Works Co., Sharpsville, Pa.

Surface Grinder Equipped with Tilting Table

In addition to plain and swivel table styles, the Wilmarth & Morman Co., Grand Rapids, Mich., is placing on the market its No. 1 hand-feed surface grinder equipped with a tilting table, as shown in the accompanying illustration.

When grinding at vertical angles on a magnetic chuck it is frequently the practice to tilt or block up one edge of the chuck, which does not provide a substantial arrangement that is free from vibration. With the grinder equipped with a tilting table the chuck is



Graduations for Tilting Angle Are in Degrees

bolted securely to the table and the entire assembly tilted to the required degree, this arrangement being intended to provide a rigid foundation for the work, resulting in greater accuracy.

Suitable T-slots are provided to accommodate a magnetic chuck, vise and other fixtures, and graduations for the "tilting angle" are given in degrees.

Erie Railroad Contracts for Handling Freight

The Consolidated Freight Handling Co., incorporated by Youngstown, Ohio, capital, has contracted with W. A. Baldwin, director of the Ohio region of the Erie Railroad, to handle the road's less-than-carload freight through the freight houses at Cleveland, Akron, Youngstown, Warren, Barberton, Ashland and Mansfield in Ohio, Corry, Sharon and Meadville in Pennsylvania and Jamestown, N. Y. The scope of the company's business may be extended to include other points along the Erie. The effect of the arrangement will be to release the Erie from employment of freight house labor at the points where the contracts are operative. The Consolidated Freight Handling Co. will hire its own labor at the rates of pay effective in the various communities. Under terms of the contract, the freight handling company becomes the lessee of local freight houses and adjacent railroad property required for such work.

A similarity in names is causing some confusion, it is explained in a letter to the trade by the Wayne Machinery Co., Inc., Ft. Wayne, Ind., maker of machine tools and woodworking machinery. It appears that there is a Wayne Machine Co. on Ft. Wayne Avenue in Indianapolis, but there is no connection between the Machinery and the Machine companies.

Fluctuations of Steel and Iron Pipe Prices

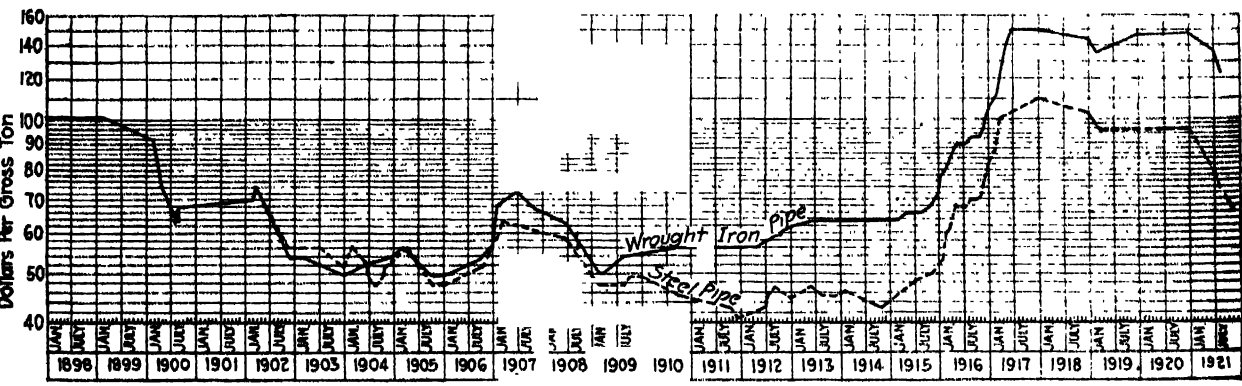
Trend of Quotations from 1898 to 1922 as Shown by Chart and
Tables—Wide Spread Which Was Almost
\$62 Per Ton in 1920

HEREWITH in chart form is told the story of the fluctuation in prices of steel and wrought iron pipe for a period of 23 years, based upon the basing or card discount on carload lots. The prices upon which the chart is based are found in the accompanying tables.

It will be observed that from 1898 to 1902 inclusive, prices of both kinds of pipe ran along about the same. In explanation it might be stated that during this period no very real idea of producing costs existed and so far as then was known costs were supposed to be about the same. This period also saw the real beginning of steel pipe as a competitor of wrought iron

is that while all manner of mechanical devices have been introduced in the manufacture of steel pipe to reduce the amount of hand labor, the making of wrought iron pipe has been and still is largely hand labor, and there has been no saving in production costs which machines would have permitted.

The drift of prices has been in keeping with that of all finished products. Pipe shared in the 1907 boom and in the collapse which followed in 1908 and also the business unsettlement which resulted from the dissatisfaction over the Payne-Aldrich tariff and the change in National Administration in 1912. We find steel pipe down to about \$40 a ton late in 1911, and



Wrought Iron and Steel Pipe Prices, 1898-1922

pipe, and the latter had such a firm grip upon consumers that the struggle for consumptive supremacy was a keen one. It will be observed also that since 1904 steel pipe has sold at a lower price than wrought iron pipe and that the spread between the two kinds widened for a number of years. At the close of 1920 the spread was almost \$62 per ton. The explanation

records of THE IRON AGE at the time note some large sales of line pipe which were made at least \$2 per ton below that figure. The market improved during 1912 and 1913, only to weaken again in the depression which developed in American business just after the outbreak

Steel Pipe

Wrought Iron Pipe				Steel Pipe			
Dollars Per Gross Ton Net, F.O.B. Mill		Dollars Per Gross Ton Net, F.O.B. Mill		Dollars Per Gross Ton Net, F.O.B. Mill		Dollars Per Gross Ton Net, F.O.B. Mill	
Date of Change	Discount	Date of Change	Discount	Date of Change	Discount	Date of Change	Discount
Sept. 1, 1898...	.55	Nov. 1, 1912...	.73	Feb. 21, 1900...	.59	Dec. 15, 1911...	.82
Dec. 28, 1898...	.55	June 2, 1913...	.72	May 1, 1900...	.67	June 1, 1912...	.81
Feb. 15, 1899...	.55	Feb. 11, 1915...	.72	July 1, 1900...	.70	July 1, 1912...	.81
Mar. 1, 1900...	.59	May 1, 1916...	.71	Aug. 1, 1900...	.72	July 24, 1912...	.80
May 15, 1900...	.67	June 1, 1915...	.71	Sept. 1, 1900...	.70	Sept. 10, 1912...	.79
July 1, 1900...	.70	Aug. 17, 1915...	.71	Mar. 1, 1902...	.69	Jan. 1, 1913...	.80
Aug. 25, 1900...	.72	Nov. 1, 1915...	.70	Mar. 15, 1902...	.67	Apr. 12, 1913...	.79 1/2
Sept. 1, 1900...	.70	Jan. 4, 1916...	.68	Nov. 12, 1902...	.75	May 27, 1913...	.79
Mar. 1, 1902...	.69	Jan. 20, 1916...	.66	Apr. 1, 1903...	.75	Aug. 8, 1913...	.80
Mar. 15, 1902...	.67	Feb. 15, 1916...	.65	July 18, 1903...	.75	Oct. 27, 1913...	.80
Nov. 12, 1902...	.76	Feb. 29, 1916...	.64	Aug. 1, 1903...	.75	Feb. 2, 1914...	.79 1/2
Mar. 16, 1903...	.76	Mar. 29, 1916...	.63	Dec. 31, 1903...	.77	Apr. 20, 1914...	.80
Dec. 31, 1903...	.78	Mar. 29, 1916...	.62	Feb. 1, 1904...	.76	Nov. 2, 1914...	.81
Mar. 1, 1904...	.77	Apr. 21, 1916...	.60	Mar. 1, 1904...	.75	Feb. 11, 1915...	.80
Mar. 13, 1904...	.76	July 24, 1916...	.60	July 1, 1904...	.78 1/2	May 1, 1915...	.79
June 1, 1904...	.77	Sept. 7, 1916...	.59	Sept. 3, 1904...	.79	Nov. 1, 1915...	.78
Jan. 3, 1905...	.76	Nov. 1, 1916...	.59	Oct. 19, 1904...	.78	Jan. 4, 1916...	.77
Feb. 1, 1905...	.75 1/2	Nov. 15, 1916...	.58	Nov. 1, 1904...	.77	Jan. 20, 1916...	.76
Mar. 1, 1905...	.75	Dec. 4, 1916...	.56	Jan. 27, 1905...	.76 1/2	Feb. 15, 1916...	.75
Apr. 29, 1905...	.74 1/2	Dec. 30, 1916...	.54	Feb. 1, 1905...	.76	Feb. 29, 1916...	.74
Oct. 2, 1905...	.78	Feb. 14, 1917...	.52	Mar. 1, 1905...	.75 1/2	Mar. 15, 1916...	.73
Jan. 1, 1906...	.78	Mar. 5, 1917...	.50	Apr. 20, 1905...	.75	Mar. 29, 1916...	.72
Oct. 13, 1906...	.76	Apr. 2, 1917...	.44	Oct. 2, 1905...	.79	Apr. 21, 1916...	.70
Dec. 12, 1906...	.75	May 1, 1917...	.38	Nov. 1, 1905...	.79	July 24, 1916...	.70
Jan. 25, 1907...	.70	July 2, 1917...	.33	Dec. 4, 1906...	.76	Sept. 7, 1916...	.69
June 10, 1907...	.68	Nov. 6, 1917...	.33	Dec. 20, 1906...	.75	Nov. 1, 1916...	.69
Oct. 19, 1907...	.70	Jan. 1, 1919...	.36	Jan. 24, 1907...	.74	Nov. 15, 1916...	.68
Dec. 12, 1907...	.75	Mar. 21, 1919...	.33 1/2	Feb. 4, 1907...	.74	Dec. 1, 1916...	.66
Jan. 25, 1907...	.70	Jan. 17, 1920...	.34 1/2	Mar. 14, 1907...	.72	Dec. 30, 1916...	.64
June 10, 1907...	.68	Dec. 15, 1920...	.34 1/2	June 10, 1907...	.74	Feb. 14, 1917...	.62
Oct. 19, 1907...	.70	Mar. 1, 1921...	.39 1/2	Feb. 13, 1908...	.79	Mar. 5, 1917...	.60
June 10, 1908...	.72	Apr. 13, 1921...	.35 1/2	Sept. 1, 1909...	.79	Apr. 2, 1917...	.55
Feb. 12, 1909...	.78	July 7, 1921...	.30 1/2	Oct. 1, 1909...	.78	Nov. 6, 1917...	.51
Mar. 15, 1909...	.78	Sept. 1, 1921...	.44 1/2	Jan. 1, 1910...	.78	Dec. 13, 1918...	.54
Aug. 4, 1909...	.76			Oct. 1, 1910...	.80	Mar. 21, 1919...	.57 1/2
Oct. 1, 1910...	.75			Dec. 1, 1911...	.82	Apr. 13, 1921...	.62 1/2
Oct. 2, 1911...	.75					July 7, 1921...	.64 1/2
Mar. 1, 1912...	.78					Sept. 16, 1921...	.68 1/2
Sept. 2, 1912...	.74					Dec. 15, 1921...	.71
Oct. 1, 1913...	.74						

of the World War. Then came the war demands, which at their height carried steel pipe to about \$110 per ton and wrought iron pipe to \$150 a ton for the base sizes.

Tubular goods were among the first of the finished steel products to rally from the depression which followed the signing of the armistice, Nov. 11, 1918, and it is doubtful whether there was ever before such a period of insatiable demand as that extending from the spring of 1919 to the summer of 1920. It was largely based on oil and gas well development, which had been restricted during the war, and because of the hindrances to production from labor and transportation troubles, not to mention considerable speculative buying, previously unheard-of prices were reached in oil country and line pipe. This development affected prices for merchant or standard pipe, for, of course, the very fancy prices which ruled for oil well and line pipe diverted production largely into those lines. The chart does not record this phase of price fluctuations since it deals only with the base discount on butt weld merchant pipe and card discounts had only slight relation to the prices which most independent companies obtained for oil country pipe in 1919 and 1920.

Since the latter part of 1920, down to date, the trend of prices has been steadily lower. Independent steel pipe makers, who throughout 1920 had quoted standard pipe at \$7 per ton above the price of the National Tube Co., as of Jan. 1, of this year, went back

to the National Tube Co. schedules. With business slack, observance of card discounts was slight and in the April effort at price stabilization prices were reduced, the base discount going to 62½ per cent, effective April 13, as compared with 57½ per cent, which the National Tube Co. had quoted from March 21, 1919, and the independents from Jan. 1, 1921. This cut failed to stimulate business and another one or two points, equal to \$4 per ton, was made, effective July 7. Still the demand failed to respond and with more sellers than buyers and none too strict observance of the regular discounts, another cut, this time of \$8 per ton in the "official" quotation, was made as of Sept. 16. This quotation was officially maintained until Dec. 15, when another \$5 reduction was made. The wrought iron price was not changed.

Present prices of steel pipe are the lowest which have prevailed in five years, but they still are almost 59 per cent above 1914 average. Peak prices for steel pipe, as disclosed by the price tables reached late in 1917, were 147 per cent above the 1914 averages. The decline in wrought iron pipe has been much lighter than that in steel pipe and the present price per gross ton of the base sizes of \$124.32 compares with the 1914 average of \$62.72, the current price being substantially 100 per cent higher than the 1914 level. Wrought iron pipe at peak prices, which came late in 1920, was 182 per cent above the pre-war average.

Recovering Salable Scrap from Discarded Navy Ships

Government Officials Studying Best Method of Dismantling
Vessels Included in Disarmament Program

SINCE the news was received that the conference for the Limitation of Armament in Washington had agreed not only to restrict the building of battleships within the next ten years but to scrap many of the ships now in service, the question of the best method of demolishing these ships has been under consideration by Navy Department officials in Washington, and also by those companies which have done similar work in this country in the past.

Intimations have come from Washington that no plant in the United States is equipped at present to scrap large warships, and the suggestion has been made that the work might well be done in England, where some plants, it is stated, have done work of this character on an extensive scale.

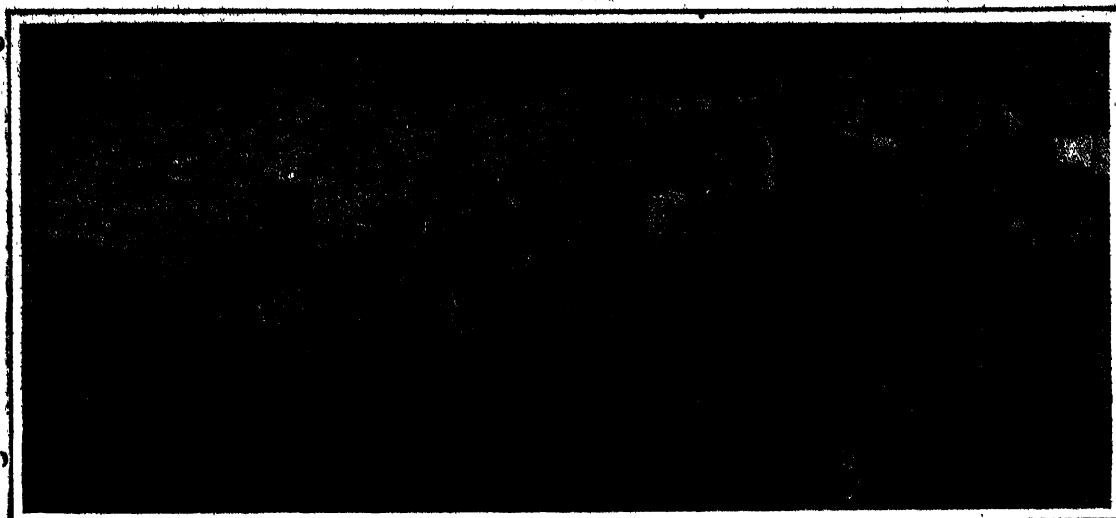
The steel trade in some quarters will undoubtedly take the point of view that it would be unfortunate to

send these ships abroad for demolition, inasmuch as the steel scrap which can be obtained from them is of value to American steel plants. Moreover, the production of good quality steel scrap has been at a minimum during the past year or more, owing to the general depression in industry, and the several hundred thousand tons of scrap which can be obtained in the demolition of the warships included in the disarmament arrangement will be exceedingly useful, especially if there should be a marked revival of steel manufacture in 1922.

The ships to be scrapped by the United States have a total displacement of 525,850 tons. Companies which have dismantled smaller vessels estimate that the total quantity of old material which can be obtained is about 70 per cent of the displacement tonnage; in this instance more than 360,000 tons will be available for



A Destroyer Being Dismantled at the Hitner Yard. In the background is an old wooden frigate, which has been stripped of salable metal parts.



The Upper Works of a Discarded Naval Vessel Are First Dismantled and Then the Hull Plates Are Removed

re-melting. The great bulk of this is steel, but a considerable tonnage of brass and other non-ferrous metals is also obtained.

Most of the ships which in the past have been sold by the Navy Department for scrap have been light cruisers, monitors, destroyers and sub-chasers. Many of the latter were destroyed after the late war, their use in the peace-time activities of the Navy not being



This Row of Destroyers Was Recently Scrapped at the Hitner Yard at Bridesburg, near Philadelphia

required. The destroyers were bought from the Government at about \$10,000 each, and the work of dismantling them was done at yards on the Atlantic and Pacific Coasts. The Henry Hitner's Sons Co., whose plant is at Bridesburg, on the Delaware River near Philadelphia, has done much of this work, and probably will be a bidder for the ships included in the disarmament program when they are offered for sale.

In some instances the Navy has used discarded ships for targets. After sinking them in shallow water they have been raised and then sold for scrap. Some have been converted into freight vessels, pleasure yachts, etc., but the terms of the present international agreement will doubtless provide for complete destruction, so that not even the hulls will remain.

The method which the Hitner company has employed in demolishing naval vessels is to moor them alongside dock at its Bridesburg plant; then strip the upper-works of each ship, including machinery. In the latter, much of the most valuable non-ferrous metal scrap is found. When nothing but the hull remains, the top row of plates is removed by electric or oxy-acetylene cutting. This work is continued down as close to the water line as possible, and then the remainder of the hull is towed up on the beach at high tide, and at low tide another row of plates is removed. This process is repeated at each high and low tide until the keel of the ship can be towed onto the land, when demolition is completed. The steel is broken up into charging boxes in the Hitner yard, and shipped to steel plants for re-melting.

A serious problem in connection with the demolition of large ships will be the removal of heavy armor plate.

If the Navy Department follows its usual method, the ships to be scrapped under the disarmament program will be sold to the highest bidders. Before the results of the Limitation of Armament Conference had become known, the Navy Department had decided to sell some of its obsolete ships, and lists were prepared and published. Bids were taken on about a dozen ships on Dec. 15, and another list, on which bids will be opened Jan. 16, includes some battleships listed in the disarmament program, such as the Maine and Missouri. Upon the results of this latter sale will possibly depend, to some extent, the method that the Navy Department will employ for the disposal of the remainder of the ships to be dismantled.

New Record for Coal Production

UNIONTOWN, PA., Jan. 23—A new record for coal production for any one mine during a single month in the history of the Connellsville bituminous region, was set up at the Ronco plant of the H. C. Frick Coke Co., during December. Working twenty-five days during the month, 134,000 tons of coal was hoisted from the Ronco shaft. Establishment of this record in the face of present industrial conditions is remarkable. All of the coal was shipped by river to the Clairton by-product plant of the Steel Corporation. It is planned to increase production at the Ronco plant until a monthly output of 150,000 tons is reached, a record expected to be attained within six months. W. J. Culleton is superintendent at the plant.

At other Frick plants in the region, production is being maintained on approximately the same basis as has been maintained during the past three months: 35 per cent coke and 55 per cent coal.

Independent coal and coke output in the region continues to show a slight increase. No change, however, in the production scale is noted at plants of W. J. Rainey, Inc.

Prospects of a national coal mining strike the latter part of March will not affect the Connellsville region, except in increase production. Present wage scales in this region are considerably under the scales in the union fields, and production has been maintained on a higher general average than in union fields. No changes in scales are expected during the first quarter in the region.

The Seaboard Steel & Iron Corporation, William F. Holl president, which was organized in Baltimore in June, 1921, is now occupying a new warehouse at Ostend and Paca streets. The building is 155 x 170 ft., divided into five bays, each of which is provided with overhead crane as well as other equipment for handling and general steel warehouse service. The company will carry a full line of steel, including structural shapes, tubes, cold rolled, cold drawn and alloy steel, tool steel, shafting, sheets and plates, rivets, etc.

Pittsburgh Foundrymen's Association

PITTSBURGH, Jan. 22.—In his talk before the Pittsburgh Foundrymen's Association at its regular monthly meeting at the General Forbes Hotel, last week, Herbert M. Ramp, superintendent of foundries, American Locomotive Co., Dunkirk, N. Y., whose subject was "Defective Castings," declared that his experience had convinced him that 50 per cent of the defective castings were directly attributable to the sand or the sand mixture used. There should be the same care in the inspection of sands as there is of other materials, the speaker urged, pointing this out as one of the duties of the foundry chemist. He made a strong plea for a greater factor of safety, not only with regard to sands but with flasks and patterns as a means to the prevention of bad castings, indicating the great care that usually was exercised in providing the machine shop with the latest and most up-to-date tools, which was quite the reverse of what was done in the matter of equipping the foundry.

Mr. Ramp said the management was often as much to blame for bad castings as were the foundrymen. The management could help matters by taking only such business as the foundry was adapted to handle, pointing out that strange work in the best of hands was subject to loss and delays. Too much should not be expected from the molders who have not control over the materials provided them. He asserted that users of castings rather than the makers had written the chemical standards now in use. Chemistry, he claimed, had not been established and that it still was necessary to revert to practical tests as a way out of troubles. In this connection he urged the importance of uniformity of materials.

Benjamin Fuller, Titanium Alloy Mfg. Co., Niagara Falls, N. Y., a former president of the Pittsburgh Foundrymen's Association and who some time ago was made a life member of the organization, was present and spoke in a reminiscent vein. C. S. Koch, Fort Pitt Steel Casting Co., McKeesport, Pa., George B. Koch, superintendent of foundries, Pennsylvania Railroad, Altoona, Pa., and Samuel D. Sleeth, foundry superintendent, Westinghouse Air Brake Co., Wilmerding, Pa., also spoke.

It was announced by C. S. Koch that the annual convention of the American Foundrymen's Association would be held May 22 and provided the proper facilities could be secured, would be held in Cleveland.

Meetings of Technical Sections

Dexter Kimball, president American Society of Mechanical Engineers, was the guest of honor at a banquet and reception tendered by the Milwaukee Society on Saturday evening, Jan. 21, at the Milwaukee Athletic Club. At the regular monthly meeting and dinner held Jan. 18, Fred A. Parsons, chief engineer Kemp-smith Mfg. Co., gave an illustrated address on "Power Required for Cutting Metal."

At a recent meeting of the Rockford, Ill., chapter of the American Society for Steel Treating, Otto F. Muehle-meyer, metallurgist of the Barber-Colman Co. of that city, presented an exhaustive paper on the hardening of steel.

A joint dinner of Boston sections of the American Institute of Electrical Engineers, American Society of Mechanical Engineers, and American Society of Heating and Ventilating Engineers was held Tuesday evening, Jan. 24, at the City Club, Boston. Following the dinner, W. L. Saunders and Henry de B. Parsons, New York, discussed the Great Lakes-St. Lawrence tide-water project.

S. P. Rockwell, metallurgical engineer, Hartford, Conn., inventor of the Rockwell hardening tester, covered in a thorough manner the subject of carburizing and case hardening, at a meeting of the Boston Chapter, American Society for Steel Treating, Friday evening, Jan. 20, at the Boston City Club. He paid special attention to soft spots, cracks, etc., giving causes and remedies. Lantern illustrations were used.

J. P. Gilligan, president of the American Society

for Steel Treating, was the speaker at the January meeting of the Cincinnati chapter held on Jan. 23 at the plant of the R. K. LeBlond Machine Tool Co. Mr. Gilligan's subject was "What Happens to Steel When You Quench It?" and his address was illustrated by stereopticon views. A dinner, with music and motion pictures, rounded out the program.

Harry F. Smith, consulting engineer of the Smith Gas Engineering Co., Dayton, Ohio, gave an illustrated talk on "Producer Gas" before a joint meeting of the Engineers' Club of Cincinnati and the Cincinnati section of the American Society of Mechanical Engineers on Jan. 19.

Dr. Zay Jeffries, Cleveland, Ohio, was the speaker at the January meeting of the Cincinnati section of the American Chemical Society on Jan. 18. His subject was "Some New Developments of Metallography," and in the course of his lecture he described the application of the X-ray in the crystal analysis of metals. G. K. Elliot presided at the meeting, which was held in the chemistry building of the University of Cincinnati.

Industrial Engineers Spring Convention

The national spring convention of the Society of Industrial Engineers will be held at the Hotel Statler, Detroit, April 26 to 28. The major subject will be the influence of industrial engineering upon the earnings of capital and labor.

A general survey covering the effects of industrial engineering upon the safety of invested capital, the regularity of dividends, the continuity of production, the satisfaction of labor and the protection of the public will be considered at the opening meeting under the subject of "How Industrial Engineering Serves Industry." Another topic at this session will consider how industrial engineering serves the chief administrator. This will be followed by an evening meeting on industrial engineering as serving the executive, the sales manager and the factory manager.

Sectional meetings of the sales, production, finance and accounting, and industrial relations groups will be held as heretofore, and as also a banquet, which is scheduled for the evening of April 27. The fatigue elimination committee will hold a dinner meeting, following which an evening session will be devoted to the subjects of how industrial engineering reduces production costs, and how it increases the productivity of each industrial unit. Another topic of this meeting will be "Practical Tests of Employees."

An afternoon session with the topic, "How Can Industrial Engineering Increase the Profits and Insure the Stability of Both Capital and Labor?" will cover the subjects of the conservation by the workmen and by the management of material, of plant and equipment, of labor and of workmen. At these meetings 15-min. papers will be read, which will be followed by 30 min. of discussion on each subject.

An unusual banquet is announced by the Providence Engineering Society to be held on Tuesday evening, Jan. 31, at the Narragansett Hotel, Providence. A part of the novelty will lie in the appearance in their initial performance of the "P. E. S. Players." Short addresses are also scheduled. One of these is by Floyd W. Parson, editorial director *Gas Age Record*, on "The Engineer in Public Service," and another by Daniel A. Mackay, captain of the Northwest Mounted Police, on "Public Service in the Northwest." Horace T. Almy, City Engineer's Office, Providence, is in charge.

The New England Iron and Hardware Association will hold its twenty-ninth annual banquet Tuesday evening, Feb. 7, at the Hotel Somerset, Boston. A reception will be held at 8 p. m. and dinner at 6.30 o'clock. Frank W. Brigham, Bethlehem Steel Co., Boston, is chairman of the committee of arrangements.

The annual meeting of the Iron Institute will be held May 4 and 5 at the House of Civil Engineers, London. English dinner will be held on the evening of

Institute
Institution
annual dinner

Machine for Welding Large Thin Tubing

A new oxy-acetylene tube-welding machine for quantity production of large diameter, thin-gage tubing has been brought out by the Davis-Bournonville Co., Jersey City, N. J. It is intended for use in tube plants where it will be set up and used for long runs on one size of tubing only.

The maximum capacity is 6 in. diameter, 10-gage tubing. By using rolls grooved to the diameter tubing



Oxy-acetylene Tube Welding Machine for Quantity Production. The maximum capacity is 6 in. diameter, 10-gage tubing

desired the machine can be set up for any size within the capacity. Rolls for all diameters of tubes are of the same size overall, the mean center distances of the mating gears remaining always the same.

The machine has two pairs of rolls, one set being the feed rolls and the other the welding rolls. The drive is by belt to the cone pulley mounted on a shaft, as shown in the accompanying illustration, a pinion on this shaft driving in turn a spur gear keyed to a worm shaft, carrying two worms. Motion is transmitted to the feed and the welding rolls through worm wheels mounted on the spindle of each pair of rolls. The worm wheel driving the feed rolls is in a vertical position and that driving the welding rolls, in a horizontal position. The back welding roll is fixed in place and the front roll is adjustable, the spindle bearing being in a slide, the position of which is controlled by a screw and handwheel. The feed rolls are also adjustable. Annular depressions are provided on top of the welding rolls for water cooling and a circulatory system can be attached where required.

The welding torch is the company's multiple jet, water-cooled type, both the tip and the barrel of the torch being cooled by circulation of water. The torch holder provides for vertical and horizontal adjustment of the torch and for varying the angle at which the tip is presented to the seam to be welded.

Tax Claims for Machinery Amortization

Chronometric valuations was the subject of an address by William F. Wooster, vice-president Lloyd-Thomas Co., appraisers, 75 Fulton Street, New York, before the Jan. 19 dinner and meeting of the New York section of the Industrial Cost Association at Keen's Chop House, New York. Chronometric valuation, said Mr. Wooster, is valuation established over a period of time. Invested capital, depreciation, amortization and amended returns to the Government were

covered. Mr. Wooster laid particular stress upon amortization claims and amended returns based upon a revision of depreciation allowances. Amortization claims on machinery and other equipment used for war work and no longer of value for use in production, but with a resale or scrap value, must be filed before March 15 to be considered by the Government.

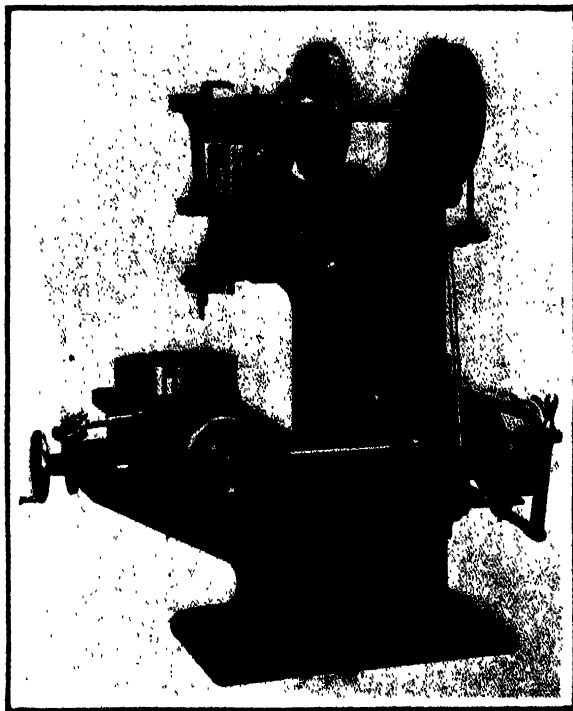
Mr. Wooster explained the governmental attitude on returns for depreciation and showed how by refiguring the depreciation and valuation of a plant from the time of its opening to the present it is possible sometimes to save considerable sums on returns. The address was followed by general discussion of amortization and amended returns.

New Die Slotting Machine

A vertical slotting machine for use in making round, square and irregular-shaped punches and dies has been placed on the market by the Peters-Bossert Co., doing a general machining business, Cincinnati.

The machine is shown in the accompanying illustration. The ram is incased in a vertical slide, fitted with a gib, and driven by an adjustable crank on the main shaft which carries a crank pin that can be adjusted to give any length of stroke up to 4 in. The ram is also slotted and fitted with an adjustable pin to change the location of the stroke to suit the work.

The slide is hinged on the upper end to permit movement of the ram on the lower end for obtaining the required amount of clearance. The lower end of the slide is connected with a toggle joint arrangement operated by an eccentric on the main shaft, which in turn moves the ram forward, while in motion on a curve on the down stroke, and clears the cut on the up stroke. This, it is claimed, produces an arc-cut in dies, so much required by modern die makers. This clearance can be changed to suit requirements. By means of the positive clearance thus provided, the use of the clapper box



The Slide Is Hinged on the Upper End and Connected with Toggle-Joint Arrangement at the Lower

has been successfully eliminated, it is said, and with it the objectionable features of the clapper box.

By the use of a pull pin, the cam can be changed quickly to make the straight cut for the punch part. Cross, longitudinal and circular hand feeds are provided, each being operated with a separate screw and hand-wheel. Power feeds are also furnished. The machine has a variable gear speed box mounted inside of the frame, giving three changes of speed, operated by a shifting lever located outside of the frame.

American Sheets Largely Used in Japan

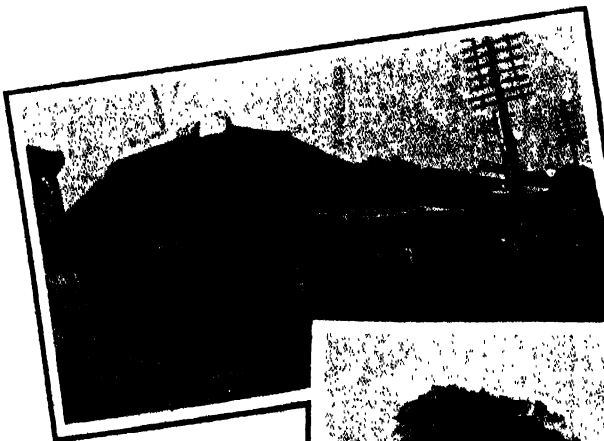
New Fire Laws Will Cause Increasing Imports—Galvanizing Done in Japanese Plants—Great Variety of Building and Other Uses

TOKYO, JAPAN, Dec. 21, 1921.—An interesting development of American trade with Japan has been a notable increase of exports of thin black sheets from the United States to this country in the past half year. These sheets are employed for a great variety of purposes and new uses are constantly being discovered by the Japanese people. It is estimated that Japan imported fully 100,000 tons of American sheets in 1921. With the exception of a very small proportion of the tonnage imported these thin sheets are galvanized in Japan. Already a number of Japanese galvanizing plants are in operation, with a total production of about 9000 gross tons per month, besides which a company, having works at Kawasaki, at which it rolls black sheets as well as galvanizes them, has a present monthly capacity

of about 300 tons of No. 30 gage sheets. This output will be increased to about 500 to 600 tons per month by the middle of 1922. The cost of galvanizing imported black sheets is understood to vary from Yen 0.30 to 0.40 (at present exchange the equivalent of about 14 to 19 cents) per sheet of 6 x 3 ft.

Sheets Used to Reduce Fire Risk

The principal use to which thin sheets are applied in Japan is that of providing a relatively cheap substitute for the highly inflammable material of which from time immemorial Japanese dwelling houses and other buildings have been constructed. While the Japanese have adopted western architecture and modes of construction for their public buildings, business offices and



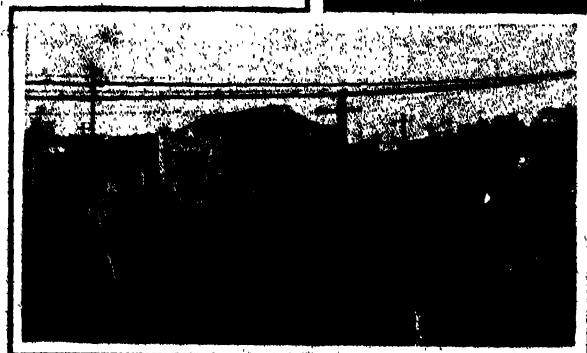
One



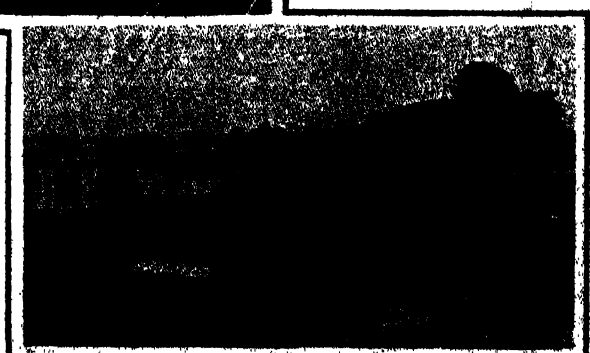
Two



Three



Four



Five

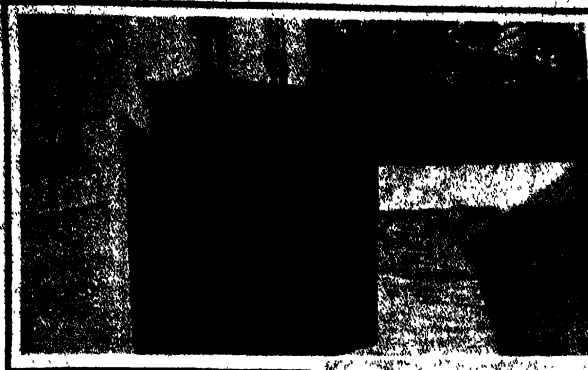
1. Throughout the country, the thatched roofs of innumerable small cottages are being gradually replaced by galvanized sheets. The illustration shows this transition in progress—galvanized sheets at the top of the thatched roof shown in the foreground, corrugated sheets for the coping, and galvanized roofing and siding on the other buildings in the background of the picture.

2. A common street view in the environs of Tokyo. Over the shops are signs made of sheets, the frames of which are usually of wood. Some of these signs are of plain black sheets, painted; most of them, however, are of galvanized sheet steel. The small carts for merchandise delivery, shown in the center of the picture, are also constructed of galvanized sheets.

3. A typical building covered with galvanized sheets to comply with the regulations requiring that such buildings in close proximity to railroads be covered with non-inflammable material.

4. The junction of the Tamagawa Railway with a branch line of the Imperial Government Railways. The building in the background is the Shikoku moving picture house, roofed and sided with plain galvanized sheets, the top being painted but the sides untreated. In the left foreground are several signboards made of galvanized sheets.

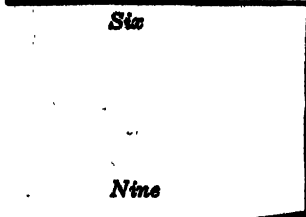
5. A combined store and dwelling house recently erected along a railroad track, almost entirely constructed of galvanized sheets.



Six



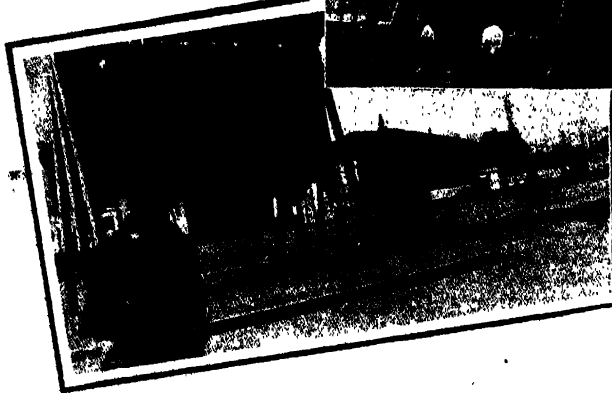
Seven



Nine



Eight



Ten



6. In every Japanese home there is at least one "tansu," or clothes chest. The one shown is trimmed with thin sheets, painted.

7. Fence surrounding a Buddhist temple. The lower part is made of corrugated sheets. The roof of the second building shown is a combination of tiles and plain galvanized sheets, which are painted red. This feature is exceptional, as while the use of paint for the preservation of steel material is spreading in Japan, it is by no means general.

8. A section of a temporary building, covered with galvanized sheets, which was constructed in the center of the city

of Tokyo, close to the central railroad station, for the celebration of the 50th anniversary of the operation of railroads in Japan. It had seating capacity and dining room accommodation for over 3000 persons.

9. A map of the city of Tokyo, facing the Central Railroad station, is painted on a huge sign made of galvanized sheets.

10. The Marunouchi Building, in course of construction. It is the largest building in the Far East, and in its construction upward of 5000 tons of American structural steel have been used, aside from the large amount of galvanized corrugated sheets as shown.

factories in the large cities, they very generally have retained for their homes the ancient, time-honored types of structure and modes of construction. Thus in Tokyo, which has a population of 2,000,000 and an area of 31 sq. mi. (the boundaries of which will soon be extended to include, under a single municipal government, an area of over 100 sq. mi. and a population of 3,500,000) the curious contrast is presented of a large number of public and business buildings similar to those of the great cities of Europe and America, in close proximity to, in fact surrounded by, immense numbers of the homes of the people—small wooden bungalows of one or two stories, constructed of highly inflammable material, with paper windows, charmingly quaint and old-fashioned, but highly dangerous in the event of a conflagration. In fact, disastrous conflagrations are frequent in Japan.

In May, 1919, regulations were promulgated in many districts, requiring the use of non-inflammable material, such as tiles or steel sheets, for the roofs of all new buildings, and also requiring the reconstruction, within four years, with such material, of old roofs in congested districts and along or in close proximity to railroads. The enforcement of these regulations, however, is within the discretion of the police authorities in each locality, depending upon circumstances. As the present cost of galvanized sheets is about one-half that of tiles covering an equal area, and there is a saving in time and labor in the installation of the former as compared

with the latter, there has been developed a heavy and constantly increasing demand for galvanized sheets for roofing purposes. Another advantage is that sheets are considered more durable than tiles or slate, particularly in the northern part of the country, where heavy snows prevail and tiles or slate have proved inadequate to withstand the added stress of the weight of snow. On the other hand, slate and tiles are largely used in southern Japan, where climatic conditions are less severe.

The accompanying photographic views give a good idea of the conditions which already have led to a large use of thin sheets and that make it quite certain that American sheet mills will be called on to make further good-sized shipments to Japan in the future.

Varied Uses of Galvanized Sheets

In a good many cases a transition is seen from the ancient style of construction of Japanese dwelling houses to what may be called the semi-foreign style, the entire covering of the houses being of galvanized sheets. An interesting feature is that plain flat sheets are rapidly replacing the corrugated variety. Both, however, are still largely used for roofing and siding of buildings generally, from moving picture houses and other large structures down to the smallest cottage, as also for fencing. Among the many uses of plain galvanized sheets are: for gutters, leaders and drain pipes of buildings; for copings of walls; for lining

wooden pipe; for covering wooden pipe crossing bridges; for stove pipe; for buckets and pails of all sizes, down to as small as one pint capacity; for signboards, replacing wood; for merchandise carts and wagons; for sliding doors; for shutters and double doors for warehouses; for show-case shutters; for replacing wood for paneling purposes; for display boards for posters, and for various kitchen utensils. Black sheets are also used for a variety of purposes, such as stove pipes, both inside and outside of dwellings, although galvanized stove pipe is more frequently used outside, on account of the humidity of the climate; signboards, of black sheets painted, although galvanized sheets are more generally used for this purpose; the Japanese "tansu" or clothes chest, as in the illustration; various kitchen utensils; locks and door trimmings; cheap shovels; stamped ware, and a variety of small articles, such as enameled cups, plates, basins and spoons.

Preference for American Sheets

The thin black sheets imported into Japan come from the United States and Great Britain, but for some

time past by far the greater proportion has been supplied by American manufacturers. While conditions in Great Britain during the past year, and particularly the strike of coal miners and the resulting scarcity and high prices of raw material and fuel, seriously restricted British exports of sheets, the larger share of the Japanese imports of this material secured by American manufacturers has been due, to an important extent, to the superior quality of the American product. In fact, certain Japanese brands of galvanized sheets, known to be obtained by galvanized black sheets of a well-known American brand, command a higher price in the Japanese market than any others. One galvanizing company in Tokyo brands its galvanized sheets with a red pigeon when made from American black sheets, and with a green pigeon when made from English black sheets. An additional price is obtainable for the former, even though the latter have undergone an extra process of re-annealing, to make them suitable for the purposes for which they are intended. This additional operation is unnecessary in the case of the American sheets of the make referred to above.

NEW MILL CONSTRUCTION

Extensive Improvements of Wheeling Steel Corporation at Steubenville and Portsmouth

WHEELING, W. VA., Jan. 23.—Steel manufacturers here commonly take the view that good business cannot be expected until the second half of the year. It is pointed out that so long as the railroads are bound hand and foot by the Government, and nothing is being done toward their financial rehabilitation, not much demand can reasonably be expected from that source. Attention also is directed to the financial distress in the important agricultural districts of the country, which naturally spells little if any buying of implements until the farmers have money, and they hardly will be thus provided until this year's harvests are gathered and begin to find their way to market. In addition to these factors is the belief that few investors will care to capitalize the current labor charges in new construction and that consequently much needed new building will be deferred until labor costs are more nearly in line with those for building materials. There must be liquidation not only of building trade labor rates, but also of coal prices, miners' wages, railroad freight and railroad labor, it is argued, before confident buying of steel can be expected, and these problems are likely to be difficult of solution and also to take considerable time.

Wheeling Steel Corporation officials believe that eventually there is going to be a good steel market, judging from the plant betterments and extensions now in progress at the works at Steubenville and Portsmouth, Ohio. Contract for the buildings to house the rod and wire mill at the latter point was placed several weeks ago. With that plant completed, the company will not only be able to supply the requirements of its subsidiary, the Wheeling Corrugating Co., for pails, barrels, etc., but through the latter, which has warehouses in various parts of the country, will become a factor in the wire products market. For this plant a continuous rod mill of somewhat special design, will be furnished by the Morgan Construction Co., Worcester, Mass. Much of the wire drawing, fence and nail machinery has been secured. There remains to be installed pickling, annealing and galvanizing equipment. The company will build also at Portsmouth a boiler plant and a gas producer and will increase its storage facilities.

At Steubenville the enlargement of the open-hearth furnaces has compelled increases in the rolling equipment to take care of the greater output of steel. A 36-in. blooming mill will be furnished by the Mackintosh-Hemphill Co., Pittsburgh, equipped with its latest

type of manipulator, having many refinements of the original, which by the way was developed at the Portsmouth, Ohio, works of the Wheeling Steel Corporation. The Wheeling Mold & Foundry Co. has the order for the tables and transfers, while the shears and intensifier will be furnished by the Morgan Engineering Co., Alliance, Ohio, and not the Morgan Construction Co., Worcester, Mass., as previously reported. The latter some time ago took the order for an 8-stand 19-in. continuous bar mill. Both the blooming and continuous mills will be driven by 4-cylinder uniflow engines to be built by the Nordberg Mfg. Co., Milwaukee. This will be the first installation of this type of engine for driving a reversing mill, and the results will be watched with considerable interest. The engine for driving the continuous mill is identical with that for the blooming mill, except that it is equipped with a governor.

To supply steam for these engines, the company will build a new boiler house with boilers of 250-lb. pressure and 150-deg. superheat. Ultimately a new power plant will be built and by means of turbo-generators sufficient power will be secured to make the company independent of outside sources of supply. The finishing end of the 45-in. mill is being remodeled. One of the skelp mills is being taken out to make way for a new gas producer which will be connected up with two new 5-hole soaking pits, with electrically operated covers. Plans also call for a new storehouse, more stockyard capacity, and the installation of 10 or 12 new cranes, including two 150-ton ladle cranes. Altogether, the company will spend about \$5,000,000 at the two plants.

Manganese Ore in 1921

The domestic shipments of high-grade manganese ore, containing 35 per cent or more metallic manganese, amounted to about 13,000 gross tons in 1921, of which more than 10,000 tons was shipped from Montana, according to H. A. C. Jenison, of the U. S. Geological Survey. The shipments of ore containing 10 to 35 per cent of manganese amounted to about 72,000 tons, most of which was shipped from Minnesota. The shipments of manganiferous and ferruginous manganese ore amounted to about 14,000 tons.

The net imports for the first eleven months of the year amounted to 390,405 tons of high-grade ore and oxide. Of this Brazil contributed 247,563 tons and India 113,730 tons.

The most important event that may affect the future of the domestic industry was favorable action by the House of Representatives on a proposed tariff on imports of manganese ore of 1 cent per pound of metallic manganese content of ore of 35 per cent or more, and more than 30 per cent of metallic manganese. The measure has not been reported as yet to the Senate.

Further Gains in Iron and Steel Exports

December Shows Advance Over November—Best Month Since May—Year 1921 Under Half of 1920; Sheets and Welded Pipe Only Items Greater in 1921

WASHINGTON, Jan. 24.—Recovery in exports of iron and steel, which has been gradual since last September, was further reflected during December. The total of 28 products for that month was 134,415 gross tons, valued at \$29,502,440, as compared with 122,290 tons, valued at \$28,543,142, in November. The total for

Exports, January, 1920, to December, 1921, Inclusive

	All Iron and Steel	-Gross Tons- Pig Iron	Semi-finished Material
Calendar year 1919...	4,239,837	309,682	258,907
January, 1920.....	353,601	18,468	19,937
February.....	308,185	15,739	22,693
March.....	417,216	22,740	30,444
April.....	395,120	14,608	19,032
May.....	420,359	13,032	16,370
June.....	402,707	17,075	29,811
Fiscal year 1920.....	4,212,732	348,126	288,766
July.....	458,866	29,647	17,343
August.....	431,484	22,645	20,920
September.....	409,300	22,724	18,113
October.....	452,015	17,396	11,853
November.....	434,297	13,929	7,042
December.....	498,765	10,055	3,415
Calendar year 1920...	4,961,851	217,958	216,873
January, 1921.....	547,394	3,710	315
February.....	393,328	1,307	92
March.....	230,635	2,320	1,023
April.....	162,592	1,234	678
May.....	142,551	2,541	749
June.....	119,081	1,689	1,106
Fiscal year 1921.....	4,168,619	129,541	82,549
July.....	86,523	2,744	363
August.....	75,827	2,424	2,447
September.....	95,169	3,078	1,318
October.....	106,582	2,830	153
November.....	122,290	1,299	1,869
December.....	134,415	2,550	250
Calendar year 1921...	2,213,042	28,305	10,363

1921, however, showed a sharp decline of 54 per cent under the exports for 1920, aggregating only 2,213,042 tons, valued at \$607,427,146, as against 4,820,016 tons, valued at \$1,112,835,287, for 1920.

Imports of twelve iron and steel products in De-

Exports of Iron and Steel—Gross Tons

	December 1920	December 1921	Twelve Months Ending December 1920	Twelve Months Ending December 1921
Ferromanganese.....	551	50	3,454	690
Ferrosilicon.....	29	50	522	268
Pig iron.....	9,475	2,450	212,742	27,247
Scrap.....	12,805	4,256	219,250	37,117
Bar iron.....	5,823	132	46,648	12,338
Wire rods.....	4,785	3,338	116,775	15,506
Steel bars.....	63,791	14,779	624,587	153,595
Billets, ingots, blooms.....	3,415	250	216,873	20,363
Bolts and nuts.....	4,334	1,124	38,945	24,280
Hoops and bands.....	4,415	1,639	53,453	20,280
Horseshoes.....	92	37	1,830	614
Out nails.....	591	58	3,553	1,094
Wire nails.....	12,137	3,720	93,178	23,109
All other nails, includ- ing tacks.....	1,435	316	12,432	4,692
Cast pipe and fittings.....	13,519	1,525	68,863	48,523
Welded pipe and fittings.....	39,193	12,896	284,727	345,279
Boilers and cast- ings.....	508	133	7,333	3,408
Spikes.....	1,409	272	12,138	8,164
Sheet piling.....	53,986	14,943	594,624	222,107
Unannealed sheets and plates.....	11,248	3,936	108,368	55,990
All other sheets and plates.....	1,864	419	32,158	12,414
Steel plates.....	114,554	3,336	920,058	235,857
Steel sheets.....	17,730	34,363	169,244	193,428
Ship plates, punched and shaped.....	2,132	33	42,329	9,570
Structural steel.....	62,496	9,423	493,655	297,022
Iron and tinned plates.....	20,955	9,170	236,410	107,726
Ship wire.....	13,391	876	134,174	39,976
All other wire.....	23,103	5,767	190,868	69,335
Total.....	497,765	134,415	4,820,016	2,213,042

December showed a decline under November, amounting to only 13,415 tons, valued at \$1,964,159, as compared with 12,290 tons, valued at \$2,041,772, in November.

For the year 1921 the decline in imports amounted to 71 per cent, when compared with 1920, the amount in 1921 being 121,058 tons, valued at \$23,751,729, as against 417,581 tons, valued at \$50,305,603, in 1920.

Imports of manganese ore in December amounted to 14,900 tons, valued at \$75,770, as compared with 8620 tons, valued at \$49,681, for November. For 1921, im- ports of manganese ore totaled 401,354 tons, valued at \$3,365,732, as compared with 606,937 tons, valued at \$12,230,922, for 1920.

Exports of machinery for December were valued at \$15,068,096, as compared with \$14,436,849 for Novem- ber; for 1921 the total was valued at \$290,414,115, as compared with \$462,933,704 for 1920, a drop of 62% per cent.

Plain sheets constituted the heaviest single item of steel exports in December. Japan continues to be the principal buyer of this tonnage, having taken 29,463 tons of the 34,363 tons, or 85.7 per cent; and of the total 1921 exports of sheets of this class, amounting to 193,428 tons, Japan took 127,230 tons, or 65.8 per cent.

Machinery Exports.

	December 1920	December 1921	Calendar Year 1920	Calendar Year 1921
Adding machines.....	769,160	\$ 115,758	\$ 6,790,407	\$ 2,632,901
Air-compressing machinery.....	661,711	182,363	5,490,397	3,905,694
Brewer's machinery.....	67,630	17,172	522,194	
Cash registers.....	514,278	273,017	5,472,630	2,532,170
Parts of.....	28,321		466,450	317,133
Concrete mixers.....	162,347	22,302	967,440	561,561
Cotton gins.....	31,186	10,122	433,589	118,463
Cream separators.....	74,106	7,643	1,106,298	414,746
Elevators and elevator machinery.....	173,723	54,632	1,517,537	1,979,504
Electric locomotives.....	18,850		880,430	2,120,712
Gas engines, stationary.....	68,310	48,796	817,925	362,570
Gasoline engines.....	2,863,639	382,122	35,532,683	3,704,198
Kerosene engines.....		66,848		3,894,355
Steam engines.....	5,184,290	2,290,179	57,699,537	35,640,486
All other engines.....	436,535	150,268	4,431,019	2,137,183
Boilers.....	905,399	236,925	8,006,288	4,947,806
Boiler tubes.....	901,975	120,587	6,077,930	3,406,167
All other parts of engines.....	2,041,568	415,561	22,142,104	11,790,508
Excavating machinery.....	182,674	37,997	2,042,727	2,380,591
Milling machinery, flour and gist.....	215,681	69,306	1,896,201	1,612,066
Laundry machinery.....	32,518	1,136,770	925,319	
All other.....	176,276	21,667	903,976	378,745
Lawn mowers.....	96,685	19,597	455,921	446,455
Lathes.....	629,594	130,001	7,876,123	2,577,660
Other machine tools.....	1,264,930	219,708	13,961,243	4,774,264
Sharpening and grinding machines.....	314,293	63,068	3,945,490	1,315,960
All other metal working machinery.....	1,557,881	370,037	18,330,577	10,668,566
Motors, gas and water.....	52,480	78,573	705,037	792,346
Mining machinery, oil well.....	1,113,461	393,349	6,236,284	11,306,713
All other.....	1,037,344	349,064	8,990,998	7,563,544
Paper mill machinery.....	394,854	412,563	3,048,997	2,987,687
Printing presses.....	1,062,571	609,174	6,283,711	8,031,245
Pumps and pumping machinery.....	398,368	13,684,468	11,966,460	
Refrigerating and ice making machinery.....	468,711	221,956	3,819,062	1,913,614
Road making machinery.....	143,594	33,576	1,327,752	989,587
Sewing machines.....	1,447,937	564,193	15,581,943	7,306,074
Shoe machinery.....	378,397	112,338	2,633,030	1,707,064
Sugar mill machinery.....	4,064,741	214,981	22,787,977	15,628,283
Textile machinery.....	2,778,340	1,892,862	20,919,614	20,928,333
Typesetting machin.....	541,666	235,676	4,968,787	2,511,455
Typewriting machines.....	2,392,194	872,061	26,041,908	12,431,397
Windmills.....	332,366	49,805	2,256,730	1,733,337
Wood working machinery saw mill.....	177,537	9,795	1,220,026	1,099,333
All other.....	492,780	93,357	3,784,823	2,514,745
All other machinery and parts of.....	11,187,567	3,369,221	96,657,650	67,926,065
Total.....	\$50,321,644	\$15,068,096	\$462,934,704	\$290,414,115

A considerable portion of this tonnage represents thin gage sheets, some of them No. 31½, and the American mills appear to have a good hold of the Japanese mar- ket for these gages, readily accepting the business, de- spite the difficulty of handling this kind of tonnage. Japan also was the leader in the market for exports in several other lines, which is indicated by the accom- panying table setting forth countries of exports for December and for the year.

Welded pipe was exported in 1921 in greater quan-

ties than any other steel product, the outgoing shipments aggregating 345,279 tons, with Mexico as the principal market, the movement to that country being 114,148 tons. Japan, however, was the heaviest buyer in December, taking 4271 tons of the 12,896 tons exported. That country also was the heaviest buyer of

Imports of Iron and Steel—Gross Tons

	December		Twelve Months End'g December	
	1920	1921	1920	1921
Ferromanganese	5,424	239	59,254	9,057
Ferrosilicon	317	1,160	13,909	7,858
Pig iron	1,861	4,475	123,201	27,601
Scrap	4,132	1,919	140,645	41,469
Bar iron	305	287	4,987	1,913
Structural steel	206	120	1,687	778
Billets, without alloys .....	...	14	9,299	5,678
All other billets	859	12	16,723	1,810
Steel rails	1,623	894	45,684	22,048
Sheets and plates	98	34	1,792	1,976
Tin and terne plates	55	63	400	454
Wire rods	241	142	5,847	916
Total	18,723	9,309	417,581	121,058
Manganese ore and oxide	64,748	14,900	606,937	401,854

tin plate for both December and 1921, taking 5974 tons of the 9170 tons exported in December, and 81,077 tons of the 107,726 exported during the year. Rail exports also found their principal market in Japan in December, shipments of 9650 tons out of a total of 14,943 going to that country. It ranked second for the

Iron and Steel Exports for Five Years

	Gross Tons
*1917	6,227,737
1918	5,338,037
1919	4,386,201
1920	4,820,016
1921	2,213,042

*Record year.

yearly exports of rails, taking 42,239 tons of the total of 822,107, China leading with 45,848 tons.

In only two items did 1921 exports exceed those of 1920: Welded pipe and fittings accounting for 345,279 tons against 284,727 tons in 1920; steel sheets amounting to 193,428 tons against 169,244 tons in 1920. Welded pipe and fittings represented 15.6 per

Exports to Principal Countries of Leading Steel Products, in December and in the Year 1921

	December, 1921		Year 1921	
	Gross Tons	Gross Tons	Per Cent of Total	
Cast Pipe				
Mexico	600	16,889	34.8	
Cuba	454	8,427	17.4	
Welded Pipe				
Mexico	3,165	114,148	33.1	
Japan	4,271	29,017	8.4	
United Kingdom	635	14,769	4.3	
Argentina	588	12,405	3.6	
Steel Rails				
China	76	45,848	14.2	
Japan	9,650	42,239	13.1	
Canada	2,242	23,032	7.3	
Honduras	1,037	12,951	4.0	
Galvanized Sheets				
Canada	1,150	20,915	37.4	
Philippine Islands	390	5,867	10.5	
Plain Sheets				
Japan	29,463	127,230	65.8	
Canada	1,888	33,403	17.3	
Steel Plates				
Canada	6,331	106,694	31.8	
United Kingdom	438	51,784	15.4	
Japan	542	31,037	9.2	
Structural Steel				
Canada	3,883	59,782	20.1	
Japan	835	48,327	16.4	
Tin Plate				
Japan	5,974	31,077	28.8	
Canada	1,518	24,044	22.8	

cent of the 1921 outgo, compared with 5.91 per cent in 1920. Steel sheets were 8.74 per cent of the total in 1921 and 3.51 per cent in 1920.

Pig iron imports for December, amounting to 4475 tons, represented almost half of the total inbound shipments of iron and steel products for the month. Except for scrap, pig iron was the heaviest single item imported for the year 1921 also, the total being 27,601

tons, while steel rails ranked next with 22,048 tons. The same relative order prevailed in 1920.

Steam engines were the most important December item of exports under the machinery list, their value being \$2,290,179, while textile machinery, with a value of \$1,892,862, ranked second. Lathes exports in December were valued at \$120,001, and for 1921 at \$2,977,689, and "other machine tools" at \$219,708 and \$4,774,294, respectively.

CENTRIFUGAL CASTING OF PIPE

United States Cast Iron Pipe & Foundry Co. to Use De Lavaud Process

The United States Cast Iron Pipe & Foundry Co. has purchased the exclusive rights for the use of the De Lavaud process for making cast iron pipe centrifugally in the United States and its possessions and in Cuba. This arrangement was recently made with a Toronto, Canada, syndicate at the head of which is Gordon Perry.

A demonstration of one of the De Lavaud machines was recently conducted at the cast iron pipe company's plant at Burlington, N. J., where 6-in. pipe 12 ft. long was produced, one every five minutes. For the company's plant in Birmingham, Ala., a contract has been made for the installation of five De Lavaud machines. These installations will be made as rapidly as possible. The machines will be of such size that 6-in., 8-in., 10-in. and 12-in. pipe can be produced. It is expected that by their use 25 men will be able to turn out 900 lengths of pipe a day with no material necessary except molten iron, whereas under the present system of sand casting it takes approximately 80 men to make 400 lengths of pipe, and there is a considerable molding and core-making cost in labor and materials. In both plants molten iron from cupolas will be used. The practicability of the De Lavaud process has been demonstrated in the operations at Toronto, where various sizes of pipe have been produced by this method for several years.

The installation of the De Lavaud machines by the United States Cast Iron Pipe & Foundry Co. is the first to be made in the United States although, apart from Canada, the process has been in use in Brazil, where it originated, as well as in the Argentine and France for a number of years. Stanton Iron Works of England obtained the rights for the use of this process in Great Britain a year or two ago.

In the early period of the demonstrations of the De Lavaud process in the United States, THE IRON AGE published the first description in its issue of Sept. 7, 1916, and later articles appeared covering the development of the process in Canada and South America.

Dominion Government Pays \$3,000,000

The Dominion Government has overridden the Auditor-General and has paid \$3,000,000 to the Dominion Steel Corporation, in connection with the company's claims for damages for the cancellation of the contract given to the plate mill at Sydney, N. S. Before the recent election, the company, which had entered a motion in the Exchequer Court by consent of the Government, offered to settle for \$4,600,000, without proceeding to trial, its claim for \$6,300,000. The Government undertook to pay \$3,000,000 of this and an order-in-council authorizing payment was passed before the election. It was held up by the Auditor-General on the ground that the case was *sub-judice*, and also that there was no appropriation from which it could be paid. The Treasury Board, which is a sub-committee of the Cabinet, overruled the Auditor-General a few days ago and the company has received its cheque, the sum being charged to demobilization. While paying \$3,000,000, the Conservative Government labored to its account to say whether or not the balance of \$3,000,000 should be paid.

CONTENTS

JANUARY 26, 1922

Sheet Mill of the Otis Steel Company	259
Staggered Arrangement of Furnaces—Powdered Coal Used—Plant Notable for Modern Equipment and Design	
Cold Rolled Strip Steel Calculations	267
Formulas for Determining Pounds Output and Piece-Work Rates in Manufacture of Cold Rolled Strip Steel	
Fluctuations of Steel and Iron Pipe Prices	269
Trend of Quotations from 1898 to 1922—Wide Spread of Almost \$62 Per Ton in 1920	
Recovering Scrap from Discarded Navy Ships	270
Officials Studying Methods of Dismantling Vessels Included in Disarmament Program	
American Steel Sheets Largely Used in Japan	274
New Fire Laws Will Cause Increasing Imports—Galvanizing in Japanese Plants	
Slight Gains in Iron and Steel Exports	277
December Best Month Since May—Year 1921 Under Half of 1920—Sheets and Pipe Only Items Greater in 1921	
Iron and Steel Interests Ask Reductions	284
Exhaustive Hearing by Interstate Commerce Commission—Witnesses Hold High Freight Rates Responsible for Depression	
Canada's Output in 1921.....	263
Multiple Tapping Machine with Dial Feed	264
Work-Holding Burnishing Barrel.....	264
Motor Driven Horning Press.....	265
Crucible for Domestic Clays and Graphites	265
Automatic Stoker Companies Merged.....	265
Growth in Chicago Industries 1914-1919..	265
Helical-Flute Expansion Hand Reamer...	265
Automatic Drilling and Reaming Machine.	266
Coal and Coke in 1921.....	266
Surface Grinder with Tilting Table.....	268
Erie Contracts for Handling Freight....	268
Record Coal Mine Production.....	271
Pittsburgh Foundrymen's Association....	272
Technical Society Meetings.....	272
Industrial Engineers Spring Convention..	272
Machine for Welding Thin Tubing.....	273
Tax Claims for Machinery Amortization.	273
Die Slotting Machine.....	273
New Mill Construction.....	276
Manganese Ore in 1921.....	276
Centrifugal Casting of Pipe.....	278
Editorials	280
Rate Case in Steel—Price Basing Points —American Steel and World Supply.— Railroad Improvements	
Foreign Trade Conditions.....	283, 306
Rochester for Foundry Exhibition.....	306
Tariff Referendum	306
Brier Hill Steel Co.'s Heavy Loss.....	306
Industrial Finance	309
Trade Changes.....	309
Ideal Industrial Relations.....	310
Wages and Unemployment.....	310
Labor Notes	311
How Labor Can Help Business.....	311
Cost of Living Factors.....	311
Iron and Steel Markets	292
Comparison of Prices	293
Prices Finished Iron and Steel, f. o. b., Pittsburgh	304
Non-Ferrous Metal Markets	305
Personal Notes	307
Obituary Notes	307
Machinery Markets and News of the Works	312
New York Jobbers' Prices	320

ESTABLISHED 1855

THE IRON AGE

EDITORS:

A. I. FINDLEY

WILLIAM W. MACON

GEORGE SMART

CHARLES S. BAUR, *Advertising Manager*

Member of the Audit Bureau of Circulations and of
Associated Business Papers, Inc.

Published every Thursday by the IRON AGE PUBLISHING CO., 239 West 39th Street, New York

F. J. Frank, *President*

PRINTED IN U. S. A.

George H. Griffiths, *Secretary*

Owned by the United Publishers Corporation 243 West 39th Street, New York. H. M. Sweetland, *Pres.*, Charles G. Phillips *Vice Pres.*, A. C. Pearson, *Treas.*, F. J. Frank, *Secy.*

BRANCH OFFICES: Chicago, Otis Building; Pittsburgh, Park Building; Boston, 410 Unity Building; Philadelphia, 1420 1422 Widener Building; Cleveland, Guardian Building.

Detroit: 317 West Fort St. Cincinnati: Mercantile Library Bldg. Washington: 816 Fifteenth St., N. W. San Francisco: 320 Market St. London, Eng.: 11 Haymarket, S. W. 1.

Subscription Price: United States and Possessions, Mexico, Cuba, Shanghai, \$6.00; Canada, \$8.50; Foreign, \$12.00 per year. Single copy 50 cents.

Entered as second class matter June 18, 1879, at the Post Office at New York, New York, under the Act of March 3, 1879.

The Rate Case in Steel

The iron and steel producers of the country have put before the Interstate Commerce Commission their reasons for asking that the industry be relieved of the heavy handicap of the 40 per cent increase in freight rates that went into effect in August, 1920. The commission was left in no doubt as to the distress in which iron and steel companies have been floundering for many months. Moreover, there can be no suggestion that in a natural desire to make their case strong the iron and steel companies have exaggerated their losses. The figures in respect to important companies are as public as those of railroad earnings, and every new financial statement concerning a steel company differs from its predecessors only in showing that as time passes the losses are greater. The annual meeting of an Ohio company this week showed that on an output of 203,000 tons of steel in 1921 the loss was nearly \$4,000,000, which figures out roundly \$20 to the ton.

In contrast, current railroad profits, approaching 4 per cent on appraised property values, are enviable, and the contrast in the two industries is further emphasized in their outlook. As Chairman Topping put it in his statement at Washington on Saturday, "With railroad operating cost steadily tending downward (November reports show a reduction of 25 per cent), the earning prospects of the railroads are at least encouraging, whereas the iron and steel outlook is the most discouraging that ever confronted us, not only because of the subnormal demand and prices which now obtain, but because of the impracticability of effecting further cost reductions without railroad co-operation." The process of railroad cost reduction, on the other hand, is but well begun. The changes in shop rules made by the Railroad Labor Board in December will produce savings that have been put at \$80,000,000 per year. And now a decision of the same board, effective Feb. 1, establishing new rules for clerks, freight handlers and station agents will add economies computed at \$50,000,000 per year "under normal traffic conditions."

There will be differences of opinion as to the extent to which the reductions in freight rates asked by the iron and steel industry will increase

the demand for steel. On that score large claims were made by those who appeared before the Interstate Commerce Commission in the hearings of the past week. So complicated is the present situation and so uneven is the adjustment from war conditions in manufacture and merchandising, that the appraisal of effects likely to follow from any single change is exceedingly difficult. It would have been said in advance that so great a drop in cereal and food-product values as has taken place would go far in facilitating readjustments in other values. Distress in any industry is not a good foundation on which to build prosperity in any other. And it is certain that the distress of the farmer is contributing in no small measure to continuing distress in iron and steel manufacture.

The argument made at Washington in behalf of lower iron and steel freight schedules, particularly on raw materials, is certainly not that the railroads should be brought to a state of distress because the steel industry has long been in that state. The argument is that railroad rates, and particularly railroad wages, should not remain on a war basis at the expense of every other industry in the country. Iron and steel manufacturers have a claim which can be urged by no other class of shippers, for there is no parallel in other industries for the hauling, often for long distances, of five tons of raw materials for the making of one ton of finished steel product. Thus on no other class or classes of freight have the railroads any such prospect of participating in the benefits of the increased activity that would be produced by lowering the transportation charge.

In no opinion is there such agreement in the whole business world as in the opinion that freight rate reductions are essential to further progress in the readjustment of prices. Whether these freight reductions are the cause or the effect of reductions in excessive railroad wages is not so important as that they be brought about. The steel industry has been in no haste in arriving at the conclusion which was urged at Washington, with such impressive marshaling of the facts. But there has never been greater unanimity throughout the length and breadth of the industry than in the opinion now held that no real turn for the better can be ex-

pected unless a reasonable reduction is made in the charge for transporting its raw materials and its finished products.

Price Basing Points

For several months bars, shapes and plates have sold in Chicago territory at prices which were not the market price at Pittsburgh plus the freight from Pittsburgh to the point of delivery. In other words, the Chicago market in these commodities has not been governed by "Pittsburgh plus." In the past few weeks THE IRON AGE has been quoting the Pittsburgh market on bars, shapes and plates at 1.50c. and the Chicago market at 1.60c. The freight between Pittsburgh and Chicago is 38c. per 100 lb. Sales by Buffalo and various Pennsylvania mills have been made also without definite regard to Pittsburgh basing.

These departures from long standing custom have created scarcely a ripple in a market which has been subject to much vicissitude, though there might have been disturbance had the departures occurred in a strong market. When this matter of "Pittsburgh plus" was first brought to general attention by criticisms of certain western consumers of steel it was argued that abandonment of the system would greatly increase the competition between mills. The argument was perhaps applicable to certain conditions, but the fact should be noted that it is not applicable to present conditions. Abandonment by the Chicago market of the Pittsburgh basis has lessened the number of competitors in that field. Many mills have simply withdrawn from the competition.

Chicago, as already stated, is only one case of departure from Pittsburgh basing. One of particular interest was reported in THE IRON AGE last week, an informal arrangement having been proposed between certain wire mills and their customers in the Cleveland district, whereby wire prices at Cleveland would be higher than prices at Pittsburgh by approximately one-half the freight from Pittsburgh to Cleveland. The arrangement would be much the same as if Cleveland were put on an f.o.b. Youngstown basis.

It is well understood in the trade that while the complaint against "Pittsburgh plus" now being prosecuted by the Federal Trade Commission is directed against the United States Steel Corporation, it was not the Steel Corporation that originated the system, which was more or less common in the steel market for years before the corporation was formed on April 1, 1901. It was not universal before that date, nor has it been universal since. For many years rails have been at the same price f.o.b. mill wherever located, with the exception of Colorado. There was an earlier period, however, when the rail market was regularly \$2 a ton higher at Chicago than at Pittsburgh. An interesting point in that connection is that while it is claimed Pittsburgh is the natural basing point on account of its heavy production, a little over 30 years ago the Chicago district was making more rails than the Pittsburgh district, yet Chicago had the higher price. In wire mills it used to be a common thing for the Chicago market to be at what was called an "arbi-

trary" over the Pittsburgh market, the "arbitrary" being usually 10c. a keg, regardless of the freight rate.

It would be difficult to argue that the existence or non-existence of the "Pittsburgh plus" system of quoting delivered steel prices encourages or retards advances or declines in prices, and it would be quite impossible to prove the case for any one of the various alternatives. The markets would simply be more sensitive, the greater the number of basing points, for the greater the mass the greater the inertia.

Pig iron has shown that it is possible, without injurious disturbance, to have a number of basing points, and also that it is impossible for the differentials between districts to vary widely. Except during the period of Government control of prices in connection with the war there have always been almost as many pig iron markets as producing districts, and prices rose and fell much the same in all the districts. These districts were separated by twilight zones, and when the market in one district advanced or declined the twilight zone would shift, inducing a change in the adjoining district.

American Steel and World Supply

A new low record for recent years in iron and steel output was made in 1921 in the sum total of the five leading countries. All were caught in the reaction from the false prosperity of 1919 and 1920. Germany and France were able to come close to their production of the preceding year. But for the world-wide depression, both probably would have shown a measurable gain. More reliable comparisons are possible than at this time last year, data as to Belgium and Germany not being available then. The 1919 and 1920 figures for Germany are based on information recently secured by our Berlin correspondent, the first that has been made public there since October, 1919, when the printing of monthly production figures was stopped. For the United States and Great Britain the figures given below are close estimates for 1921 and official for other years, while those for France are based on nine months' data statistics for last year and those for Belgium on 10 months' returns. For other years official data are given, corrected to date. Comparisons are made with 1920, 1919 and 1913:

Output of Pig Iron and Steel (Including Castings) in Five Countries, Gross Tons

	1921*	1920	1919	1913
Pig Iron				
United States	16,750,000	36,925,900	31,015,300	36,972,000
Great Britain	2,611,400	8,007,900	7,398,000	10,260,000
Germany	5,750,000	5,550,000	5,654,000	16,765,000
France	3,294,000†	3,350,400	2,376,000	5,124,000
Belgium	875,600†	1,112,000	247,200	2,445,600
Total	29,281,000	54,976,200	46,690,500	65,566,600
Steel				
United States	20,250,000	42,132,900	34,671,200	31,300,800
Great Britain	3,624,800	9,056,800	7,894,000	7,668,000
Germany	7,750,000	7,710,000	6,732,000	17,340,000
France	2,913,000†	3,002,400	2,148,000	4,620,000
Belgium	804,000†	1,215,600	328,800	2,427,600
Total	35,342,400	63,117,700	51,774,000	63,356,400

*Partly estimated.

†For France based on nine months and for Belgium on 10 months' output.

The countries named probably produced about 90 per cent of the world's steel in 1921. In these columns a year ago a comparison of the 1920 output

with 1919 and 1918 showed the commanding position of the United States, which was credited with about 67 per cent of the total production of both pig iron and steel. Last year the American percentage fell to about 57, a proportion by no means small in the light of a shrinkage of over 50 per cent from the domestic output of 1920. Comparisons as to Great Britain must be made in the light of the coal strike which for three months seriously crippled that country's steel industry. Belgium in 1921 by no means kept up the rate of recovery indicated in 1920.

Total pig iron output in 1921 was only 53 per cent of that for 1920 and 45 per cent of the 1918 total, while steel production in 1921 was only 56 per cent of that for 1920 as well as of that for 1918. Between the pig iron output and that of steel in the five countries last year the difference is about 6,000,000 tons, steel being over 20 per cent greater. In 1920 the margin of over 8,000,000 tons was less than 15 per cent. In 1918, the pig iron total at 65,500,000 tons was more than 2,000,000 tons greater than that of steel. The present day preponderance of steel indicates the growth of the basic open-hearth steel industry with its large use of scrap, and corresponding conservation of the world's iron ore supply.

Railroad Improvements

The railroads have been getting to the point where they can consider the making of improvements as distinguished from extensions—a distinction not always made in popular discussions of the railroad position.

The railroads have not yet had a month of earnings at the rate contemplated by the Transportation act, but they have been making progress in that direction. In the first two months of 1921 there were deficits instead of earnings, but except for a possible retrogression in the last two months of the year the earnings have been progressively less unfavorable. The improvement is ascribed almost wholly to economy, rather than to increase in traffic. Measured by ton-miles of freight moved, traffic decreased in the first four months of the year, April being the low month, and then increased, so that August showed a heavier movement than January. September and October brought further increases, but it is understood the last two months of the year will show some decline.

In the first six months of 1921 the operating ratio of the Class I roads was about 88 per cent, while the next five months averaged about 76 per cent. That is a great improvement, but 76 per cent is still very high by comparison with pre-war ratios.

The general opinion is that railroad conditions are now moving in the right direction, so that the railroads are getting to the point of being able to spend some money beyond what is necessary merely for conducting transportation. Railroad borrowing power is increasing, both because railroad reports are improving and because the money market in general is becoming more favorable.

In some quarters the expression "railroad expenditures" suggests the laying of track and the buying of locomotives and freight cars. It is im-

probable that much of that sort of thing will be done. There are idle locomotives and freight cars and some of them are in bad order. The necessity for increasing the number is not pressing. As to track extensions, there may be some disposition to build short feeder lines, but certainly there will be little laying of strictly new railroad. In this connection the *Railway Age* mentions an interesting point, that already this year the Class I railroads have bought more passenger cars than they did in all of 1921—222 cars against 207. This is not to increase passenger carrying capacity, but to improve service.

A great many improvements are waiting to be made, falling in two general categories—improvements that will decrease the cost of operation and improvements that will increase the carrying capacity of the roads. All the improvements will cost money, and the desirability of their being made will be used continually by the railroads as an argument against reductions in freight rates. One particular improvement does not fall precisely in either of the categories mentioned, the introduction of automatic train stops. The Interstate Commerce Commission is now pressing this subject, and the attitude of the railroads no doubt will be that this would be chiefly a safety measure, although in the long run it would no doubt also both decrease cost of operation and increase capacity. First, the railroads will be called upon to make experiments which will cost money, and the money must be found long in advance of any economy that may ultimately result.

The Yale & Towne Manufacturing Co., Stamford, Conn., made this statement recently in explanation of the company's decision to build a plant in Germany:

Investigation has indicated that the cost of production in Germany is so much lower than in the United States that it is hopeless at this time to compete in many export markets with goods of American manufacture.

There are other evidences of like steps being taken on the strength of the belief that Germany is the cheapest producer, due to cheap labor and cheap money. American moving picture interests are taking advantage of this condition by an increasing use of films "made in Germany." That Germany is at work on a broad scale was given emphasis by the fact that her iron and steel exports late last year exceeded those of any other nation and recently her buying of American copper has been on an unprecedented scale.

Out of 22,409 tons of steel castings produced in Canada last year, 13,384 tons, or 62.4 per cent, was made in electric furnaces. And this was done in a year of depression when the country's total steel output fell to 56,000 tons per month from 92,000 tons per month in 1920. The best record in the production of electric steel castings in the United States was in 1920 when the castings made in electric furnaces were only 12.4 per cent of the total. And the United States leads the world in the use of the electric furnace. Electric power is cheap in Canada and the steel foundry industry is profiting thereby.

SCARCITY IN GERMANY

**Fuel Curtailment Restricts Pig Iron Production—
Exports Decrease—May Import
Newfoundland Ore**
(Special Correspondence)

BERLIN, GERMANY, Jan. 2.—The German iron and steel market is closely linked with the exchange question. Whether the recent increase in value of the mark represents a turn of the tide depends entirely upon this upward trends continuing for any length of time. The notable improvement in currency which began early in December has thus far directly affected only the scrap market, where prices for best grades have receded from the high point of 3300 m. to about 2100 m., the present quotation.

However, the tendency of the scrap market is no longer indicative of the trend in finished iron and steel, at least not to the extent that it was formerly. Scrap prices are now fluctuating with exchange rates. This may be explained by the fact that fairly large tonnages of old material are stored in France, Belgium, Holland and the United Kingdom, which naturally leads to larger offers to German buyers whenever German prices approach normal. A Dutch firm at Rotterdam has attempted to obtain rolled material from German mills for a British account, offering to exchange scrap stored at Le Havre, France. As a result of the improvement of the mark, German consumers of scrap have purchased stocks from England.

Aside from scrap, there is no distinct change in the tone of the market. The possibility of a readjustment of reparations has introduced an element of uncertainty and buyers are cautious in placing orders. While formerly the mills showed a marked reserve in closing deals, the consumer is now slow to engage in long-term transactions. The demand for lots for current delivery is still active and complaints of inadequate supplies by domestic consumers are as numerous as ever. This feature is more noteworthy when it is considered that export business has lately shown a decrease in volume. With the decline in world's market prices, the increase in value of German currency, the 4 per cent export levy, and the risks incident to the uncertain future of the mark, there is very little inclination among producers to compete in international markets, the more so as a revival in building is expected in the spring. Belgian competition in rails is considered as serious.

Fuel Supplies Curtailed

The coal shortage has led to a cutting of the self-consumption fuel quota for smelting plants. The reduction in supplies amounts to 150,000 tons (100,000 tons of coke and 50,000 tons of coal), and came into operation in January. A feature of the ore market is the offering of Wabana ores by British interests closely connected with the Wabana ore mines in Newfoundland. This ore has been considered as a substitute for Swedish ores provided an agreement is reached on price. The high content of silica is also a deterrent.

Demand for pig iron continues strong and because of the coke shortage can not be met by the furnaces, so that the importation of Czecho-Slovakian pig iron is under consideration. Among recent price advances are Siegerland steel-making iron and 8 to 10 per cent spiegelisen which have been fixed by the pig iron syndicate at 2964 m. and 3067 m. per ton.

The existence of the pig iron syndicate has been prolonged for five years more and the participation quota system thoroughly revised. The quota for each works heretofore was, with few exceptions, fixed about 10 years ago, and in view of the important changes during and since the war, no longer corresponds to their producing capacities. The new agreement provides that the production figures for each works during a period of six months (minus the tonnage for self-consumption) shall constitute the participation quota for the successive three months. The

possibility of an unlimited development of participation quotas is restricted by a provision retaining the former quotas at maximum figures.

Semi-finished Material Scarce

Semi-finished material is scarcer than pig iron. Mills depending upon outside sources for their supplies are finding it extremely difficult to cover their most urgent requirements. Some grades, such as sheet bars, have almost disappeared from the market and blooms are also difficult to obtain. Many mills are now using ingots for rolling light sheets.

Interest in finished material is chiefly centered on bars and structural shapes. Rail requirements are known to be enormous, but business is restricted because of the financial difficulties of the railroads. Several mills have already granted credits to private railroads. Activity also prevails in the wire market where mills are booked for at least three months ahead. It is safe to assume that 40 per cent of the present output is for export. Drawn wire for export is quoted at £10 to £12, which is but little above the domestic level. The loss in production caused by the recent strike at the Düsseldorf works is severely felt in the tube market. Most of the mills have orders booked into the second quarter of 1922. The tone of the sheet market is easier on the heavier gages, which are more readily obtainable, but supplies of medium and light gages continue scarce.

Prices during the past fortnight do not exhibit any noteworthy changes. The tone of the closing week of the year 1921 was quiet but firm. We quote as follows, per metric ton, unless otherwise stated:

	Marks Per Metric Ton
Bar iron.....	6,800
Structural shapes.....	6,900
Tees and channels.....	6,500
Flats.....	6,600
Rounds.....	6,550
Squares.....	6,500
Angles.....	8,200
Sheets, heavy.....	6,300
Sheets, medium.....	8,400
Plates, light.....	11,600
Seamless steel tubing, 1 in., per meter.....	19

LAST TWENTY PER CENT

President Clarke Speaks on Importance of Exports to Industries

PITTSBURGH, Jan. 24.—E. A. S. Clarke, president Consolidated Steel Corporation, New York, and Governor H. J. Allen, Kansas, were the principal speakers at the annual banquet of the Engineers Society of Western Pennsylvania at the William Penn Hotel here last evening. Mr. Clarke's subject was "Foreign Trade and Its Relation to This Country." He said that no business was profitable if any substantial element of its production remained unsold. In every line of production, there is an element roughly estimated as the last 20 per cent, the sale of which is essential to the profit of the whole operation. Cost of material and expense of operation come first and it is what is left that makes the profit. Foreign trade of the United States now is in the position of that "last 20 per cent" in relation to our industry as a whole. Mr. Clarke drew attention to the steady growth in exports of manufactures, noting that they have grown from 14.8 per cent of the total in 1880 to 47.2 per cent in 1914, while in the same period exports of raw materials and food-stuffs had dropped from 84.8 per cent of the whole to 52.5 per cent of the total. He reviewed at some length the assistance rendered by the Government through the Department of Commerce, and also told of the help which had come through the War Finance Corporation and the Webb-Pomerene law.

Governor Allen's talk was chiefly about the industrial relations court of Kansas, telling how successful this has been in the adjudication of labor disputes in Kansas. George S. Davison, president Basic Products Co., Pittsburgh, was toastmaster.

Iron and Steel Interests Ask Reductions

Exhaustive Hearing by Interstate Commerce Commission— Witnesses Hold High Freight Rates Responsible for Business Depression

BY L. W. MOFFETT

WASHINGTON, Jan. 24—Unprecedented in its exhaustive detail, iron and steel, foundry, and coal and coke interests representing every important producing section of the country, have completed their testimony before the Interstate Commerce Commission in behalf of substantial reductions in freight rates. Submitted in connection with the commission's general rate investigation, the testimony was begun last Thursday with the opening of the shippers' side in this proceeding, and was concluded yesterday. The first and second days were devoted exclusively to coal and coke rates while the third and fourth days were given over to rates on raw material used in the manufacture of iron and steel, which necessarily included coal and coke, as well as ore and limestone. Testimony was also submitted as to refractories, pig iron and semi-finished and finished steel.

Sitting for the commission were Commissioners Hall (presiding), Lewis, Aitchison and Esch.

Whatever may be the outcome of the investigation, scheduled to close on Feb. 25, it is certain that the iron, steel, foundry, and coal and coke people presented a carefully prepared and voluminous case abounding in facts and figures that could hardly be exceeded for intelligent study. That both the commission and the railroads were impressed is evident. This is not to say that the railroads were swayed from their repeated claims that their financial condition does not warrant general reductions in freight rates; nor is it to say the commissioners were moved to that conviction. But it is a certainty that the facts presented pictured to them most vividly the depressed condition in the iron and steel industries, whose representatives are firmly of the opinion that lower freight rates would stimulate activity for them and be of benefit to every interest in the country, including the carriers. The hope is entertained that the proceedings will result in relief through lower freight rates and some are confidently expectant to this end, with a difference of opinion as to whether it will be through general reductions on all lines or cuts of some character in rates on raw products.

Appeal for Old Rates

Broadly, the iron and steel industry wants the Commission to restore rates prevailing before the so-called 40 per cent general advance which was effective Aug. 26, 1920, in ex parte 74. This was urged by Chairman John A. Topping, of the Republic Iron & Steel Co., as spokesman for the majority of the independent steel makers and by such a prominent United States Steel Corporation representative as L. C. Bihler, traffic manager for the Carnegie Steel Co. F. A. Ogden, general freight agent for the Jones & Laughlin Steel Co., appeared for the same interests as Mr. Topping and supplemented testimony of the latter, making a similar plea as to rate reductions. Their requests related to raw products, pig iron, and semi-finished and finished steel. Iron and steel producers, coal, coke, pig iron and steel and foundry interests, all pointed out that their industries not only have been liquidated but are producing at a loss.

The attitudes of bituminous coal producers were expressed by the first witness for the shippers, J. D. A. Morrow, vice-president of the National Coal Association, who requested a heavy cut in coal rates, and suggested that a reduction of 75c. a ton by April 1, "in all probability would be fully compensated for by the lower fuel costs of the carriers alone, to say

nothing of any other reductions in railroad operating expenses."

The position of the iron and steel makers in the Chicago district as a group, was explained through Robert Hula, assistant traffic manager of the Steel & Tube Co. of America, who urged "maximum relief in rates on coal, if in the judgment of the commission reductions can be made under existing circumstances."

His request for an early decision in order to remove the prevailing uncertainty in the commercial world due partly to the railroad situation, and his assurance that the interests for which he spoke do not want to destroy the transportation system expressed the strain running through most of the testimony. The point was repeatedly made, however, that lower rates would increase both the volume of traffic and net revenues for the railroad.

H. D. Langhorne, speaking for the Virginia Pig Iron Association, in urging reductions in rates on basic commodities, including furnace materials and pig iron, said such action would stimulate the movement of commodities and increase the operating revenues of the railroads. W. A. Barrows, Jr., speaking for the Eastern Pig Iron Manufacturers, said that iron and steel consumers of all classes are waiting for lower freight rates before making any available purchases and urged reductions in rates upon the percentage basis.

Bearing a Great Burden

J. Fred Townsend, traffic manager for the National Tube Co., submitted elaborate tables showing the large increases in rates both inbound and outbound to indicate the heavy burden the steel industry is bearing. When he had finished Commissioner Hall suggested that other witnesses might as well omit declarations and exhibits of that kind because it was obvious that the cumulative effect of the 5, 15, 25, and 40 per cent advances made since 1918, was an increase of a little more than 110 per cent. Figures of that kind, Mr. Hall said, show no more than that the steel industry has suffered in the same way as all other payers of freight rates.

"But the increase on inbound raw materials has been more than 110 per cent," said Mr. Townsend. "On coal it was 150 per cent."

"But that includes increases on intrastate rates," observed Mr. Hall.

Mr. Townsend said that it took eight carloads of raw material to produce one carload of wrought pipe. The increase in the freight bill of the National Tube Co. on inbound material was from \$5,554,820 in 1918 to \$11,816,584 in 1921. On outbound the increase was from \$9,476,852 to \$19,378,455. The increase in car mile was 112 per cent.

"Was your labor cost in 1920 greater than your total revenue in 1918?" asked Mr. Hall.

"Are you asking about labor cost on railroads?" inquired Charles E. Seidertling, commerce attorney for the United States Steel Corporation, who was conducting the examination of the witness. Mr. Hall said that what he had embodied in his question was the fact with regard to the railroads.

"I'm not prepared to say," said Seidertling, "but

but the average loading is in the neighborhood of

55,000 lb. The industry desired, he said, a minimum of 25,000 lb. at fifth class, 60,000 at sixth, with l.c.l. shipments moving at fourth class. He said that there are a number of articles rated at fifth class that have minima as low as 24,000, hence the suggestion that wrought pipe have a carload rating as low as that. He said that it would give the comparatively small dealer a chance to order in quantities he could handle.

The witness said that the domestic rates on wrought pipe were too high for present conditions, especially to the Pacific coast, where foreign competition has wholly displaced American pipe. The rate figures out \$38.30 per ton. A reduction of 50 per cent, he said, with the average loading would still yield a revenue of \$669.81 per car, or 24c. per car-mile. Foreign pipe, he said, is coming from Germany at \$5.80 per gross ton from Hamburg and \$4.80 from Antwerp. A rate as low as \$3 a ton, he said, had been made recently on other commodities, such as building sand in ships coming from foreign ports to Pacific ports to load with lumber and grain.

Buffalo Causes a Stir

The hearing was enlivened Monday during the examination of James P. Daly, traffic manager of the Donner Steel Co., who appeared on behalf of Buffalo district iron and steel interests, during which he repeated requests made previously by these producers for readjustment of rates on coal and coke to their plants and opposed reduction in rates on iron ore from lower Lake Erie ports to interior furnaces.

Attorney Francis B. James was conducting the examination, when objection was raised to all of the testimony by Attorney Charles S. Belsterling on the ground that the complaints made by Mr. Daly are before the commission or are to come before it in other cases.

Mr. James said the statement of Mr. Daly was intended as an answer to the demands of other iron and steel interests for reductions in ore rates.

Commissioner Hall advised Mr. Belsterling that his objection had been noted, but the testimony would not be struck out for the present. He said, however, that it covered only local matters in a general hearing and could be disposed of under complaints filed.

Mr. Daly, asked by Commissioner Lewis what specific commodities should be reduced in the event no general reductions were made, replied that no single commodities should be selected arbitrarily, but pointed out that if it is found on a sound basis that such action is justified, the first reduction should be made on coal. He assigned as his reason the fact that coal is used in practically all industries and a reduction in rates on this commodity would tend toward the liquidation and stimulation of industries of the country generally. He advocated cuts in ore rates as they relate to the rail movement from the mines to the upper docks, stating that this would benefit all furnace interests, while a cut on ore from lower lake ports would give no benefits to lake front furnaces and stating at the same time that ore rates from lower lake ports now are relatively low.

Cause of Present Depression

"The rates on raw materials entering into the manufacture of iron and steel are much too high and must be reduced," said J. M. Gross, general traffic manager for the Bethlehem Steel Co. "There are yet to be effected many readjustments in the rates on furnace materials and these adjustments should be made before or simultaneously with any general reductions. That the present level of freight rates on raw materials is, to a large extent, responsible for the present conditions in the steel industry is frequently alleged and it is believed can be easily demonstrated. Most industries ship approximately one ton of products for every ton of raw materials. Thus the burden of a horizontal increase in freight charges in the case of such products in comparison to selling price amounts to far less than in the case of a ton of steel. The successive horizontal increases in freight charges have resulted in increases in total freight charges with respect to each ton of steel prod-

ucts which are far out of line with the increases per ton of practically every other commodity and industrial product. These increases in freight charges, of course, are reflected in prices for steel which are entirely out of line with prices for other commodities judged on a pre-war basis."

Charts Submitted

J. L. Roney, general traffic manager for the American Rolling Mill Co., Middletown, Ohio, on Monday, submitted charts in support of the proposal that the 40 per cent advance in the Eastern district should now be eliminated. In addition to that he emphasized the desirability of export rates on iron and steel so as to enable the American mills at all times to market their surplus. Thereby, he said, continuous and economical operation would be assured and labor would always be employed in the mills. He urged the commission to see to it that export rates were always so adjusted.

"Would you rather have a small reduction in rates or an assurance of service?" asked Commissioner Lewis.

"We have service now but no business," answered the witness. "Give us the rate reduction and we'll get the business. If we have the business, we are willing to take chances on obtaining service."

Admitting, in answer to Commissioner Hall's questions that the depression in business is world-wide, Mr. Roney contended that a reduction in rates in the United States would have the effect of improving business.

A. S. Lucas, chairman of the Birmingham District Traffic Managers' Association, spoke Monday afternoon particularly for producers of cast iron pipe and fittings, and said that the present rates are restricting the use of pipe by municipalities because the appropriations they have for installing water pipe are insufficient to pay for the required tonnage and freight rates. He said, as an instance, that Phoenix, Ariz., needed 6000 tons of pipe, but on finding it would cost \$60 per ton, delivered, was able to take only half that amount. Answering questions, Mr. Lucas said he would remove the whole of ex parte 74 "as a starter" and then make other readjustments.

American Foundrymen's Association

Testimony in behalf of the American Foundrymen's Association was given Monday afternoon by its president, W. R. Bean, who asked for the removal of railroad rate increases on inbound shipments of pig iron and outbound shipments of castings of all kinds made in ex parte 74. He told the commission that the association has a membership of 1600 foundry organizations which are of the firm conviction that the increase in the volume of business which will result in the near future from the reductions suggested will place the carriers in a better financial position than will be the case if present rates are maintained.

American Pig Iron Association

Appearing for the American Pig Iron Association, which represents merchant blast furnace interests in the various producing sections of the country, Richard Peters, Jr., urged that the commission restore rates on both inbound raw materials and on outgoing pig iron shipments such as prevailed prior to the general advance of rates on Aug. 26, 1920. His statement was comparatively brief inasmuch as pig iron associations from different groups had already set forth the condition existing in the iron industry, which is charged partly to high freight rates, and he treated the question in a general and broad way. He stated that the high freight rates have localized distribution of pig iron and destroyed the economic system on which the pig iron industry was created. Producers are losing established trade, he said, and it will be difficult to re-establish it. Likewise, he pointed out, consumers find it a financial burden to get the particular mixtures of iron they require which are produced in the different sections of the country according to the requirements.

Lake Superior Iron Ore Association

One exhibit was submitted to the commission Monday afternoon by L. C. Sprague of M. A. Hanna & Co., testifying for the Lake Superior Iron Ore Association,

to show that the rates on iron ore from the mines to upper lake ports are too high and should be reduced. Unsuccessful efforts were made to have the statement of Mr. Sprague struck from the record, but he pointed out that the facts were taken from the records of the Interstate Commerce Commission and not, as charged, from those included in the Adriatic Mining Co. case. He said the purpose of the statement was to show that the advance in rates on iron ore was greater than on other commodities, and that the advance put on the rates from the mines to the docks was intended to cover the increased cost of transportation both in the upper lake region and also from the lower lake ports to furnace points.

Maladjustments Cited

S. L. Meyer, in behalf of the Hammond Iron Works, Warren, Pa., said Monday afternoon that instead of ordering general reductions in rates, the commission would confer a greater benefit on the whole country by removing the present maladjustments and thus enable manufacturers such as the Hammond Iron Works to get back some of the business lost by reason of the increase in the spread of rates from the same point of origin to the manufacturing plants of different fabri-

cators and manufacturers. He said he had in mind the fact that prior to the percentage advances there was a difference in rates to the fabricating plants of the Hammond company and its competitors of 10c. per 100 lb. on steel plates used in fabricating tanks. At present the difference is 16.5c. Under the old adjustment, the complaining producer could absorb the difference in rates and compete on terms that permitted it to obtain a fair share of the business. At present, he said, instead of 20 per cent of the business in the big continent oil fields, the company has only 2 per cent. He said that formal complaint is soon to be filed by the Hammond Iron Works against the existing differentials.

"I do not believe that the Interstate Commerce Commission, under present conditions, could order reductions sufficient to help business without bankrupting the carriers," said H. C. Lust, who also appeared for the Hammond Iron Works. "A 10 per cent reduction would not, I believe, originate an additional pound of steel traffic for the railroads, or an additional ton of coal for them. My idea is that it should devote its attention to ironing out the maladjustments so as to enable all to go back into the markets in which they competed prior to the percentage advances."

Freight Rates Double Those of 1913; Steel Prices Up One-Fourth

Chairman John A. Topping of the Republic Iron & Steel Co., who appeared in behalf of a number of independent manufacturers of iron and steel, stressed the great disproportion between the advance in freight rates since 1913 and the percentage by which existing prices of finished steel exceed the average of steel prices in 1913. The transportation advance is substantially 100 per cent while that of steel is only one-fourth as much. The following is taken from Mr. Topping's statement:

"The independent group of steel manufacturers represent approximately 55 per cent of the steel ingot capacity of the United States, and have an invested capital of approximately \$3,000,000,000. Under normal conditions they employ about 350,000 men, with payroll, based on normal employment at present wages, of approximately \$400,000,000 per annum. Their productive capacity is about 28,000,000 tons of ingots per annum. This capacity, when fully employed, suggests a traffic volume to the railroads of about 168,000,000 tons per annum.

"This large group of iron and steel producers, known as the independents, to distinguish them from the United States Steel Corporation, owns no railroads except such as are required as a plant facility for terminal use, or for connecting railroad purposes, and they are therefore entirely dependent upon the carriers for transportation. It may also be stated that normal railroad traffic depends, to a larger extent upon the prosperity and general activity of this great group of manufacturers than on almost any other interest, because the iron and steel manufacturer furnishes the railroads with six tons of traffic for every one ton of manufactured finished product. That is to say, for every ton of outbound movement five tons of inbound raw material are required for its production; consequently, railroad prosperity greatly depends upon maintaining such conditions for manufacture as will make for fair prices, and unless this is done neither normal demand for iron and steel nor a maximum volume of traffic can be maintained.

The Great Decline in Steel

"Iron and steel prices have fallen out of all proportion to the reduction in cost; consequently, cost of production for iron and steel must be further reduced, or the selling prices of iron and steel must be increased, a contingency which, if forced, might be disastrous to both the carriers and producing interests.

"The decline in iron and steel prices was emphasized and liquidation hastened by an almost complete col-

lapse in demand. Prices during the year 1921 declined over 50 per cent, while demand at the low point did not exceed 20 per cent. In fact, the iron and steel trade is suffering the worst depression in its history, as average production for 1921 did not exceed 40 per cent, whereas, following the panic of 1907, production was at 70 per cent and after the panic of 1893 averaged about 85 per cent.

"As a consequence of these adverse conditions during 1921, profits were quickly eliminated and losses substituted, while current operations are no less discouraging; in fact, losses became so pronounced that cost reductions were mandatory, and wage reductions of about 46 per cent followed. This reduction, taken in connection with other economies, resulted in cost reductions of about 85 per cent, while iron and steel selling prices, as previously stated, declined about 50 per cent, which decline compares favorably with the unprecedented average decline in farm products of about 56 per cent.

Unfairness of Existing Freight

"We believe that where freight rates bear so large a percentage to the commodity value as freight rates now do to iron and steel costs, freight reductions are essential to a normal consumption of these commodities; in other words, with freight charges representing 50 per cent or more of iron and steel values, normal consumption and movement of these commodities is impossible. Not to emphasize the claims of any particular district, but for purposes of illustration, permit me to point out that on coal, which costs our company about \$2.25 per ton to mine, and is shipped over the B. & L. E. and B. & O. railroads, a distance of 81½ miles, the freight charge is \$1.50 per ton; consequently transportation represents about 75 per cent of the coal cost. On iron ore, where the mine cost runs from \$1 to \$2 per ton, varying with the character of the mine operation, the freight charge, based on an average movement from the Mesabi range of about 77 miles, is \$1 per ton, or approximately 55 2/3 per cent of the average cost of ore. The lower lake rate on ore is no less excessive, as the rate on iron ore for direct shipment from Cleveland to Youngstown, a distance of about 47 miles, is 90½c. per ton. This rate the carriers voluntarily reduced to 74c. per ton effective during the last quarter of 1921. I mention to continue this rate after December denied the carriers, presumably because of

"The Iron Age is commencing

ship of iron and steel prices to freight rates, stated that whereas freight rates have doubled since 1913, the price of seven items of iron and steel, including rails, at Dec. 1, 1921, was \$.0209 per lb., as compared with the 1913 average price of \$.0166 per lb., or an increase of \$.0043 per lb., the equivalent of an increase of 26 per cent, or only one-fourth the percentage of increase made in freight rates.

"Julius Kruttschnitt, chairman of the executive committee of the Southern Pacific Railroad, recently stated that 'freight rates on all railroads declined about 1 per cent between the years 1900 and 1917, and that the total freight rate increase to date was about 74 per cent.' It was also stated by Howard Elliott, chairman of the Northern Pacific Railroad, before this commission, that 'there was practically no inflation in the transportation business during the war.' These statements are not correct so far as they relate to freight rates on coal, coke, limestone, iron ore, iron and steel products, as may be easily ascertained by reference to freight tariffs issued for the Youngstown territory on iron and steel products for the years 1900 to 1917. From these it will be observed that freight rates increased from 3 per cent to 40 per cent, and that the total average increase from 1900 to 1921 on inbound freight was about 90 per cent. For the Birmingham district the increase on inbound raw materials was over 300 per cent. On the other hand, outbound freights on iron and steel in the central traffic territory from 1900 to 1917 increased to principal points about 80 per cent, and from 1900 to 1921 from 122 per cent to 160 per cent.

Burden on Steel Disproportionate

"It may be assumed, perhaps, that the claims made by the gentlemen mentioned had reference to the average of all freight rates being substantially unchanged during the period referred to. But even so, only one conclusion can be reached, viz., that iron and steel products and raw commodities required in their manufacture have carried a disproportionate share of the transportation burden, as compared with other commodities; and, therefore, the unfairness of the increase made on iron and steel commodities under *ex parte* 74 is emphasized. Then again, inasmuch as railroad maintenance of way and equipment represents nearly 20 per cent of the cost for conducting transportation, and as iron and steel enters largely into this item of railroad cost, is it not manifestly to the advantage of the railroads to bring about, in their own interest, lower costs for iron and steel?

"The problem is, can the cost for conducting transportation be reduced sufficiently to put into effect freight rates on bulk commodities like coal, iron ore, iron and steel, sufficiently low to insure a normal movement? The answer is—Yes, and it should be done. The problem is largely a labor question, for labor is the big item of cost, as it represents about 60 per cent of the cost of conducting transportation, and yet this item of cost has hardly been touched, the reduction effected amounting to only about 12 per cent, whereas the wages of most other labor (outside of that employed in transportation) have been reduced by 30 per cent to 50 per cent. It is therefore clear that the Railroad Labor Board should not oppose but recommend that the railroad executives should make further wage reductions and adjustments in keeping with competitive rates for labor, otherwise you are exempting railroad labor from the economic consequences of the war by maintaining war wage rates in times of peace, in the face of reductions in the cost of living variously estimated by the Bureau of Labor Statistics at 22 per cent to 37 per cent, depending upon the locality. . . ."

Mr. Topping again brought out the point developed in his statement before Examiner Howard Hosmer in the iron ore rate hearing at Chicago, Dec. 7, showing how the steel industry had been extended into many new districts because of the growth of the open-hearth process. These markets once supplied by the older steel-making districts are no longer open to them. Output of some plants, particularly those solely dependent upon rail transportation, has been curtailed, cheaper

water transportation having helped some of the newer districts.]

Lower Freight Rates Will Increase Steel Consumption

"We are of the opinion that fair readjustments of freight rates will gradually restore normal conditions of demand for iron and steel, and bring about normal traffic conditions. While production has increased during the past twenty years about 320 per cent, and present steel ingot capacity is over 50,000,000 tons, yet the normal consumptive requirements of the country have also grown; in other words, the per capita consumption of steel has increased from 300 lb. in 1900 to 834 lb. in 1920, or about 178 per cent, while the population of the country increased nearly 60 per cent, whereas during this period our exports increased over 300 per cent.

"Normal activity in iron and steel industry, as a whole, means a total traffic volume to the railroads of about 300,000,000 tons per annum, this tonnage representing about 15 per cent of the total annual business of the carriers. Estimating present capacity employed at not to exceed 40 per cent, the present volume of iron and steel traffic does not exceed 120,000,000 tons per annum; but, if the iron and steel business can be brought back to normal, the railroads would benefit to the extent of an increase in traffic of 180,000,000 tons per annum, and this increased traffic volume might more than offset revenue losses through reductions in the commodity rates suggested, because the increased traffic promised consists of the most profitable business handled by the carriers.

Where War Profits of Steel Companies Went

"From the testimony submitted to your commission by Howard Elliott, chairman of the Northern Pacific Railroad Co., it would appear that he, at least, is under the impression that the accumulated 'war profits' of the manufacturing companies were such that the existing freight burdens can be carried indefinitely without hardship.

"No greater mistake could be made by the railroad executives or by others in authority, than to act upon any such assumption, because the average steel earnings during the past six years have not been excessive. I base this statement upon the average earnings realized by three large steel companies during the last six years, after deductions for taxes, depreciation and inventory shrinkage. The net profits of these companies have averaged about 9½ per cent on the combined capital and surplus. If the percentage of profits is calculated upon a fair appraisal value of these properties the rate would be considerably reduced. When the hazards and uncertainties of steel operations are considered, particularly taking into account the necessity for making large expenditures to keep pace with changes and improvements in steel-making processes, the above earnings cannot be considered excessive during the six most prosperous years of the steel trade.

"Large expenditures were also made out of earnings by most all of the steel companies during the war, for patriotic purposes, under conditions of cost which were not far from 300 per cent above normal. A substantial portion of this construction cost must be written off on war account, and the balance must be carried as excess producing capacity, which at present has no useful value. In fact, we feel that with our current losses running into substantial figures, the railroad situation is less desperate than ours, because temporarily, at least, we would be content with railroad current profits, which are about 4 per cent on the appraised property values. Then again, with railroad operating cost steadily tending downward (November reports showing a reduction of 25 per cent), the earning prospects of the railroads are at least encouraging, whereas the iron and steel outlook is the most discouraging that ever confronted us, not only because of the subnormal demand and prices which now maintain, but because of the impracticability of effecting further cost reductions without railroad co-

operation. We must, however, make further reductions in cost or advance our prices, and to increase prices under existing conditions of business would, in our opinion, be exceedingly hazardous to the interests of both the carriers and ourselves.

"We therefore urgently recommend that reductions be made of a substantial character in the freight rates on iron and steel and their related commodities, not only because the rates now in existence are out of all proportion to the value of the products, but principally because existing rates of freight are not justified by the cost of the service, plus a fair railroad profit."

Lower Export Rates Stimulated Business

F. A. Ogden, general freight agent Jones & Laughlin Steel Co., Pittsburgh, also advocated the abolition of the ex parte 74 increase on iron and steel products. He argued that this 40 per cent advance was a factor in bringing about the slump in the steel business, as for eight months prior to the putting in effect of this advance the steel mills were doing a very large business. In 1921, part of the increase in shipments which developed in August and continued through the remaining months of the year was due to the granting of a reduction of 25 per cent in the export rate on iron and steel to Atlantic ports. September, October, November and December all showed increases in exports, the total of the four increases over the August rate being 144,753 tons. Counting six tons of raw material to a ton of steel, the speaker calculated that the lower export freight rate was responsible for the hauling of 144,753 tons more finished steel, and also the hauling of 868,518 tons additional raw materials. Mr. Ogden believed that if proper reductions were made in domestic rates there would be a like or greater increase in domestic shipments. The freight advances of 5, 15, 25 and 40 per cent put in effect since 1914 caused an

increase of 66 per cent on ore rates, 162.5 per cent on coal, 124 per cent on coke and 115 per cent on fluxing stone. The increase in freight costs of assembling raw material for a ton of metal is over \$5. The books of many of the steel companies will show losses for the year 1921. Such operations as the steel companies are maintaining are to hold at least a part of their organizations together, and to help in giving their employees work.

Eliminating the last 40 per cent advance in rates on the raw materials and finished products of the iron and steel industry was also urged by H. C. Crawford, Philadelphia, traffic manager of the Cambria Steel Co., Johnstown, Pa., in his testimony given Saturday. Asked by Commissioner Lewis if, in case it was found the general reductions requested could not be made by the commission, what raw materials he would prefer to see given lower rates and in the order desired, Mr. Crawford named ore, coal, coke and limestone. He said that in naming these he was considering the fact that the Midvale Steel & Ordnance Co., of which the Cambria Steel Co. is one unit, has plants at points other than Johnstown. Mr. Crawford expressed the belief, supported by exhibits, that a comparison of present steel prices with freight rates shows that the latter are greater than the price levels can stand. Roughly, he said, prices of steel to-day are almost the same as those prevailing in 1913. The heavy increases in freight rates on inbound raw materials and outbound finished steel products made since 1913 were shown to the commission, together with the distances of train movements, and earnings per car mile as well as the freight cost of assembling raw materials. As an instance of his elaborate figures, it was shown by Mr. Crawford that the outbound rates had increased from 105 to 184 per cent since 1913. Wages in that year and at present also were quoted.

A Statement for Steel Corporation Subsidiaries

A STATEMENT was made by L. C. Bihler, traffic manager Carnegie Steel Co., on behalf of Carnegie Steel Co., American Steel & Wire Co., American Sheet & Tin Plate Co., American Bridge Co., and Lorain Steel Co., principally located in the so-called eastern territory. Extracts are as follows:

"The transportation costs on necessary ore, coke and limestone, to produce one ton of pig iron have increased, calculating the freight on the ore from the lower Lake Erie ports, and on the fuels and fluxes from customary points of supply in western Pennsylvania and Ohio, from 74 to 107 per cent in the Mahoning and Shenango valleys, Pittsburgh, McKeesport, Donora, Neville Island, Mingo Junction, Bellaire, and Wheeling districts, when comparing 1921 with 1914. This refers only to the three basic commodities used in blast furnaces for the production of a ton of pig iron; on coke the increase in freight rates is as high as 124 per cent, on limestone 250 per cent, and on coal as high as 236 per cent. There are also other items of substantial increases in freight on supplies, etc., which are in addition to the figures cited, and represent further increase in the cost of production of a ton of steel, such as brick, sand, clay, fluor spar, dolomite, ganister, firestone, etc.; coal for fuel under the boilers, gas producers (in fact, over five tons of various materials are required for the manufacture of a ton of finished steel). The advances on these materials range from 87 to 220 per cent.

"Taking a few principal points of destination on outbound manufactured iron and steel and comparing the rates in effect from Pittsburgh and Youngstown, Jan. 1, 1914, with the present rates, shows increases ranging from 117 to 146 per cent; the increase on class rate traffic as a result of 5, 15, 25 and 40 per cent increases, 1921 vs. 1914, is 112 per cent.

"High freight rates have retarded construction and tend to localize the zone into which a steel mill can ship. Office buildings, apartments and dwelling houses (of

the latter of which many are still needed) must be constructed at reasonable cost. As long as costs of building materials are high and unduly high freight rates prevail, high interest on capital invested will continue, and rents will not come down as fast as they should.

"A study shows average car mile earnings of railroads in the Eastern district approximately 35c. per car mile, including general merchandise, for the first nine months of 1921. As against this average car mile earnings on raw materials to and finished products from Pittsburgh district are as follows:

Ore (Line haul only).....	\$0.493
Coal (Average 30-mile radius).....	3.02
Coke	0.82
Limestone	1.25
Pig iron	0.74
Billets	0.78
Rolled products	1.02

And to and from Youngstown, Ohio:

Ore (Line haul only).....	0.67
Coal	0.91
Coke	0.69
Limestone (Hillsville to Youngstown).....	4.69
Pig iron	0.78
Billets	0.78
Rolled products	1.00

"A comparison of rates, average weights and revenue on plates, structural steel and merchant bars, 1913 vs. 1920, show increase in rate 122.2 per cent, and increase in revenue 193.9 per cent on account of greatly increased average weight per car.

"The iron and steel industry has done its full share in liquidation. On the principle of affording the greatest possible assistance in economic reconstruction of industry in the country, and benefiting the largest number of persons, it is well to consider the fact that a restoration of normal production and shipment of iron and steel will almost double the number of people now employed directly in this industry, in addition to which it would afford employment to an increased number of employees in mines, quarries, coke works and other in-

industries producing raw materials and supplies, as well as additional workmen in steel consuming plants, to say

nothing of additional employment to railroad employees now idle."

Blast Furnace Interests Under Serious Hardships

IRON and steel buyers of all classes are waiting for lower freight rates before making any unavoidable purchases. W. A. Barrows, Jr., of the freight rate committee of the Eastern Pig Iron Association, told the commission Saturday. He added that the interests he represents do not agree with the opinion expressed by President Daniel Willard of the Baltimore & Ohio Railroad. Mr. Barrows said he was speaking for 16 separate iron and steel companies operating 54 blast furnaces near the eastern seaboard of the eastern group territory, with a total inbound movement of approximately 11,000,000 tons annually in normal times.

It was stated that on Jan. 1, 1922, the market price of pig iron was less than the cost of raw materials and their transportation to the blast furnaces, and that the furnaces he represents are in a desperate condition. Mr. Barrows pointed out that, as a typical instance, pig iron was selling for \$20.50 per ton while the total cost of raw material and transportation was \$24.08. A pig iron price to-day based on the relationship between price and transportation cost which prevailed in 1913, Mr. Barrows said, would be \$27.54 per ton, or 34 per cent above the current price. Such a situation, it was declared, could not be met by an increase in the price of pig iron. The market is absorbing now but a small output and foreign iron is coming from Europe. A recent transaction, he said, was the sale of European pig iron at a north Atlantic port at \$18.65 per ton, c.i.f. No stone had been left unturned by Eastern pig iron makers to reduce their costs. He said that while it might be true as contended by George M. Shriver of the Baltimore & Ohio that freight rates in 1921 showed a smaller advance above the rates he used as the base than was shown in commodities, exactly the reverse was the fact with regard to the selling price of pig iron as related to freight rates.

Taking Pottstown, Pa., as a representative point, Mr. Barrows showed the relative increase in the price of pig iron and the price of transportation entering into its manufacture, taking 3.6 tons of inbound raw material, as follows:

	1901	Jan. 1, 1922	Per Cent Increase
Price pig iron per ton.....	\$14.88	\$20.50	40
Rail transportation cost....	6.76	11.13	64.5
Total transportation cost..	8.36	19.01	55.6

This was compared with an exhibit of Mr. Shriver as follows:

	1901	1921	Per Cent Increase
All commodities	108	216	100
All freight rates.....	89	152	71

"Thus while the price of all commodities has increased more than all freight rates," said Mr. Barrows, "the price of pig iron has increased much less than the freight charges on the materials involved in its production. A ton of pig iron is less able today to purchase the transportation necessary to its production than in 1901, or in the years intervening."

To indicate the additional tonnage in raw materials to be achieved by any effective stimulation of the industry in the Eastern group, Mr. Barrows quoted some interesting figures. He said that in 1920 the Eastern

pig iron district produced 3,500,000 tons of pig iron, entailing the transportation of 12,600,000 tons of blast furnace raw materials. In 1921 the production was approximately 1,850,000 tons with a furnace materials traffic of 4,860,000 tons.

Situation of Virginia Furnaces

Asserting that the freight rates on raw materials used in making pig iron exceed the market price of the finished product, M. D. Langhorne, superintendent of the Oriskany operations of the Lavino Furnace Co., speaking for the Virginia Pig Iron Association, told the commission that every blast furnace and iron mine in the Old Dominion is closed because they could not operate without losing from \$4 to \$5 on each ton of pig iron produced.

"Pig iron that sold for approximately \$50 per ton at times during the war period is now selling for about \$20, or at pre-war prices," said Mr. Langhorne. "Freight rates have been raised to a point never imagined, amounting, in our case, to an increase of as high as 186 per cent on ore, 128 per cent on stone and from 255 to 309 per cent on coke. The latter figure, we believe, shows a much greater increase than has been made in the same commodity in any other producing section. We find our industry in a position, regardless of the fact that we have reduced labor and other expenses as low as possible and resorted to the use of cheap high grade foreign ores to increase our tonnage and reduce our coke consumption, where we cannot make iron for less than \$25 per ton, losing on every ton produced from \$4 to \$5. This places us in a position even worse than that of any other iron producing section and has resulted in the closing down of every furnace within the State, as well as all of the ore mines and quarries, leaving the entire pig iron industry in a deplorable and chaotic condition and placing a great hardship on the communities dependent on the operation of these plants for a livelihood."

Bad Adjustment of Ore Rates

J. E. Rotthaus, of the Thomas Iron Co., appeared as a witness Saturday with regard to rates on ore. He said that there is a serious maladjustment of these rates and asked for the elimination of ex parte 74 rates. When asked by Commissioner Hall whether he would extend his proposal to all other commodities, Mr. Rotthaus replied affirmatively, although adding that he was speaking only of iron ore. He said that adjustment of rates on ore in that part of the country was so bad that the richest iron mine in the Wharton, N. J., district had been closed and ores from India, Spain, Sweden, Colombia and Cuba are being used. He said that for 74 miles they had a rate on ore of \$2.05, while competing plants at Bethlehem could obtain imported ore by the way of Constable Hook, N. J., at \$1 per ton or from Cornwall mines in Pennsylvania for \$1.10. A properly aligned rate for his company, he stated, would be 93c. Under the ex parte 74 rate of \$2.25 from Buffalo, he said, the railroads hauled 300,000 tons of Lake Superior ore, while under the preceding rate of \$1.54 they hauled 3,500,000 tons.

Maximum Relief on Coal Rates Urged

REPRESENTING iron and steel manufacturers of the Chicago district, including the Wisconsin Steel Co., the Inland Steel Co., the Illinois Steel Co., and the Steel & Tube Co. of America, and also the Milwaukee Coke & Gas Co., maximum relief in rates on coal was urged by Robert Hula, assistant traffic manager of the Steel

& Tube Co. of America, if in the judgment of the commission reductions can be made under existing circumstances. He likewise requested that, in the event a reduction is made in coal rates, the same measure of reduction be made on coal from the various fields to Lake Erie ports for trans-shipment by boats, inasmuch

as some of the Chicago district manufacturers avail themselves of the Lake service. It was pointed out that the necessity for maintaining a relationship to Lake Erie ports with the all-rail rates is self-apparent. Among the exhibits Mr. Hula presented was one containing a statement of rates and revenues on raw materials and finished products and he called attention to rates on coking coal from various coal fields to the Chicago district beginning with Jan. 1, 1914. This showed marked increases in percentages. Other sheets of this exhibit set forth the high average loading and the resulting revenues, the same information on steam and gas coal, which showed even greater percentage increases, the weighted average being 133.7 per cent; rates on coking coal from various coal fields to the present time, and rates on coke from the Connellsville and Pocahontas ovens to the Chicago district, indicating an increase of 84.8 per cent. It was urged by Mr. Hula that the commission render its decision at the earliest date practicable as the present agitation for reduced rates and the uncertain conditions created thereby act as a check upon commerce.

Do Not Wish to Destroy

In opening his statement, Mr. Hula said, that the interests he represents do not wish to destroy the transportation systems of the country, nor to deny them the right of making fair profits, but if conditions allow the commission to make reductions in transportation rates, "We feel that the condition in our industry warrants the careful consideration of the commission, as the steel industry is considered as one of the business barometers of the country and in our judgment is in a worse economic condition than any other industry with perhaps one exception. Annual reports of many steel companies confirm this statement."

To indicate the volume of tonnage in which the companies are interested, Mr. Hula submitted an exhibition showing they have 1586 coke ovens, with an annual coal consuming capacity of 9,694,000 tons and an annual coke producing capacity of 6,750,500 tons. In addition to the coal requirements of these interests at the coke ovens, it was stated that there are large quantities of coal used for steam and gas purposes, aggregating some 3,000,000 or 4,000,000 tons, all of which indicated these steel companies are interested in approximately 14,000,000 tons of coal. Authorities were cited to show that more coal is consumed annually within the Chicago switching district than is consumed in all of the New England states and further that more coal is consumed in the switching district of Chicago than in all of New York State, including Greater New York. He said:

Current figures indicate that production of steel has not exceeded 38 per cent of steel plant capacities during the year 1921, which fairly reflects the present consumption of and demand for iron and steel products.

Prices of iron and steel products have been reduced in many cases below the cost of production and many companies will be unable to maintain these deflated values unless production costs are decreased by lower assembling charges on the basic raw materials, which have not been reduced since the termination of the war.

Decline of Steel Prices

Mr. Hula said that prices on iron and steel products have declined 62 per cent since August, 1917, this being the war peak, and that present prices are from 18.8 per cent to 22.4 per cent higher than the 10-year pre-war average. He also stated that it was shown at the recent Chicago hearing on rates on iron ore in the Lake Superior district that iron and steel prices today are 48.6 per cent above the 1914 level and also that prices of all commodities are on practically the same basis. He added:

Records indicate, that bars, plates and shapes, which are a large percentage of the Chicago manufacturers' output, are today selling at even lower levels than the average for the entire country. . . . in some instances being less than the prices obtaining in 1913. This means that the Chicago manufacturers have been forced to absorb the entire advance in invoices of raw materials, increased freight

thereon, increased cost of labor, taxes and overhead, occurring since 1913.

Freight rates today on raw materials entering into the manufacture of pig iron in the Chicago district are 76.3 per cent above the 1914 level. This was set forth in an exhibit and it was shown that the assembling costs on coal have been increased to a greater extent than the other raw materials.

Compared with Price of Pig Iron

Mr. Hula said that by comparison with the 1914 price on pig iron at Chicago, which was \$18.69 per ton, it is found that the coal assembling charge of \$2.8719 in the same period, was 21.1 per cent of the selling value. On Jan. 3, 1922, he said, the price of pig iron at Chicago was \$19 per ton, while the assembling charge on coal was \$5.1069, or 26.87 per cent of the selling value. To restore the relationship which existed in 1914, it was found that the present assembling charges on coal should be reduced approximately 21.5 per cent. With steel plants operating at 38 per cent of capacity, Mr. Hula said, it is self-apparent that the consumption of coal and coke is proportionately decreased, which naturally reflects upon the tonnage to be hauled by the interested carriers and therefore any action which will tend to stimulate steel plant operation will likewise increase the volume of tonnage to the carriers. He said that it is the belief of the iron and steel industry in the Chicago district that a reduction in the assembling cost on coal will have more effect upon the resumption of the normal operation and consumption through the fact that the industry will be enabled to maintain the deflated prices to the consumer. Mr. Hula submitted a chart compiled from the article "Prices of Iron and Steel and Other Products" appearing in the annual number of THE IRON AGE of Jan. 5, 1922, for the purpose of illustrating the relative price levels in effect today on various representative commodities and also the railroad rate assembling costs on basic raw materials entering into the manufacture of pig iron. This showed steel beams to be the only commodity that had reverted to the 1913 or ante-war basis, with farm products second, in deflated value, being 14 per cent higher than 1913 prices; metal prices third, or 19 per cent higher; finished steel fourth, or 24 per cent higher, and pig iron fifth, or 27 per cent higher. The average for all commodities shown, he said, is today 49 per cent higher than the 1913 base. Projected on the chart was the railroad freight assembling cost on limestone, iron ore, and coal, which at the present time is approximately 78 per cent higher on coal than in 1913.

Strong Appeal for Shippers

Appearing as the first witness for the shippers, J. D. A. Morrow, vice-president of the National Coal Association, representing approximately 2,000 operators producing 60 per cent of the aggregate bituminous output of the country, urged a heavy nation-wide cut in freight rates on coal as a means of lowering the cost of coal to the ultimate consumer and improving the economic position of the nation. He insisted that inflated railroad rates on coal must come down if costs to the ultimate consumer are to be substantially lowered, both in coal itself and in products manufactured from coal. A material reduction in the rates was declared to be necessary to the industrial and business revival of the United States upon which the prosperity of the carriers as well as the nation at large must depend. Although not definitely suggesting what particular cut in freight rates on soft coal the railroads actually ought to make Mr. Morrow said that, through savings to the carriers to-day in cheaper fuel coal alone, as compared with a year ago and making allowance for the saving in freight rates on their own fuel coal, the railroads undoubtedly would be justified in making a reduction of 75 cents a ton. He added:

In the 12 months ended Sept. 30, 1921, the carriers purchased a little over 130,000,000 tons of fuel coal. The reduction in cost under the average for this year reached 99c. per ton in October, 1921. With a further estimated reduction after April 1 next, the total savings to the carriers would approximate \$215,000,000 under the railroad fuel cost for the 12 months ended Sept. 30, 1921.

If this \$215,000,000 saving in railroad fuel cost should be translated into a reduction in freight rates on bituminous coal and allowance made for the saving to the carriers by reduced rates in the freight charges on their own fuel cost, the total saving to the carriers on their fuel coal costs would compensate for an average reduction of 75c. per ton on the bituminous coal rates of the country.

We are not suggesting 75c. as an average reduction which should be made. We are merely pointing out the fact that by April 1, 1922 such a reduction in all probability would be fully compensated for by the lower fuel costs of the carriers alone, to say nothing of any other reductions in railroad operating expenses.

The savings in the cost of bituminous coal to users, from substantial coal rate reductions, would add greatly to the purchasing power of the people. For example, an average reduction of even 60c. per ton on bituminous coal would release nearly \$1,000,000 a day to be spent in other ways.

Charges Declared Excessive

As indicating the excessive freight charge on haulage of coal to-day, Mr. Morrow pointed out, from records of the carriers before the Interstate Commerce Commission, that the average rate per ton is \$2.27, as against an average sales price at the bituminous mines of \$2.18 a ton, or 14c. higher than the cost of the coal. He stated that the freight charge of \$150 or \$200 on a car of coal which can be bought at the mines for from \$50 to \$100 shows on its face the disproportion between the transportation cost and the market value of the commodity. To make plain the relation of the transportation charges to the present high prices of delivered coal, Mr. Morrow stated that 48½ per cent of each dollar paid for coal ordered by the manufacturer goes to the operator, out of which all his costs must come, while 51½ per cent goes to pay the freight on the coal. Mr. Morrow admitted that inflation in wages of the bituminous coal mining industry must be readjusted, but pointed out that wages already have been reduced to the approximate level of November, 1917, throughout the mining fields which are not controlled by the United Mine Workers of America. In some of the union fields also, wages have been reduced to that approximate level, it was declared. In the remaining fields, Mr. Morrow asserted, wages must be reduced on April 1 next.

Statement by George H. Cushing

Rates on coal and coke in effect on April 6, 1917, the day the United States declared war against Germany, were declared by George H. Cushing, managing director of the American Wholesale Coal Association, to have been reasonable. He said that the trend of prices generally warranted a 50 per cent increase over those applicable on the date mentioned while rates 50 per cent over those existing at that time are unreasonable to the extent they exceed the maximum of increase.

Summarized, Mr. Cushing said that the association he represents is of the opinion that:

1. Coal rates are unreasonable to the extent that they exceed 50 per cent over those of April 6, 1917.
2. Export rates are unreasonable to the extent of \$1 per ton.
3. In any readjustment, the differentials, as between producing districts, prevailing April 6, 1917, should be preserved.
4. Reconsignment and demurrage rates of April 6, 1917, were reasonable and should be restored.
5. Demurrage rates are unreasonable to the extent that they exceed \$2 per car per day.

R. H. Hayden, New York, of the National Association of Purchasing Agents, said that the association by referendum vote had favored deflation in high freight rates similar to that in prices on commodities generally. The association, which he says has 4,000 manufacturing and industrial concerns affiliated with it, which consume approximately 100,000,000 tons of coal annually, went on record as being overwhelmingly in favor of reduction in freight rates on basic raw materials, especially coal, but that it does not want any cuts made in rates that would injure the credit of the railroads. The association, said Mr. Hayden, would like to see rates decrease along the line by which they were in-

creased in ex parte 74, so that present differentials would be maintained.

By-Product Coke Plants Suffer Severely

The present high rates on coal and coke have had the effect of preventing by-product coke plants from operating and have restricted development of the by-product coking industry, the commission was told Friday by J. D. Forrest of Indianapolis, who spoke for makers of by-product coke north of the Ohio River, among them some steel interests which sell coke. Some by-product plants, it was stated, have been abandoned owing to high freight rates, and stocks of by-product coke in the country aggregating 1,017,000 tons have accumulated, located as follows: Jersey City, N. J., 280,000 tons; St. Paul, 145,000 tons; Indianapolis, 131,000 tons; Terre Haute, Ind., 71,000 tons; Camden, N. J., 33,000 tons; Detroit, 67,000 tons; St. Louis, 55,000 tons; Kansas City, 50,000 tons; Milwaukee, 75,000 tons; Chicago, 85,000 tons; Geneva, N. Y., 25,000 tons. Mr. Forrest said it was not his purpose to advocate specific coking-in-transit rates but that the principle should be recognized. Francis B. James, representing the Providence Gas Co., included among those for whom Mr. Forrest spoke, said his company took exception to this feature of Mr. Forrest's testimony because it was opposed to the principle of coking-in-transit.

By-product plants, Mr. Forrest said, cannot compete with Connellsville beehive ovens because the former have a double haul—coal to ovens and coke to consumer—which results in pyramiding and increasing freight rates and it was pointed out that it requires 1.25 tons of coal to make one ton of by-product coke.

Mr. Forrest said the carriers recognized the crushing burden that rates had been to by-product coke makers and had made some changes and proposed others but now are awaiting a decision by the commission in the present case before making further adjustments. On cross-examination, Mr. Forrest said that a large portion of the output of the by-product coke plants for which he spoke, went to metallurgical plants, but not all to steel plants themselves. Some by-product ovens, he said, are closed down at steel works which are buying beehive coke because of the wide differential in freight rates against by-product ovens. He read figures to show that these differentials vary from a few cents up to 71 cents per ton.

Examiner in Basing Point Case

WASHINGTON, Jan. 24.—John W. Bennett of the regular trial staff of the Federal Trade Commission, has been assigned as examiner at Pittsburgh base case hearing, beginning in Milwaukee Monday next.

A New England manufacturing company desires through THE IRON AGE to learn where it may obtain several rolled steel welded cylinders of a finished outside diameter of 48 in., a length of 6 ft. and a finished thickness of 5/16 to ¾ in. The stipulation is that the finished cylinder must be sufficiently true not to require very heavy counterweighting to maintain a balance at a speed of 220 r.p.m.

A meeting of industrial power will be held in the Engineering Societies Building, New York, Friday evening, Jan. 27. David B. Rushmore, General Electric Co., will preside and papers will be read by John S. Griggs, Jr., consulting engineer, New York, on "Power in Industrial Plants," and by Harold Goodwin, Jr., consulting engineer, Philadelphia, on "Steam Electric Power for the Industries."

The January meeting of the Tri-City chapter of the American Society for Steel Treating will be held Thursday evening, Jan. 26, at Davenport, Iowa, and will be addressed by the president of the National Society, F. P. Gilligan, on the subject, "Quality First." The motion picture of the United States Bureau of Mines, "Manufacture of Steel for Sheets and Plates," will be presented.

Iron and Steel Markets

WINTER SCHEDULES HOLD

Mills Operate at December Rate—Prices Uncertain

Coal Strike Possibilities — Pittsburgh Basing More and More Eliminated

With the ups and downs of steel works operation in January, shown in a range of 40 to 50 per cent for the Steel Corporation and 25 to 40 per cent for the larger independent companies, the rate of new buying has been little changed. The variations have been chiefly in the rate at which mills have replenished buyers' stocks in the different lines.

It is considered a favorable sign that the mills have kept so well up to the rate of December, with the prospect that the present pace can be held pending the appearance of the so-called seasonal demand of February or early March.

While orders are coming in considerable numbers, the volume is not impressive and uncertainty as to the course of prices is not relieved. On the one hand is the expectation, long disappointed, of lower freight rates; on the other hand, the expected coal strike would mean scarcity and higher prices in coal, coke, pig iron and steel. Thus far precautionary buying is not a measurable factor in any of these lines.

At Chicago larger mill operations are expected when steel specifications on recent and pending car purchases come out. The Gary rail mill will resume operations Jan. 30 with a three months' run in prospect. An Illinois Central order for 20,000 tons of rails and one from the Rock Island for 25,000 tons are about to be placed. Prices on track supplies are weak and proximity of mill is more of a factor in the distribution of business. The Lehigh Valley has contracted for repairs to 800 cars. The Great Northern is in the market for 250,000 tie plates.

Railroad equipment features the export market. The South Manchurian Railroad wants 6000 tons of 100-lb. rails, and mills are meeting keen British competition. For Mexican railroad shops \$800,000 worth of machine tools are under consideration. A car builder has taken an export order for 300 cars.

Not in many months have so many new fabricated steel projects appeared as in the past week. Including 10,000 tons for tank work, 57,000 tons is under negotiation. Awards are also large in comparison with recent weeks, being about 16,000 tons.

In the Central West, with soft steel bar prices irregular, hard steel reinforcing bars have settled to 1.40c. in ordinary transactions.

Hot-rolled strip steel of the wider and heavier sizes that compete with steel bars has sold at 1.35c. and in a few cases lower.

Each week develops more cases of departure

from Pittsburgh basing on finished steel. Equalization of freight rates is a natural development of such competition. In wire nails, while the \$2.50 basis has been maintained by leading producers, the use of barges for transport to Ohio River points has given a lower delivered price. A feature in wire is the appearance of seasonal demand for fencing from some of the Southern States.

As the price of Southern pig iron continues to recede, it becomes an increasingly important factor in the North, particularly in the Chicago market, where sales have been made as low as \$15.50, Birmingham, or 50c. lower than the prevailing quotation. In the Pittsburgh district a resale lot of 1000 tons of basic went at \$17.75, Valley, but the lowest price made by a furnace was \$18, Valley, or 25c. below the recent ruling price. The general tendency of foundry iron is downward, and the demand is light, although some jobbing foundries report an encouraging increase of melt. Many foundries continue to figure on the large tonnage required for the New York-New Jersey vehicular tunnel on which bids will be received Feb. 7.

The Steel Corporation, which has been selling ferromanganese at \$60, Pittsburgh, has raised its price to \$58.35, Atlantic seaboard, which has been the price of importers of the British product.

Pittsburgh

PITTSBURGH, Jan. 24.

The most cheerful report about the steel business here is that it is at least holding its own with last month. In a number of lines, orders are more frequent than they were recently, but individually and in the aggregate, they leave much to be desired. As far as prices are concerned the situation is even more unsettled than it has been and the actual selling basis with the sole exception of black and galvanized sheets is very uncertain, due to the fact that there is so little recognition of the Pittsburgh base on the part of mills located outside the Pittsburgh district.

There is considerable equalization of freights on the part of Pittsburgh makers of wire products in competitive territories and business in the major products in districts having a more favorable freight rate from other centers of production is subject to much the same condition. The market in hot-rolled flats, hoops, bands and strips is very much unsettled because of the competition regular makers of these products have to combat from irregular producers. The regular quotation of 2c., Pittsburgh, on these products is merely a quotation, and business actually has been done at least \$5 per ton lower.

The general average of steel mill operations in this district has not changed much since a week ago. The Jones & Laughlin Steel Co. has put on another blast furnace of its Eliza group in Pittsburgh and is getting ready to put on one at its Woodlawn, Pa., plant. This company now has six of its 12 stacks making iron and its steel works operations are at about the same percentage. The Allegheny Steel Co. maintains operation of three open-hearth furnaces and this week has its tube mill in operation as well as 15 sheet mills. The Pittsburgh Steel Co. has added to its active building capacity, but is making so less of steel. On the other

A Comparison of Prices

Advances Over the Previous Week in Heavy Type, Declines in Italics

At date, one week, one month, and one year previous

For Early Delivery

	Jan. 24, 1922	Jan. 17, 1922	Dec. 27, 1921	Jan. 25, 1921
Pig Iron, Per Gross Ton:				
No. 2X, Philadelphia.....	\$21.34	\$21.34	\$21.34	\$32.09
No. 2, Valley furnace.....	20.00	19.50	19.50	30.00
No. 2, Southern, Cin'ti.....	20.50	20.50	21.50	34.50
No. 2, Birmingham, Ala.....	16.00	16.00	17.00	30.00
No. 2 foundry, Chicago.....	19.00	19.00	19.00	31.00
Basic, del'd, eastern Pa.....	20.25	20.25	20.25	32.50
Basic, Valley furnace.....	18.00	18.25	18.25	30.00
Bessemer, Pittsburgh.....	21.46	21.46	21.96	33.96
Malleable, Chicago.....	19.00	19.00	19.00	31.56
Malleable, Valley.....	19.50	19.50	20.00	32.00
Gray forge, Pittsburgh.....	20.96	20.96	20.96	30.96
L. S. charcoal, Chicago.....	30.80	31.50	31.50	40.50
Ferromanganese, del'd.....	60.00	60.00	60.00	100.00
Rails, Billets, etc., Per Gross Ton:				
O.-h. rails, heavy, at mill.....	\$40.00	\$40.00	\$40.00	\$47.00
Reas. billets, Pittsburgh.....	28.00	28.00	28.00	43.50
O.-h. billets, Pittsburgh.....	28.00	28.00	28.00	43.50
O.-h. sheet bars, P'gh.....	29.00	29.00	30.00	47.00
Forging billets, base, P'gh.....	32.00	32.00	32.00	48.50
O.-h. billets, Philadelphia.....	33.74	33.74	33.74	49.24
Wire rods, Pittsburgh.....	36.00	36.00	38.00	57.00
Skelp, gr. steel, P'gh, lb.....	1.50	1.50	1.50	2.45
Light rails at mill.....	1.50	1.50	1.55	2.75
Finished Iron and Steel,				
Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Iron bars, Philadelphia.....	1.81	1.81	1.85	2.70
Iron bars, Chicago.....	1.60	1.60	1.60	2.68
Steel bars, Pittsburgh.....	1.50	1.50	1.50	2.35
Steel bars, Chicago.....	1.60	1.60	1.60	2.73
Steel bars, New York.....	1.83	1.83	1.88	2.73
Tank plates, Pittsburgh.....	1.50	1.50	1.50	2.65
Tank plates, Chicago.....	1.60	1.60	1.60	3.03
Tank plates, New York.....	1.83	1.83	1.83	3.02
Beams, Pittsburgh.....	1.50	1.50	1.50	2.45
Beams, Chicago.....	1.60	1.60	1.60	2.82
Beams, New York.....	1.83	1.83	1.88	2.82
Steel hoops, Pittsburgh.....	1.90	2.00	2.00	3.05
*The average switching charge for delivery to foundries in the Chicago district is 70c. per ton.				
†Silicon, 1.75 to 2.25. ‡Silicon, 2.25 to 2.75.				
The prices in the above table are for domestic delivery and do not necessarily apply to export business.				
Sheets, Nails and Wire,				
Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Sheets, black, No. 28, P'gh.....	3.00	3.00	3.00	4.35
Sheets, galv., No. 28, P'gh.....	4.00	4.00	4.00	5.70
Sheets, blue an'd, 9 & 10.....	2.25	2.25	2.25	3.55
Wire nails, Pittsburgh.....	2.50	2.50	2.50	3.15
Plain wire, Pittsburgh.....	2.25	2.25	2.25	3.25
Barbed wire, galv., P'gh.....	3.15	3.15	3.15	4.10
Tin plate, 100-lb. box, P'gh.....	\$4.75	\$4.75	\$4.75	\$7.00
Old Material, Per Gross Ton:				
Carwheels, Chicago.....	\$15.00	\$15.50	\$15.50	\$21.00
Carwheels, Philadelphia.....	16.50	16.50	16.50	25.00
Heavy steel scrap, P'gh.....	11.00	14.50	14.50	16.00
Heavy steel scrap, Phila.....	11.50	14.50	14.50	14.50
Heavy steel scrap, Chicago.....	11.50	11.50	11.00	15.50
No. 1 cast, Pittsburgh.....	16.50	16.50	16.00	25.00
No. 1 cast, Philadelphia.....	16.50	16.50	16.50	23.50
No. 1 cast, Ch'go (net ton).....	13.00	13.00	12.50	18.00
No. 1 RR. wrot, Phila.....	14.50	14.50	14.50	20.00
No. 1 RR. wrot, Ch'go (net).....	10.50	10.50	10.25	14.00
Coke, Connellsville, Per Net Ton at Oven:				
Furnace coke, prompt.....	\$2.75	\$2.75	\$2.75	\$5.00
Foundry coke, prompt.....	3.75	3.75	3.75	6.00
Metals,				
Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Lake copper, New York.....	13.75	13.87½	13.87½	13.25
Electrolytic copper, refinery.....	13.50	13.62½	13.62½	12.75
Zinc, St. Louis.....	4.65	4.77½	4.82½	5.40
Zinc, New York.....	5.00	5.12½	5.17½	5.55
Lead, St. Louis.....	4.40	4.40	4.37½	4.80
Lead, New York.....	4.70	4.70	4.70	5.00
Tin (Straits), New York.....	31.25	32.00	32.75	32.50
Antimony (Asiatic), N. Y.....	4.45	4.45	4.50	5.50

Composite Price, Jan. 24, 1922, Finished Steel, 2.062c. Per Lb.

Based on prices of steel bars, beams, tank plates, plain wire, open-hearth rails, black pipe and black sheets	These products constitute 88 per cent of the United States output of finished steel.	Jan. 17, 1922, 2.062c. Dec. 27, 1921, 2.062c. Jan. 25, 1921, 3.057c. 10-year pre-war average, 1.684c.
---	--	--

Composite Price, Jan. 24, 1922, Pig Iron, \$18.39 Per Gross Ton

Based on average of basic and foundry irons, the basic being Valley quotation, the foundry an average of Chicago, Philadelphia and Birmingham	Jan. 17, 1922, \$18.57 Dec. 27, 1921, 18.48 Jan. 25, 1921, 30.52 10-year pre-war average, 15.72
---	--

hand, there is a slight falling away in the activities of the American Sheet & Tin Plate Co. and no material gain in the operations of the Pittsburgh district plants of the other Steel Corporation subsidiaries.

The pig iron market has been enlivened by a resale of 1000 tons of standard basic iron to a Pittsburgh district sheet maker at \$17.75, Valley furnace. This is a decline of 50c. a ton from the price ruling on the last previous sale and the closing of a few fair sized tonnages also has served to bring to the surface a weaker situation in foundry iron. The heavier grades of scrap are weaker because of a lack of demand and increased anxiety on the part of dealers to secure orders, but on the lighter materials there is enough demand to keep the market extremely firm. The fuel situation shows no particular change.

Pig Iron.—The trade here has been considerably excited by a recent sale of 1000 tons of basic pig iron at \$17.75, Valley furnace, but needlessly so, because the iron moved was a resale tonnage and the price is not yet representative of the real market in this grade. The iron was a portion of a tonnage being held by a furnace interest on the account of a railroad equipment manufacturer and there is some doubt whether any more of the iron is available at that price. The inquiry, however, served to develop the fact that basic

iron from Valley furnaces was not quotable at higher than \$18, as several Valley producers named that figure on the business, or 25c. per ton below what recently had been quoted. No sales have been made at \$18, but the fact that it has been offered at that price serves to establish it as the market quotation. At this price, basic iron is back at the low point of late last summer. The oil well supply company has closed against its recent inquiry for 3000 tons or more of 1.60 to 2 per cent silicon foundry iron, paying \$18.75, Valley furnace for much of the tonnage and \$19 for the remainder. A sanitary ware manufacturer recently bought 1000 tons of foundry iron, paying \$19, Valley furnace for No. 2 grade. The market here no longer is quotable on No. 2 Valley foundry iron at higher than \$19 and if the oil well supply company's purchase is to be regarded as No. 2 iron, the range would be \$18.75 to \$19. We note a sale of 1000 tons of standard Bessemer iron at \$19.50, Valley furnace and the market on this grade appears to be rather firm on that basis.

We quote Valley furnace, the freight rate for delivery to the Cleveland or Pittsburgh district being \$1.96 per gross ton:

Basic.....	\$18.00
Bessemer.....	19.50
Gray forge.....	19.00
No. 2 foundry.....	19.00
No. 1 foundry.....	\$18.75 to 19.00
Malleable.....	19.50

Ferroalloys.—The market is showing a little more activity in ferromanganese. A Valley steel maker recently closed for a fair sized tonnage on the basis of \$62, Pittsburgh, and we note the sale of 800 tons to a West Virginia steel maker who paid \$61, Pittsburgh, for about 100 tons of 80 per cent material. These sales represent an advance of \$1 to \$2 per ton over the prices recently accepted by the selling interest which, in common with other makers, now is asking \$58.35 Atlantic seaboard, or \$63.67 delivered Pittsburgh common freight point. Current production of ferromanganese by the Carnegie Steel Co. to-day is probably less than the present requirements of the several Steel Corporation subsidiaries which it serves on this material, but it still has a fair sized stock. Other producers and English sales representatives still are quoting \$58.35, Atlantic seaboard, for 80 per cent material, but as yet that price has not prevailed in this district except on small lots. The American Steel Foundries is in the market for 300 tons. The Jones & Laughlin Steel Co. becomes independent of outside sources of supply as a result of the recent purchase of manganese ore and is expected to soon blow in a furnace at its Woodlawn, Pa., plant, for the manufacture of ferromanganese. Efforts to boost the price of 50 per cent ferrosilicon above \$55 furnace, freight allowed, have not been successful, such sales as have recently been made having been at \$54 to \$55. Interest in spiegeleisen in this district is small, but there is a Chicago inquiry for 100 tons before makers. Stocks of this material are light and are mostly of low grade material. Prices are nominal.

We quote 78 to 82 per cent domestic ferromanganese at \$61 to \$63.67 delivered; 78 to 82 per cent foreign ferromanganese, \$58.35, c.i.f. Atlantic seaboard; German, for 76 to 80 per cent, \$54, seaboard. Average 20 per cent spiegeleisen at \$30 to \$32 delivered, Pittsburgh or Valleys; 16 to 19 per cent spiegeleisen, \$28 to \$30 delivered Pittsburgh; 50 per cent ferrosilicon, domestic, \$54 to \$57, freight allowed. Bessemer ferrosilicon is quoted f.o.b. Jackson and New Straitsville, Ohio, furnaces as follows: 10 per cent, \$38.50; 11 per cent, \$41.80; 12 per cent, \$45.10; 13 per cent, \$49.10; 14 per cent, \$54.10; silvery iron, 6 per cent, \$27; 7 per cent, \$28; 8 per cent, \$29.50; 9 per cent, \$31.50; 10 per cent, \$33.50; 11 per cent, \$38; 12 per cent, \$38.50. The present freight rate from Jackson and New Straitsville, Ohio, into the Pittsburgh district is \$4.06 per gross ton.

Billets, Sheet Bars and Slabs.—Specifications on sheet bars are coming along rather well to the Carnegie Steel Co., and some of the other makers also find consumers more willing to take tonnage due them on contracts, but beyond this business shows no appreciable increase. It is said that some users of billets have pretty well reduced their stocks and that any improvement in the demand for finished products is likely to mean larger orders and specifications. This refers particularly to makers of track equipment, but at present those interests are not getting many sizable orders. Reports are current here that rerolling billets recently sold in the Chicago district at \$28, Chicago. Prices here are not very well defined because of a lack of demand, but quotations represent a fair appraisal of to-day's possibilities.

We quote 4 x 4 in. soft Bessemer and open-hearth billets at \$28 to \$29; 2 x 2 in. billets, \$29 to \$30; Bessemer and open-hearth sheet bars, \$30; slabs, \$29 to \$30; forging billets, ordinary carbons, \$32 to \$33, all f.o.b. Youngstown or Pittsburgh mills.

Wire Rods.—There is a fairly steady demand for small tonnages with prices holding within the recent range of \$36 to \$38, Pittsburgh or Youngstown, depending upon the desirability of the business presented and also as to whether it is for domestic or export account. Lower prices usually prevail on the latter kind of business. Prices are given on page 304.

Steel Skelp.—We note a few fair sized sales of steel pipe skelp at 1.50c. Pittsburgh, and no material advance over this base now seems to be obtainable on boiler tube skelp, although some makers are holding at 1.65c.

Wire Products.—Orders and specifications with all makers in this and nearby districts have been larger in the past week than before in some time, but while the market is fairly satisfactory in this respect, it is not so in the matter of prices, for the reason that sales into competitive territory have to meet the quo-

tation ruling in such districts. It is claimed there is no abandonment of the Pittsburgh base prices of \$2.50 base per keg for nails and \$2.25 base per 100-lb. for plain and annealed wire, but equalization of freight charges is common in practically all big consuming districts, this being tantamount to a price reduction. As far as the Pittsburgh district is concerned, the market still is \$2.50 for nails and \$2.25 for wire.

We quote wire nails at \$2.50 base per keg, Pittsburgh, and bright basic and Bessemer wire at \$2.25 base per 100 lb., Pittsburgh.

Steel Rails.—Specifications for standard rails for February and March delivery lately have been coming along rather well from railroads tributary to Pittsburgh. Interest in light rails remains extremely moderate and on those sections rolled from new steel, sales are impossible at more than 1.50c. base. As a matter of fact, some difficulty is experienced in getting even that price, since rails rolled from old standard sections readily are had at 1.45c. and this price, from mills, having favorable freight rates to point of consumption.

We quote 25 to 45-lb. sections, rolled from new steel, 1.50c. base; rolled from old rails, 1.45c. base; standard rails, \$40 per gross ton mill for Bessemer and open-hearth sections.

Sheets.—Consumers of black and galvanized sheets still are moving with great caution in the matter of purchases and none of the mills seems able to accumulate more than a few weeks' rollings. In spite of this fact, the regular market quotations of 3c. base for black, and 4c. base for galvanized are being strictly observed. It is claimed that there is no money in either grade at less than these prices and there is also the possibility that any deviations from these quotations by independents would be followed by a really steep cut by the Steel Corporation sheet-making subsidiary. The latter reports the past week to have been a rather good one and its operations are understood to be well up to the recent average of 75 per cent. This interest reports some business in the heavier gages of blue annealed sheets at 2.25c. base, but sales of this kind of material on the plate base does not seem to have entirely ceased. Prices are given on page 304.

Tin Plate.—The market is slightly quieter than it has been, due to the fact that specifications are largely in against shipments over the next month or six weeks. Operations of the mills of the American Sheet & Tin Plate Co. reflect the lighter orders, but both this company and the independents are operating at a comparatively high rate for this time of the year. We estimate the current operations of the industry as a whole at around 65 per cent of capacity. Prices do not change much with standard production cokes at \$4.75 per base box Pittsburgh, to carload lot buyers, with the usual concessions to the large consumer.

We quote standard production coke tin plate at \$4.75 per base box f.o.b. Pittsburgh for carload lots.

Cold-Finished Steel Bars and Shafting.—Orders are more frequent for cold-rolled and cold-drawn screw stock and shafting, but the demands chiefly are for rounding out depleted stocks and generally are for small lots. A pretty strong effort is being made to maintain a price of 2c. base Pittsburgh, for carload lots, but the fact that a good sized tonnage sold in the Chicago district a short time ago at 1.75c. base, Pittsburgh, has become pretty well known, and makes it hard for makers to maintain 2c. except for rather small tonnages. A southern Ohio maker is reported to have recently named 1.85c. Pittsburgh on a fair sized tonnage. In a general way the market is quotable at 1.90c. to 2c. on lots of a carload or more. Ground shafting is unchanged at 2.25c. base for carloads, f.o.b. mill.

Hoops and Bands.—Hoops are still quoted at 2c. base, Pittsburgh, by most makers, but the market is weak at that price, as where freight rates are in favor of one mill over another, there is a disposition to equalize them. Under conditions of this sort, business has been done as low as 1.90c. Pittsburgh. On bands 2c. base, Pittsburgh also is quoted by most makers, but as a basis of sales that figure is almost out of the question. There are instances where a price

of 1.75c. base, on the hoop and band card, has been authorized but failed to bring the business. A range of from 1.75c. to 1.90c. appears to be a fair appraisal of to-day's price possibilities on bands.

Iron and Steel Bars.—Developments of the past week have fully demonstrated that the market is not quotable at more than 1.50c., Pittsburgh, for merchant steel bars of ordinary analysis. It is possible to buy as little as a carload at this price and then for business within this immediate territory because outside mills are making that price f.o.b. mill, and the delivered price runs considerably under the Pittsburgh price, plus the freight. Demand still is for small lots for early delivery. Iron bars also are moving slowly from local mills, because prices here have not responded to declines in other markets.

We quote steel bars rolled from billets at 1.50c.; reinforcing bars, rolled from billets, 1.50c. base; reinforcing bars, rolled from old rails, 1.35c. to 1.40c.; refined iron bars, 2c. to 2.10c. in carloads, f.o.b. mill, Pittsburgh.

Structural Material.—Structural awards with shops in this district are not at all numerous, and in all instances involve lots of less than 100 tons. Structural inquiries are fairly numerous, but it is too early to say whether they will materialize into active orders in the near future. Most of the shops here have enough orders to maintain a fair rate of operation, but they seem to be well covered on plain material and sales of the latter are small. Sizable lots readily can be placed at 1.50c., Pittsburgh, but 1.60c. is asked on small tonnages. Prices are given on page 304.

Plates.—The past week has developed nothing of interest in this market, demands in all cases being for small tonnages and the mills being so poorly engaged as to tempt operating companies to seek business in other lines. As far as the Pittsburgh district is concerned, the price is 1.50c., base, but in competitive territory this price cannot be obtained.

We quote sheared plates, $\frac{3}{4}$ in. and heavier, tank quality, at 1.50c. f.o.b. Pittsburgh.

Iron and Steel Pipe.—Business is holding its own with last month, but still reflects caution on the part of both the jobbers and users, and no big tonnages are going upon makers' books. Slight concessions from regular prices of steel pipe are appearing, but the market hardly is active enough to develop substantial recessions. Plant operations remain relatively high, but this is partly due to the building up of mill stocks since it is expected that demands during the next few months will be largely for spot tonnages. Discounts are given on page 304.

Boiler Tubes.—Only moderate demands are coming out for steel boiler tubes, and since there is not enough business to give all makers a share, competition between mills is keen and prices still lean in buyers' favor. The mill price generally is the card and 5 per cent extra in carloads, but instances are heard where an additional $2\frac{1}{2}$ to 5 per cent has been offered. In less than carloads, there is a supplementary discount of 5 per cent on the card discounts. Card discounts are given on page 304.

Coke and Coal.—It is impossible to chronicle any material change in the situation either as regards prices or demands. Spot offerings of furnace coke are limited, but no more so than the demand, and while the cool weather has stimulated the demand for coke for heating purposes, it is still possible to buy furnace fuel anywhere from \$2.75 to \$3 per net ton oven. Spot foundry coke is in steady rather than active demand with prices ranging from \$3.75 to \$4.25 per net ton, oven, on direct business, and about 25c. per ton higher on business passing through brokerage hands. The coal market has been enlivened slightly by railroad purchases, but in a general way the possibility of a strike of the coal miners as of April 1 has not yet been reflected in the demand. Non-union steam coal still is available as low as \$1.35 per net ton at mines, for mine-run grade, ranging from that up to \$1.50, while non-union by-product grade ranges from \$1.45 to \$1.65 on most of the current business. Gas coal being a product of union districts, is not available at less than \$2, and is selling as high as \$2.55.

Hot-Rolled and Cold-Rolled Strips.—There is uniform observance of a base of 3.50c., Pittsburgh, on cold-rolled strips, although weakness in hot-rolled strips, sales of which have been done well below 2c., is causing some complaint among buyers of the former over the spread between the two kinds. This differential is a matter of at least \$30 a ton, and the claim is made that this is too great. The regular makers of hot-rolled strips are quoting 2c. base Pittsburgh, but find it necessary to shade this price in competition with skelp, plate and blue annealed sheet makers.

Nuts and Bolts.—Makers in this district still complain of a slow and unsatisfactory trade with buyers confining their purchases very closely to actual needs. Makers here are not making new quotations, but usually are following those announced in other centers. Discounts are given on page 304.

Rivets.—Leading makers report no decided betterment either as regards the volume or number of orders coming in. There are reports of rather sharp concessions from quotations on large rivets, notably in the East, and Pittsburgh district makers admit having lost business on quotations of \$2.25 base per 100-lb. for large structural rivets. They are, however, holding to that figure and to the usual premium on boiler rivets. Occasional sales of small rivets are being made at 70, 10, 10 and 5 per cent off list. Prices and discounts are given on page 304.

Spikes.—The market is not showing much life nor are prices especially strong. The most recent sizable sale of standard spikes was at \$2.15 base per 100 lb. Pittsburgh, and this now is representative of the market on large lots. On smaller quantities the going price is \$2.20. Small spikes range from \$3.25 to \$3.30 base per 100-lb. with only a moderate demand. Prices are given on page 304.

Old Material.—Prices show considerable irregularity in the steel works grades with heavy material inclined lower because users are out of the market, but showing an opposite tendency in the lighter material for which there is a rather good demand. Sales of cast iron borings recently have been made in this district at \$12, while fair sized tonnages of machine shop turnings have gone as high as \$10.50 and of compressed sheets at \$12. Meanwhile, the consumptive demand for heavy melting steel and other grades finding the same general use, has dwindled to such a point that the market is at least 50c. per ton lower because of the efforts of dealers to find purchasers. The Jones & Laughlin Steel Co. this week put on an additional blast furnace at its Pittsburgh plant partly because it is able to effect a considerable saving in the cost of making ingots by charging hot metal rather than cold scrap. Takings by Steel Corporation subsidiaries also are smaller than they were recently. Consumers of rerolling rails are not much interested because there is no profit in either rerolled bars or rerolled rails, at current prices, even with old rails at \$15.

We quote for delivery to consumers' mills in the Pittsburgh and other districts taking the Pittsburgh freight rate, as follows:

Heavy melting steel, Steubenville, Follansbee, Brackenridge, Monessen, Midland and Pittsburgh.....	\$14.00 to \$14.50
No. 1 cast, cupola size.....	16.50 to 17.00
Rerolling rails, Newark and Cambridge, Ohio; Cumberland, Md.; Huntington, W. Va., and Franklin, Pa.....	15.00 to 15.50
Compressed sheet steel.....	11.75 to 12.00
Bundled sheets, sides and ends.....	10.50 to 11.00
Railroad knuckles and couplers.....	15.00 to 15.50
Railroad coil and leaf springs.....	15.00 to 15.50
Low phosphorus standard bloom and billet ends.....	17.50 to 18.00
Low phosphorus plates and other grades.....	17.00 to 17.50
Railroad malleable.....	12.50 to 13.00
Iron car axles.....	23.00 to 24.00
Locomotive axles, steel.....	21.00 to 22.00
Steel car axles.....	15.00 to 15.50
Cast iron wheels.....	15.00 to 15.50
Rolled steel wheels.....	15.00 to 15.50
Machine shop turnings.....	10.00 to 10.50
Sheet bar crop ends.....	14.00 to 14.50
Heavy steel axle turnings.....	11.50 to 12.00
Short shoveling turnings.....	11.00 to 11.25
Heavy breakable cast.....	14.25 to 14.75
Stove plate.....	13.00 to 13.50
Cast iron borings.....	11.50 to 12.00
No. 1 railroad wrought.....	11.50 to 12.00

Chicago

CHICAGO, Jan. 24.

Pending the settlement of the railroad and coal problems as well as difficulties of local scope such as the Chicago building situation, it is felt that caution will continue to actuate the policy of buyers and mill and furnace bookings will not increase materially. Local observers are confident, however, that iron and steel production will not again decline to the low levels of last summer in view of the fact that the large hang-over stocks of 1920 have long since been absorbed. Mere replenishment buying will sustain the present operations of producers and as economic readjustment progresses, the tendency, it is believed, will be toward increased output.

How vital the matter of freight rates is to local producers is illustrated by a recent reduction in export rates from Chicago. Ever since last fall, Pittsburgh mills have enjoyed an export rate of 28c. by rail to New York. With an all-rail export rate of 71c. to the Pacific Coast until recently and latterly a rate of 50c., local mills have had difficulty in competing for Oriental business. Effective Jan. 30, however, a combination rail and river rate of 28c. to New Orleans goes into effect, in anticipation of which a local mill has taken several thousand tons of sheets for Japanese delivery within the past three weeks. Domestic rail rates to the Pacific Coast have not yet been reduced, but a substantial reduction is hoped for in the near future.

Railroad car business continues to be the feature of current market activity. When steel specifications against recent and prospective car orders are booked, improved mill operations are looked for. In the meantime, the general operating situation in this district is on about the same basis as heretofore. The Inland Steel Co. continues to run at 40 to 45 per cent of ingot capacity.

Pig Iron.—The market is quiet, current purchases being confined principally to small lots, ranging from carloads to a few hundred tons. A Chicago district melter has bought 400 tons of foundry for early delivery at \$19, base, local furnace. On the other hand, the Auto Specialties Co., St. Joseph, Mich., has closed for 1000 tons of malleable for second quarter delivery at a reported price which would figure back to \$17.75, base, Chicago furnace. The identity of the seller has not been disclosed and it is possible that the business may have been taken by Detroit or Toledo producers. The freight from Detroit to St. Joseph is \$3.22 as against \$2.94 from Chicago. While reports of shading on local iron are frequent and the market is undeniably weak, it cannot yet be definitely said that the ruling market is below \$19, base, furnace for foundry, malleable and basic. New inquiries of size are few. The Western Electric Co. wants 400 tons of foundry for February shipment and a Terre Haute melter is in the market for 500 tons of malleable for similar delivery. Sellers are of the opinion that the approach of the threatened coal strike will tend to stiffen the market and will drive in considerable business in both pig iron and coke. Southern iron is becoming more of a factor in this district with each reduction in price. A number of carloads have been sold at \$15.50, base, Birmingham, and one producer is now quoting the same price f.o.b. furnace, or the equivalent of \$15.10, Birmingham. Charcoal iron is weaker and at least two producers are now quoting \$27, base, furnace. Buyers of silvery find that the blast furnace product cannot be bought for less than the Jackson County schedule, but electrolytic material is still available at concessions of a dollar or two a ton.

Quotations on Northern foundry, high phosphorus malleable and basic irons are f.o.b. local furnace and do not include a switching charge averaging 70c. per ton. Other prices are for iron delivered at consumers' yards, or when so indicated, f.o.b. furnace other than local.

Lake Superior charcoal, averaging	
all, 1.50, delivered at Chicago.....	\$20.50 to \$21.50
Northern coke, No. 1, all, 2.25 to 2.75	12.50
Northern coke, foundry, No. 2, all,	
2.75 to 3.25.....	12.00
Northern high phos.....	12.50
Southern foundry, all, 1.75 to 2.25....	\$22.17 to
\$22.50	
Michigan, not over 2.25 all.....	12.00
Basic.....	12.50
Low phos., Valley furnace, all, 1.50 &	
per cent copper free.....	22.00
Silvery, all, 2 per cent.....	\$22.32 to \$23.00

Ferroalloys.—The American Steel Foundries is in the market for 300 tons of 80 per cent ferromanganese. A local steel mill has bought 100 tons of spiegelisen at \$36.50 delivered. A number of Chicago district buyers have closed for the year's requirements in 50 per cent ferrosilicon at the prevailing market, which ranges from \$56 to \$57.50 delivered.

We quote 78 to 82 per cent ferromanganese, \$68.75, delivered; 50 per cent ferrosilicon, \$56 to \$57.50, delivered; spiegelisen, 18 to 22 per cent, \$36.50 to \$37, delivered.

Railroad Equipment.—The Central of Georgia has placed 500 box cars with the Mt. Vernon Car Mfg. Co. The Pacific Fruit Express is inquiring for 3300 refrigerator cars. The Chicago Northwestern has ordered 50 passenger service cars from the American Car & Foundry Co., including 20 coaches, 10 smokers, three chair cars, three combination baggage and smokers, nine baggage cars and five baggage and mail cars. The Burlington has put out a formal inquiry for 55 passenger and light freight locomotives.

Rails and Track Supplies.—The Gary mill will resume operation Jan. 30 with about three months' specifications ahead. The Illinois Central and the Rock Island are expected to place orders for 20,000 tons and 25,000 tons respectively in the near future. The Missouri Pacific has placed 500 kegs of standard track spikes with the Illinois Steel Co. and for its Western lines divided 1000 kegs between the Colorado Fuel & Iron Co. and the Kansas City Bolt & Nut Co. Prices on track supplies are weak and the tendency is toward the localization of business. As low as \$37, f.o.b. mill, has been done on tie plates, and 2.10c., Pittsburgh, has been quoted on standard spikes. On track bolts less than 3.15c., Pittsburgh, has been done.

Standard Bessemer and open-hearth rails, \$40 light rails rolled from new steel, 1.60c. to 1.65c. f.o.b. makers' mills.

Standard railroad spikes, 2.15c. to 2.20c., Pittsburgh; track bolts with square nuts, 3.15c. to 3.20c., Pittsburgh; tie plates, steel and iron, 1.85c. to 1.90c., f.o.b. mill; angle bars, 2.40c., f.o.b. mill.

Bars.—Current demand for soft steel bars is principally for car construction and reinforcing work. Jobbers are buying little and automobile, implement and miscellaneous manufacturers are not factors in the market. For the Jones Island sewage disposal station at Milwaukee 5000 tons of reinforcing will soon be let. The Dupont Engineering Co. is low bidder on the general contract and is reported to have submitted a figure which was a quarter of a million dollars below most other bids, which were in the neighborhood of a million dollars each. Bids will be opened today on a general hospital at Madison, Wis., requiring 236 tons, and for the Putnam department store, Davenport, noted in the structural material paragraph, 135 tons of reinforcing will be let. Revised bids have been asked on the First National Bank Building, Albuquerque, New Mexico, which originally called for 265 tons. Figures have also been asked on a hotel building for that city. The municipal power plant at Lansing, Mich., mentioned in the structural material paragraph, will require 115 tons of reinforcing. H. L. Vanderhorst, Kalamazoo, Mich., has the general contract for the Stocking vocational school, Grand Rapids, for which 45 tons of structural steel has been let to the Rochester Bridge Co. and 80 tons of reinforcing is still to be bought. Bids will be asked Jan. 31 on the Roosevelt high school, Des Moines, Iowa, a \$350,000 project. Mill prices on soft steel bars are substantially unchanged, although the tendency appears to be towards weakness. The Northern Pacific is said to have bought about 1800 tons for the manufacture of 5,000,000 large rivets at 1.40c., Chicago, but this report lacks confirmation. Bar iron demand is slowly improving, although individual orders remain small. One mill is now on its sixth week of continuous operation, and another, which had been idle since the first of the year, started up Jan. 17. Hard steel bars are not active.

Mill prices are: Mild steel bars, 1.50c. to 1.55c., Chicago; common bar iron, 1.55c., Chicago; rail section, 1.60c., mill or Chicago.

Jobbers quote 1.50c. for mild bars and 1.55c. for common bars. The warehouse quotations on standard reinforcing bars are 1.10c. for round and 1.15c. for square, both for 10,000 lb. bars. Medium and heavy bars are 1.15c. for round and 1.20c. for square.

Wire Products.—The better rate of buying noted last week has been sustained. The bulk of the tonnage booked consists of nails, but there is also encouraging activity in light poultry fence, and barbed wire. Jobbers in the South and Southwest are buying more freely than those in the North and Northwest. Owing to the fact that winter weather has forced a suspension of rip track work, railroad purchases of nails have fallen off sharply. Prices appear to be firm on nails, wire and other finished products. For mill prices, see finished iron and steel f.o.b. Pittsburgh, page 304.

We quote warehouse prices f.o.b. Chicago: No. 9 and heavier black annealed wire, \$3.13 per 100 lb.; No. 9 and heavier bright basic wire, \$3.28 per 100 lb.; common wire nails, \$2.25 per 100 lb.; cement coated nails, \$2.65 per keg.

Sheets.—Domestic business is slack, but further orders have been booked for export, the Inland Steel Co. having taken 3000 tons additional for Japan during the past week. Prices are firm.

Mill quotations are 3c. for No. 28 black, 2.25c. for No. 10 blue annealed and 4c. for No. 28 galvanized, all being Pittsburgh prices, subject to a freight rate to Chicago of 38c. per 100 lb.

Jobbers quote: Chicago delivery out of stocks, No. 10 blue annealed, \$3.80; No. 28 black, 4.15c.; No. 28 galvanized, 5.15c.

Cast Iron Pipe.—Sellers are encouraged by the promising business outlook. The United States Cast Iron Pipe & Foundry Co. was the only bidder on 1353 tons for Chicago and was low bidder on 800 tons for Rockford, Ill. The same company was awarded 400 tons through a contractor for the Centralia, Ill., water company. A private inquiry for 1500 tons at Dayton, Ohio, is still pending. Madison, S. D., takes bids on 600 tons today; Grand Rapids, Mich., on 800 tons, Jan. 28; and Brook Park, Ohio, on 250 tons, Feb. 4. Going prices appear to range from \$32.50 to \$34, Birmingham, for 6-inch and above.

We quote per net ton, f.o.b. Chicago, as follows: Water pipe, 4-in., \$45.60 to \$47.10; 6-in. and above, \$41.60 to \$43.10; class A and gas pipe, \$4 extra.

Belts and Nuts.—No signs of a revival in buying are to be noted, and no ruling discounts can be named. A number of makers have been quoted f.o.b. factory instead of f.o.b. Pittsburgh, and there appears to be a growing tendency in this direction. It is felt, however, that there will be no general abandonment of the Pittsburgh base until the present case before the Federal Trade Commission has gone to a decision.

Jobbers quote structural rivets, 3.48c.; boiler rivets, 3.58c.; machine bolts up to 3/4 x 4 in., 60, 10 and 10 per cent off; larger sizes, 60 and 10 off; carriage bolts up to 3/4 x 6 in., 60 and 10 off; larger sizes, 55 and 5 off; hot pressed nuts, square and hexagon tapped, \$3.75 off; blank nuts, \$4 off; coach or lag screws, gimlet points, square heads, 65 and 5 per cent off. Quantity extras are unchanged.

Structural Material.—The insurgent faction in the local building trades unions is now in control and it seems probable that there will be a fight to a finish between organized labor and the proponents of an open shop. Notwithstanding this development, bids will be taken Jan. 28 on 20,000 tons for the headhouse and concourse of the Chicago Union Station. Mill prices are on about the same footing as heretofore, although in some cases fabricators have been able to place large tonnages at as low as 1.50c., Chicago, which is the price at which carbuilders have been buying their steel.

Recent fabricating awards include:

Masonic Temple, Oklahoma City, Okla., 1635 tons, to J. B. Klein Iron & Foundry Co., that city.

Store building for Leopold Metzger, Minneapolis, 107 tons, to Crown Iron Works, that city.

Municipal and Memorial Building, Ironwood, Mich., 117 tons, to Worden-Allen Co.

Gates, rods and miscellaneous shapes for Chippewa Reservoir dam, Winter, Wis., 150 tons, to Worden-Allen Co.

Tuberculosis hospital, National Soldiers' Home, Milwaukee, structural steel, 133 tons, to C. Hennecke Co., Milwaukee.

Steel mesh, 140 tons, to Robertson & Jackson, Inc., Milwaukee.

Bridge tramway, Cheswick Power Co., Cheswick, Pa., 400 tons, to Hoyt & Patterson, Pittsburgh.

Pending business includes:

Municipal power plant, Lansing, Mich., 1470 tons, low bidder on general contract, Dupont Engineering Co. and Wallace-Aldinger Co.

Lower island sewage disposal plant, Milwaukee, 450 tons of structural steel and 6000 tons of reinforcing, Dupont Engineering Co., low bidder on general contract.

Bridge, Department Store, Davenport, Iowa, 1020 tons, to Worden-Allen Co., that city.

Bridge over Missouri River, Booneville, Mo., 4000 tons.

The mill quotation on plain material ranges from 1.60c. to 1.70c., Chicago. Jobbers quote 2.68c. for plain material out of warehouse.

Plates.—Local mills will furnish 70,000 tons of steel for the cars recently placed by the Union Pacific, the Illinois Central and the Central of Georgia. It will be some time, however, before the specifications for this material are prepared. Outside of additional railroad car business on the verge of being placed, there is little plate tonnage in prospect. A number of tank inquiries for the Louisiana and Oklahoma oil fields have been figured on by local fabricators, but there is no certainty that orders will result. Carbuilders continue to buy plates at 1.50c., Chicago, while the general market is from \$2 to \$4 higher.

The ruling mill quotations range from 1.60c. to 1.70c., Chicago. Jobbers quote 2.63c. for plates out of stock.

Old Material.—A large local mill has bought about 10,000 tons of heavy melting at a reported price of \$11.75, and there has also been somewhat better buying by bar iron mills and foundries. Both buyers and sellers believe that present prices are scraping bottom and that the next swing is likely to be upward. Generally speaking, the market cannot yet be termed active and the price situation is substantially unchanged, a few advances being balanced by declines in other commodities. On Jan. 31, the Government will take bids at Chicago on 31,000 gross tons of shells located at Savanna, Ill., Columbus, Ohio, and Toledo. Railroad offerings include the Burlington, 4000 tons; the Sante Fe, 3300 tons, and the New York Central and the Big Four, blank lists.

We quote delivery in consumers' yards Chicago and vicinity, all freight and transfer charges paid, as follows:

Per Gross Ton	
Iron rails.....	\$16.00 to \$16.50
Relaying rails.....	20.00 to 25.00
Cast iron car wheels.....	15.00 to 15.50
Hot rolled or forged steel car wheels.....	13.00 to 13.50
Steel rails, rerolling.....	12.00 to 12.50
Steel rails, less than 3 ft.....	12.50 to 13.00
Heavy melting steel.....	11.50 to 12.00
Frogs, switches and guards cut apart.....	11.50 to 12.00
Shoveling steel.....	11.00 to 11.50
Low phos. heavy melting steel.....	13.50 to 14.00
Drop forge flashings.....	7.50 to 8.00
Hydraulic compressed sheet.....	7.50 to 8.00
Axle turnings.....	8.50 to 9.00

Per Net Ton	
Iron angles and splice bars.....	14.00 to 14.50
Steel angle bars.....	10.50 to 11.00
Iron arch bars and transoms.....	15.00 to 15.50
Iron car axles.....	19.50 to 20.00
Steel car axles.....	12.50 to 13.00
No. 1 busheling.....	8.25 to 8.75
No. 2 busheling.....	6.00 to 6.50
Cut forge.....	10.00 to 10.50
Pipes and flues.....	6.50 to 7.00
No. 1 railroad wrought.....	10.50 to 11.00
No. 2 railroad wrought.....	10.00 to 10.50
Steel knuckles and couplers.....	11.25 to 11.75
Coil springs.....	12.50 to 13.00
No. 1 machinery cast.....	13.00 to 13.50
No. 1 railroad cast.....	12.50 to 13.00
Low phos. punchings.....	11.00 to 11.50
Locomotive tires, smooth.....	9.50 to 10.00
Machine shop turnings.....	4.50 to 5.00
Cast borings.....	6.00 to 6.50
Stove plate.....	12.00 to 12.50
Grate bars.....	10.50 to 11.00
Brake shoes.....	10.50 to 11.00
Railroad malleable.....	11.25 to 11.75
Agricultural malleable.....	11.25 to 11.75

New York

NEW YORK, Jan. 24.

Pig Iron.—Interest in the pig iron market still continues to center in the bids to be received Feb. 7 on the segments for the New Jersey-New York vehicular tunnel. While many companies are showing an interest and are figuring on how they can bid, prevailing opinion is that only a very few are equipped to make the segments and it is probable that the tonnage will be divided among not more than three or four bidders. The policy of the furnaces has not yet been defined and it does not seem probable that there will be any definite announcement of policy until after the contract for the segments has been awarded. Then the furnaces will figure with successful contractors. Among others interested is an importer of foreign iron, but there seems to be no prospect of any foreign iron going into the tunnel. Prices of English, Belgian and French iron are such that they cannot meet competi-

tion in this country, except possibly on the Pacific Coast. Considerable figuring, is being done on export iron to the Far East and it seems to be within the range of possibility that some iron, preferably from the South, can be sold for that shipment. Generally speaking, the market is quiet with some jobbing foundries showing a very comfortable increase in business. The usual asking price of No. 2, plain eastern Pennsylvania iron is \$20, furnace, but buyers claim to be able to buy at \$19.50.

We quote delivered in the New York district as follows, having added to furnace prices \$2.52 freight from eastern Pennsylvania, \$5.46 from Buffalo and \$6.16 from Virginia:

East. Pa. No. 1 fdy., sil. 2.75 to 3.25..	\$23.02 to \$23.52
East. Pa. No. 2X fdy., sil. 2.25 to 2.75	22.52 to 23.02
East. Pa. No. 2 fdy., sil. 1.75 to 2.25..	22.02 to 22.52
Buffalo, sil. 1.75 to 2.25	24.46 to 24.96
No. 2 Virginia, sil. 1.75 to 2.25	27.16 to 28.16

Ferroalloys.—Demand for ferromanganese is still light and confined to carload lots for early delivery, sales of the British alloy being noted at \$58.35, seaboard. There is also a little activity in spiegeleisen, light sales having been made at \$26, furnace, for the 20 per cent grade and at \$25, furnace, for the 16 to 19 per cent alloy. The purchase of 20,000 tons of Brazilian high grade manganese ore by a large independent Pittsburgh steel maker at 22c. per unit, seaboard, has created considerable interest in this market and it is reported that a further 10,000 tons has been sold to the same consumer. These sales establish a market for this material, none having been sold in many months heretofore. Quotations for 50 per cent ferro-silicon are unchanged at \$55 to \$60 per ton, delivered, depending on the consuming point and the quantity involved; purchases are confined to small lots, although active negotiations are in progress by leading producers and importers to close contracts for 1922. There is no demand for ferrochrome. Quotations are as follows:

Ferroalloys

Ferromanganese, domestic, delivered, per ton	\$60.00 to \$63.00
Ferromanganese, British, seaboard, per ton	\$58.35
Spiegeleisen, 20 per cent, furnace, per ton..	\$26.00
Ferrosilicon, 50 per cent, delivered, per ton,	\$55.00 to \$60.00
Ferrotungsten, per lb. of contained metal, 40c. to 50c.	
Ferrochromium, 6 to 8 per cent carbon, 60 to 70 per cent Cr., per lb. Cr., delivered...13c. to 14c.	
Ferrovanadium per lb. of contained vanadium	\$4.00

Ores

Manganese ore, foreign, per unit, seaboard..22c. to 26c.	
Tungsten ore, per unit, in 60 per cent concentrates	\$2.00 up
Chrome ore, 40 to 45 per cent Cr ₂ O ₃ , crude, per net ton, Atlantic seaboard.....	\$20.00 to \$25.00
Chrome ore, 45 to 50 per cent Cr ₂ O ₃ , crude, per net ton, Atlantic seaboard.....	\$25.00 to \$27.00
Molybdenum ore, 85 per cent concentrates, per lb. of MoS ₃ , New York.....	50c. to 60c.

Finished Iron and Steel.—Though the local steel market as a whole is very quiet, the past week has brought a marked increase in the number and aggregate tonnage of structural steel projects. Fabricators are figuring on more work than has come their way since 1920. At least 30,000 tons are involved in six new operations in New York City on which bids are now being received. Many of the jobs now up for bids are revivals of undertakings that were figured on before but did not then go ahead. Among the projects being bid on may be mentioned the following:

Hospital, Elizabeth, N. J., 1000 tons.	
Office building, Madison Avenue near Thirty-fourth Street, New York, 1000 tons.	
Office building, Washington, D. C., 1000 tons.	
Addition to store of R. H. Macy & Co., New York, 8000 tons.	
Hotel, Syracuse, N. Y., 3500 tons.	
New York Cotton Exchange building, 3000 tons.	
Apartment house, Long Island City, 500 tons.	
Office building at Fifth Avenue and Thirty-sixth Street, New York, 2000 tons.	
Standard Oil Co. building, New York, 5000 tons.	
Hospital, Baltimore, 1000 tons.	
Power plant for Brooklyn Edison Co., 600 tons.	
Building projects for which the steel fabrication awards have been made are as follows:	
Apartment hotel, 2120 Broadway, New York, 350 tons, to A. E. Norton Co.	
Apartment building at Riverside Drive and 166th Street, New York, 500 tons, to A. E. Norton Co.	

Apartment building at Lexington Avenue and Eightieth Street, New York, 500 tons, to A. E. Norton Co.

Apartment hotel at 37 Fifth Avenue, New York, 550 tons, to A. E. Norton Co.

Apartment building at 133 West Seventy-first Street, New York, 450 tons, to A. E. Norton Co.

Two buildings at Johns Hopkins University, Baltimore, 600 tons, to McClintic-Marshall Co.

Oil tanks for Vacuum Oil Co., New York, 1700 tons, to Warren City Boiler Works, Warren, Ohio.

Work for Central Railroad of New Jersey, 150 tons, to Phoenix Bridge Works.

Seventeen 80,000-bbl. oil tanks at Cushing, Okla., for the Sinclair Crude Oil Purchasing Co., 5000 tons of plates, to Phoenix Iron Works Co.

Two buildings in Newark, N. J., 300 in one and 300 in another, to Hay Foundry & Iron Works.

Not much new railroad work is coming to light, but it is expected that cars and locomotives under consideration by the Chicago, Burlington & Quincy Railroad will be placed this week. The freight cars number 7300 and locomotives 55. The Chicago & Northwestern Railroad has placed 45 passenger cars with the American Car & Foundry Co. and the Long Island Railroad has ordered 40 passenger cars from the same company. The Chicago, Burlington & Quincy has ordered 62 passenger cars with the Pullman Co. and 58 baggage cars and mail cars with the Standard Steel Car Co. The American Car & Foundry Co. has booked 300 box cars for export and will require about 300 tons of steel for the work. The Lehigh Valley Railroad has placed an order with the Pressed Steel Car Co. for the repair of 200 freight cars and orders have also been placed for 600 others. The Great Northern is in the market for 250,000 tie plates. Developments in the steel market are few. Prices are weak and 1.45c., Pittsburgh, now thoroughly represents the market on plates, shapes and bars, with some concessions from this level on very desirable business. Tin plate shows weakness whenever a good inquiry makes its appearance, despite the fact that the mills are operating nearly at capacity; it is being sold for domestic shipment fully \$5 a ton below the \$4.75 price, while further concessions have been made for export trade. Sheets appear firm at 2.25c. for blue annealed, 3c. for black and 4c. for galvanized, all base Pittsburgh. Wire nails have been sold down to \$2.40 per 100 lb. keg, Pittsburgh. About 2000 tons of steel bars for a job at Seattle, Wash., will be placed by a Seattle company which obtained the contract. Eastern contractors who were bidding on the work had made inquiry here for the steel.

We quote for mill shipments, New York, as follows: Soft steel bars, 1.83c. to 1.88c.; plates, 1.83c. to 1.88c.; structural shapes, 1.83c. to 1.88c.; bar iron, 1.83c. to 1.88c. On export shipments the freight rate is now 28.5c. per 100 lb., instead of 38c., the domestic rate.

Warehouse Business.—The market continues dull. There is some slight activity in sheets, black and galvanized, but prices are weak, probably caused in part by offers at low prices from over-stocked dealers. While small lots out of warehouse will bring up to as high as 5c. per lb., base for galvanized and 4c. per lb. for black, on any reasonable quantity 4.75c. per lb. and 3.75c. per lb. could be done. The brass and copper market is fairly active and spring purchases are expected to swell considerably the present volume of business. Copper sheets for roofing will probably begin to show more activity by the end of February. Wrought iron and steel pipe warehouses report the usual seasonal dullness. We quote prices on page 320.

High Speed Steel.—The market is similar in every respect to previous weeks. Most producers report a few exceedingly small orders. Quotations on 12 per cent tungsten high speed steel are nominally 55c. to 95c. per lb. with special brands of some companies ranging up to as high as \$1.05 per lb.

Cast-Iron Pipe.—No new municipal lettings are in sight, but despite the dullness natural to this season, orders are reported by one maker, as more numerous than for the same month of last year and his foundry is operating at about 75 per cent of capacity. A general feeling of optimism is reported based upon construction prospects in the spring. We quote per net

ton, f. o. b., New York, carload lots, as follows: 6-in. and larger \$47.30; 4-in. and 5-in., \$52.30; 3-in., \$62.30, with \$4 additional for Class A and gas pipe.

Old Material.—The market is quiet. Buying prices are slightly lower with some dealers, while others are quoting the same as last week. Specification pipe has been slightly advanced by some brokers. One of these has increased his price twice in the past week. Another is quoting up to \$7.75 per ton as a buying price. Relaying rails would probably bring \$27 to \$28 per ton, although the purchase of a small tonnage by a contractor for use in New York State was reported last week at about \$22 per ton delivered. Stove plate has stiffened slightly and dealers who have had recent transactions state that they have paid as high as \$10.50. Heavy melting steel remains unchanged at \$7.50 to \$8. Short length rails have declined about 50c per ton from last week's quotation, \$8 to \$8.50 per ton now being a fair offering price.

Buying prices per gross ton, New York, follow:

Heavy melting steel, yard.....	\$7.50 to \$8.00
Steel rails, short lengths, or equivalent.....	8.00 to 8.50
Re-rolling rails.....	9.50 to 10.00
Relaying rails, nominal.....	27.00 to 28.00
Steel car axles.....	10.00 to 10.50
Iron car axles.....	18.50 to 19.00
No. 1 railroad wrought.....	10.00 to 10.50
Wrought iron track.....	8.00 to 8.50
Forge fire.....	5.00 to 5.50
No. 1 yard wrought, long.....	8.50 to 9.00
Cast borings (clean).....	7.50 to 8.00
Machine-shop turnings.....	4.00 to 5.00
Mixed borings and turnings.....	4.00 to 4.50
Iron and steel pipe (1 in. diam. not under 2 ft. long).....	7.25 to 7.75
Stove plate.....	9.50 to 10.50
Locomotive grate bars.....	9.00 to 10.00
Malleable cast (railroad).....	8.00 to 8.50
Car wheels.....	10.50 to 11.00

Prices which dealers in New York and Brooklyn are quoting to local foundries, per gross ton, follow:

No. 1 machinery cast.....	\$16.50 to \$17.00
No. 1 heavy cast (columns, building materials, etc.), cupola size.....	15.50 to 16.00
No. 1 heavy cast, not cupola size.....	14.00 to 14.50
No. 2 cast (radiators, cast boilers, etc.).....	10.00 to 10.50

Philadelphia

PHILADELPHIA, Jan. 24.

A slightly perceptible increase in orders for certain steel products has been noted by steel mills in the past week. The heavier products—plates, shapes and bars in particular—have gained little, if any, but the demand for tin plate, sheets and wire products is somewhat better. A new feature is seasonal demand for wire fencing from some of the Southern States. Orders for structural steel have not shown any marked improvement, but a greater number of projects is being figured, and the outlook becomes somewhat more promising. Jobbers are placing more business, but the orders are small. In pig iron the same dullness that has prevailed since the first of the year is still in evidence and January sales in this district will fall considerably below those of December.

Pig Iron.—No change worthy of note has occurred in the pig iron situation. The past week has been quiet, but no more so than the preceding weeks of this year. The most important transaction was the purchase by a radiator manufacturer at Trenton, N. J., of 1200 tons of No. 2 plain iron, the business being divided among three furnaces. Eastern Pennsylvania furnaces have quoted the Saco-Lowell Shops and the Garney Heater Co., both New England interests, on about 2000 tons each of foundry iron, and there are a few other inquiries in the market ranging from 500 to 2000 tons. Some second quarter inquiry has appeared and a few sales have been made for that delivery. About 400 tons of Buffalo No. 2 plain iron was sold to a central Pennsylvania melter for second quarter shipment at \$19; Buffalo. Interest in the 100,000 tons of pig iron required for the New York-New Jersey vehicular tunnel is keen, but some Eastern furnaces have declined not to quote because of the long deliveries. Prices of foundry iron remain fairly steady at \$20 for No. 1 plain, \$20.50 for No. 2X and \$21 for No. 1K, all

f.o.b. furnace. Concessions from these prices are granted where the furnace has a freight rate disadvantage in competition with other furnaces, but such concessions have usually been small. On one transaction a furnace went as low as \$19.50, furnace, for No. 2 plain. A steel company inquiring for basic has been quoted \$19, furnace, by one basic maker, but is trying to buy at a better price.

The following quotations are, with the exception of those on low phosphorus iron, for delivery at Philadelphia, and include freight rates varying from 84 cents to \$1.54 per gross ton:

East. Pa. No. 2 plain, 1.75 to 2.25 sil.....	\$20.84 to \$21.26
East. Pa. No. 2X, 2.25 to 2.75 sil.....	21.34 to 21.76
Virginia No. 2 plain, 1.75 to 2.25 sil.....	27.24 to 27.74
Virginia No. 2X, 2.25 to 2.75 sil.....	27.74 to 28.24
Basic delivery eastern Pa.....	20.25
Gray forge.....	20.50 to 21.50
Malleable.....	23.00 to 24.00
Standard low phos. (f.o.b. furnace).....	30.00
Copper bearing low phos. (f.o.b. furnace).....	28.00

Ferroalloys.—The Steel Corporation, which has been selling ferromanganese at \$60, Pittsburgh, has decided to quote \$58.35, Atlantic seaboard, which is the price quoted by other domestic producers and also by importers of the British alloy. The American Steel Foundries is in the market for 300 tons. There is little demand for spiegeleisen, which is obtainable at about \$25, furnace.

Semi-Finished Steel.—There is some demand for forging billets, but little for re-rolling quality. The former grade is quoted at \$32 to \$33, Pittsburgh, and the latter at \$28 to \$29, Pittsburgh. Sheet bars and slabs are also obtainable at \$28 to \$29, Pittsburgh.

Plates.—Eastern mills are not gaining in plate bookings. Mills which are willing to make price concessions are faring somewhat better than their competitors as to tonnage. On ordinary lots 1.45c. and 1.50c., Pittsburgh, are quoted, some mills adhering quite firmly to the latter quotation. Buyers with attractive orders to place, claim to be able to get quotations equivalent to 1.40c., Pittsburgh, or lower, but there is no confirmation of sales below 1.40c.

Structural Steel.—Fabricators are figuring on more work than has come their way in some time, but little business has been placed in the past week or two. Bids will be requested soon on 3000 tons for the new Philadelphia public library. The Belmont Iron Works will fabricate 900 tons for the Western Union Building at Eleventh and Locust streets. Plain material is being sold at 1.45c. and 1.50c., Pittsburgh.

Bars.—A re-rolling mill is reported to have taken 300 tons of reinforcing bars for the Philadelphia-Camden bridge at a price equivalent to 1.35c., Pittsburgh. Another lot of 300 tons for a fence around a large estate near Philadelphia was sold at 1.40c., Pittsburgh. A Detroit automobile manufacturer is in the market for about 5000 tons of bars for early shipment. Soft steel bars are fairly firm at 1.50c., Pittsburgh, and most of the cutting is on reinforcing quality.

Warehouse Business.—The willingness of the steel mills to book even the smallest tonnages is cutting down the demand for steel out of stock. Local warehouses report no gain in volume of business. Prices for Philadelphia delivery are as follows:

Soft steel bars and small shapes, 2.50c.; iron bars (except bands), 2.50c.; round edge iron, 2.80c.; round edge steel, iron finish, 1½ x ½ in., 2.95c.; round edge steel planished, 3.70c.; tank steel plates, ¼-in. and heavier, 2.75c.; tank steel plates, 3/16-in., 2.925c.; blue annealed steel sheets, No. 10 gage, 3.50c.; light black sheets, No. 28 gage, 4c.; galvanized sheets, No. 28 gage, 5c.; square twisted and deformed steel bars, 2.65c.; structural shapes, 2.60c.; diamond pattern plates, ¼-in., 4.60c.; 3/16-in., 4.785c.; ¼-in., 4.90c.; spring steel, 4.10c.; round cold-rolled steel, 3.25c.; squares and hexagons, cold-rolled steel, 3.75c.; steel hoops, No. 13 gage and lighter, 3.25c.; steel bands, No. 12 gage to 3/16-in., inclusive, 3.10c.; iron bands, 3.90c.; rails, 2.75c.; tool steel, 8c.; Norway iron, 5c.; toe steel, 4.50c.

Sheets.—Prices of sheets show resistance. Apparently there are no concessions being offered by the mills, except that one or two plate mills have been selling annealed tank quality steel sheets as a substitute for blue annealed on the plate basis of 1.50c., Pittsburgh. There has not been enough of such selling, however, to disturb the market seriously. Regular blue annealed makers have little difficulty in getting 2.25c., Pittsburgh, from their established trade. Black

sheets at 3c. and galvanized at 4c., Pittsburgh, are quite firm. Concessions on tin plate appear to have been made, prices as low as \$4.50 per 100 lb. base box being reported.

Wire Products.—A better demand for wire products is noted, particularly fence wire and woven wire fencing, demand for the latter coming principally from the South. Prices are holding except that wire nails are being offered at \$2.40 per keg by makers who use rejected wire rods as their raw material.

Old Material.—Two blast furnaces came into the market last week for borings and turnings, one paying \$9.25, delivered, for 500 tons, and another \$10.25 for a similar quantity. Otherwise there is little demand and prices are stationary. We quote for delivery at consumers' works in this district as follows:

No. 1 heavy melting steel.....	\$11.50 to \$12.00
Scrap rail.....	11.50 to 12.00
Steel rails, rerolling.....	15.50 to 18.00
No. 1 low phos., heavy 0.04 and under.....	17.00 to 18.00
Car wheels.....	18.50 to 17.00
No. 1 railroad wrought.....	14.50 to 15.00
No. 1 yard wrought.....	12.00 to 12.50
No. 1 forge fire.....	10.00 to 10.50
Bundled sheets (for steel works).....	9.50 to 10.00
No. 1 busheling.....	11.00 to 12.00
No. 2 busheling.....	9.00 to 10.00
Turnings (short shoveling grade for blast furnace use).....	9.25 to 10.25
Mixed borings and turnings (for blast furnace use).....	9.25 to 10.25
Machine-shop turnings (for rolling mill and steel works use).....	9.00 to 9.50
Heavy axle turnings (or equivalent).....	9.50 to 10.00
Cast borings (for steel works and rolling mills).....	12.00 to 12.50
Cast borings (for chemical plants).....	13.50 to 14.00
No. 1 cast.....	16.50 to 17.00
Railroad grate bars.....	14.00 to 14.50
Stove plate (for steel plant use).....	14.00 to 14.50
Railroad malleable.....	13.00 to 14.00
Wrought iron and soft steel pipes and tubes (new specifications).....	11.50 to 12.00
Iron car axles.....	No market
Steel car axles.....	17.00 to 18.00

St. Louis

ST. LOUIS, Jan. 24.

Pig Iron.—Demand for pig iron is confined largely to carloads, the two largest inquiries being for 150 tons each. One of these is from a local melter, the other from a Southern Illinois steam specialty manufacturer. Orders for carloads come from all over the St. Louis trade territory, but the total volume is small. Two furnaces have been taken off by the American Steel Foundries and one furnace has been blown out by the Commonwealth Steel Co. Stove plants in St. Louis have not reopened since the holidays, there is a strike among the Belleville, Ill., plants, and there is little activity among the stove foundries at Quincy, Ill. The market is nominal at \$19, Chicago, and \$16, Birmingham, but lower quotations have been made. On the other hand, one producer reports sales of a few carloads of Northern iron at \$20, Chicago. Several cars of ferromanganese and one car of 50 per cent ferro-silicon were sold.

We quote delivered consumers' yards, St. Louis, as follows, having added to furnace prices \$2.88 freight and war tax from Chicago and \$5.91 from Birmingham:

Northern foundry, all 1.75 to 2.25.....	\$21.88
Northern malleable, all 1.75 to 2.25.....	21.88
Basco.....	21.88
Southern foundry, all 1.75 to 2.25.....	21.91

Finished Iron and Steel.—The Texas & Pacific Railroad, Dallas, Tex., is in the market for 37,000 pairs of 85-lb. angle bars, about 925 tons, and the St. Louis Southwestern wants 2500 pairs of 56-lb. angle bars. The Missouri, Kansas & Texas placed an order for its requirements for six months for locomotive tires, and another St. Louis road has contracted for requirements for a similar period. The Missouri Pacific placed an order for 1000 kegs of track spikes, in addition to 1000 reported in THE IRON AGE last week. The Union Pacific has postponed for several weeks the placing of orders for 25 each of baggage, passenger and observation cars. Demand for wire rods is improving, and the sale is reported of 260 tons to a Kansas City concern. Demand for pipe is fair, but an improvement is indicated in Oklahoma and the Marx, Tex., fields because of the advance in crude oil, which is expected to increase

drilling operations. The Colorado Fuel & Iron Co. got an order for 800 tons of reinforcing bars for a San Antonio, Tex., job. The building labor situation has been made more complex by the refusal of the Building Trades Council to accept by an overwhelming vote the proposal of the Master Builders' Association for a reduction of 20 per cent in wages.

For stock out of warehouse we quote: Soft steel bars, 2.62½c. per lb.; iron bars, 2.62½c.; structural shapes, 2.72½c.; tank plates, 2.72½c.; No. 10 blue annealed sheets, 3.47½c.; No. 28 black sheets, cold rolled, one pass, 4.15c.; cold drawn rounds, shafting and screw stock, 3.66c.; structural rivets, \$3.32½ per 100 lb.; boiler rivets, \$2.62½; tank rivets, 7/16 in. and smaller, 65 and 5 per cent off list; machine bolts, large, 60-10 per cent; small, 60, 10 and 10 per cent; carriage bolts, large, 55-5 per cent; small, 60 and 10 per cent; lag screws, 65-5 per cent; hot pressed nuts, square or hexagon blank, \$4; and tapped, \$3.76 off list.

Coke.—Inquiry for coke is limited, except in carload lots to furnace grades used by water gas companies. Two lots of 6000 tons each of Granite City by-product were sold and other scattering sales brought the total sales for the week around 12,000 to 14,000 tons for shipment through first half and all of 1922. Foundry coke is inactive, no more than carload sales being made, and no inquiries of note pending. Demand for domestic coke is better because of colder weather in this section.

Old Material.—Buying of heavy melting steel and rolling mill grades is at a standstill. Prices are in some instances weaker. There are no railroad offerings of consequence this week.

We quote dealers' prices f.o.b. consumers' works, St. Louis industrial district and dealers' yards, as follows:

Per Gross Ton	
Old iron rails.....	\$15.00 to \$15.50
Steel rails, rerolling.....	11.50 to 12.00
Steel rails, less than 3 ft.....	11.50 to 12.00
Relaying rails, standard section.....	23.00 to 28.00
Cast iron car wheels.....	14.00 to 14.50
No. 1 heavy railroad melting steel.....	10.50 to 11.00
No. 1 heavy shoveling steel.....	10.00 to 10.50
Ordinary shoveling steel.....	9.00 to 9.50
Frogs, switches and guards out apart.....	10.50 to 11.00
Ordinary bundle sheet.....	4.50 to 5.00

Per Net Ton	
Heavy axle and tire turnings.....	5.00 to 5.50
Iron angle bars.....	12.50 to 14.00
Steel angle bars.....	9.00 to 9.50
Iron car axles.....	18.00 to 18.50
Steel car axles.....	13.50 to 14.00
Wrought iron arch bars and transoms.....	13.00 to 13.50
No. 1 railroad wrought.....	9.50 to 10.00
No. 2 railroad wrought.....	8.50 to 9.00
Railroad springs.....	11.25 to 11.75
Steel couplers and knuckles.....	11.25 to 11.75
Locomotive tires, 42 in. and over, smooth inside.....	8.00 to 8.50
No. 1 dealers' forge.....	7.00 to 7.50
Cast iron borings.....	5.50 to 6.00
No. 1 busheling.....	8.50 to 9.00
No. 1 boilers cut in sheets and rings.....	7.00 to 7.50
No. 1 railroad cast.....	13.00 to 13.50
Stove plate and light cast.....	11.50 to 12.00
Railroad malleable.....	8.50 to 10.00
Agricultural malleable.....	9.00 to 9.50
Pipes and flues.....	7.50 to 8.00
Heavy railroad sheet and tank.....	6.00 to 6.50
Light railroad sheet.....	4.50 to 5.00
Railroad grate bars.....	9.50 to 10.00
Machine shop turnings.....	4.50 to 5.00
Country mixed iron.....	7.50 to 7.00
Country railroad mixed.....	7.00 to 7.50
Horsehoes.....	9.50 to 10.00
Railroad brake shoes.....	9.00 to 9.50

Boston

Boston, Jan. 24.

Pig Iron.—New England foundries have continued a policy of buying pig iron only as needed. They have not been convinced it is time to anticipate requirements, first, because the average daily melt shows little appreciable increase, and second, because the concerted movement has been made by eastern Pennsylvania and Buffalo furnace interests to hold prices. Buying the past week has been of a hand-to-mouth character or for mixture purposes. The immediate future is more promising, however. A manufacturer of textile machinery may close shortly on 500 tons to 1000 tons each of No. 1X and No. 2X for immediate delivery; the Garney Heater Co., Framingham, Mass., on 1000 tons No. 2 plain or more, second quarter delivery; a Connecticut foundry on 500 tons No. 2X, delivery extending over next three months. Speculative stock interests in varying amounts, which in the aggregate make a good showing, and some of the smaller inquiries. Other production concerns are in

the making, for supplies are close to nothing, notwithstanding small weekly melts. Most Connecticut foundries have small stocks because some time back they made a price settlement rather than take high-priced iron. Firmer prices on special analysis iron are noted. A special low phosphorus malleable sold this week at \$23, furnace; high manganese Buffalo at \$26, furnace, and off malleable at better than \$19, furnace. Eastern Pennsylvania No. 2X apparently is obtainable at \$19.50 furnace. One of the most active Buffalo furnaces refuses to meet that price, turning down 500 tons. Numerous small quantities of Alabama iron were placed in Massachusetts and Connecticut this week at \$16 and \$16.50, furnace base. Little was done in Virginia iron. Delivered prices follow:

We quote delivered at common New England points as follows, having added to furnace prices \$4.06 freight from eastern Pennsylvania, \$5.46 from Buffalo, \$6.53 from Virginia and \$10.66 from Alabama:

East. Penn., silicon 2.25 to 2.75.....	\$24.06 to \$25.06
East. Penn., silicon 1.75 to 2.25.....	23.56 to 24.56
Buffalo, silicon 2.25 to 2.75.....	24.46 to 25.96
Buffalo, silicon 1.75 to 2.25.....	24.46 to 25.46
Virginia, silicon 2.25 to 2.75.....	29.08 to 29.58
Virginia, silicon 1.75 to 2.25.....	28.58 to 29.08
Alabama, silicon 2.25 to 2.75.....	27.16 to 27.66
Alabama, silicon 1.75 to 2.25.....	26.66 to 27.16

Finished Material.—Mill representatives report little business this week, and prices as barely steady. The fact that bar business recently was placed at 1.45c., Pittsburgh, and the Maine Central has bought small tonnages of plates at less than 1.50c., have had an unsettling influence on trade. The one bright spot is the structural steel market. No large tonnages were placed this week, but will be shortly, and further sizable business is in the making. Warehouses in some instances shortly will be obliged to place business but the volume involved is problematical. Their business is improving, although slowly. With the exception of a reduction of 50c. a keg on rivets, and a spread of \$3.50 to \$3.75 in wire nails, the local warehouse price situation shows little change.

Jobbers now quote: Soft steel bars, \$2.55½ per 100 lb. base; flats, \$3.05½; concrete bars, stock lengths, \$2.55½; structural angles and beams, \$2.65½; plates, \$2.65½ to \$2.83; tire steel, \$3.85 to \$4.25; open hearth spring steel, \$4.50; crucible spring steel, \$11.50; bands, \$3.15½ to \$3.53; hoop steel, \$3.15½; cold rolled steel, \$3.55 to \$4.05; too calk steel, \$8; refined iron, \$2.55½ per 100 lb. base; best refined iron, \$4.25; Wayne iron, \$5.50; Norway iron, \$5.50; No. 10 blue annealed sheets, \$3.48 per 100 lb. base; No. 28 black sheets, \$4.50; No. 28 galvanized sheets, \$5.50.

Coke.—One order for 1000 tons of by-product foundry coke was placed by a Massachusetts foundry this week. Business otherwise was confined to small tonnages of spot and to releases of small tonnages on contract, the latter predominating. Both the New England Coal & Coke Co. and the Providence Gas Co. quote foundry coke at \$10.40, delivered, where the local freight does not exceed \$3.40, but the undertone of the market is reported as firmer. The firmness is based more on an anticipated curtailment of the Connellsville output rather than on prospects of a greater demand in New England within the immediate future. The statistical position of coke in New England foundry yards is such that any interruption in transportation, due to snow or ice, undoubtedly would place pig iron melters in an uncomfortable position.

Old Material.—On those old materials for which any demand exists, prices are firmer. Business the past week, however, was largely between dealers. Comparatively small tonnages are going into consumption. The Crompton & Knowles Loom Works, Worcester, Mass., inquiry on 1000 tons No. 1 machinery has strengthened the market. That is, the inside price seldom is quoted lower than \$18 delivered, whereas a week ago less could be done. Car lots have been sold this week at \$18 to \$18.50, delivered, and in one instance at \$18.90. A high freight rate was involved in the latter transaction. There is no market for stove plate or railroad malleable. New England and New York melters have bought horseshoes this week in car-load lots, for which the dealer paid \$13.50. Heavy melting steel is firmer on buying by Worcester, Mass., interests. Little inquiry comes from Pennsylvania mills for steel. Borings continue in demand and are firmer because of their scarcity. A local dealer this

week paid \$5.20 for skeleton, but that price is exceptional.

The following prices are for gross ton lots delivered consuming points:

No. 1 machinery cast.....	\$18.00 to \$18.50
No. 2 machinery cast.....	16.00 to 16.50
Stove plate.....	15.00
Railroad malleable.....	13.00 to 13.50

The following prices are offered per gross ton lots f.o.b. Boston rate shipping points:

No. 1 heavy melting steel.....	\$8.00 to \$9.00
No. 1 railroad wrought.....	10.50 to 11.00
No. 1 yard wrought.....	9.50 to 10.00
Wrought pipe (1-in. in diam., over 3 ft. long).....	7.00 to 7.25
Machine shop turnings.....	3.25 to 3.50
Cast iron borings, rolling mill.....	7.25 to 7.50
Cast iron borings, chemical.....	8.00 to 8.25
Blast furnace borings and turnings.....	3.50 to 3.75
Forged scrap and bundled skeleton.....	4.50 to 5.00
Street car axles and shafting.....	10.50 to 11.00
Car wheels.....	11.50 to 12.00
Revolving rails.....	10.00 to 10.50

Buffalo

BUFFALO, Jan. 24.

Pig Iron.—Further evidences of a weakening in the market is furnished by the statement of two furnaces that \$19.50 is acceptable on any order. Hitherto they have held firm at \$20 base, but falling off in sales in two weeks have been so marked that to meet competition, the reduction is extended to tonnages of all sizes. Of the five producers here, all are interested in the New York vehicular tunnel with the exception of one. There is no disposition on the part of any interest, however, to quote beyond second quarter delivery. Some of the foundries interested in the tunnel proposition ask for bids on the basis of 100,000 tons. Total sales are about 5000 tons. Inquiry is scattered, including one for 1000 tons of No. 2 X and another of the same grade for 600 tons. Inquiry from outside the district is not as brisk as a month ago when foundries generally felt Buffalo iron was so weak that freight differentials could be overlooked.

We quote f.o.b. per gross ton Buffalo as follows:

No. 1 foundry, 2.75 to 3.25 sil.....	\$20.00 to \$20.50
No. 2X foundry, 2.25 to 2.75 sil.....	19.50 to 20.00
No. 2 plain, 1.75 to 2.25 sil.....	19.00 to 19.50
Basic.....	18.25 to 18.50
Malleable.....	20.00 to 20.50
Lake Superior charcoal.....	31.75

Finished Iron and Steel.—Bar and shape demand has shown marked improvement and a steady demand is also evident in cold-finished material. Other materials are slow and commodities such as bolts, nuts, pipe and wire, which have been fairly firm in demand, are very slow. Bar quotations at less than 1.50c. are more often heard and one desirable inquiry brought out a reported quotation of 1.42½c. Quotations of this kind are for immediate acceptance only and are withdrawn if the order is not forthcoming the same day. Some indication of the rolling situation may be gained through the experience of a buyer who placed an order for 50 tons of plates with a mill with the understanding that rolling must start the same day and the order was taken on that basis. The Lackawanna Bridge Co., now operating as a subsidiary of the Lackawanna Steel Co., will fabricate 1400 tons of shapes for the new Ford hotel, Buffalo. A new hotel proposition in Syracuse involving 3500 tons is interesting local fabricators, but bids have not been asked. The Buffalo Steel Car Co. is working on 500 cars for the Lackawanna Railroad.

Warehouse Business.—Sheet and bar orders showed slight gain, but structural demand is quiet. Prices on shafting have been reduced. The lack of interest on the part of many regular warehouse customers which was attributed to the inventory period, has passed, and a wider circle of buyers lead to encouragement.

We quote warehouse prices f.o.b. Buffalo as follows: Structural shapes, 2.65c.; plates, 2.65c.; plates, No. 8 gage, 3.35c.; soft steel bars and shapes, 2.55c.; hoops and bands, 3.15c.; blue annealed sheets, No. 10, 3.40c.; galvanized steel sheets, No. 28, 5.25c.; black sheets, No. 28, 4.25c.; cold-rolled strip steel, 5.90c.; cold-rolled round shafting, 3.40c.

Old Material.—A mill has bought several consignments of steel at \$18.50, but the aggregate of its purchases is far short of its needs. Dealers are firm in the decision not to release steel at this price and a \$14 price is likely to be the ruling quotation daily.

Inquiry from outside the district for turnings and borings comes to hand daily, but no business develops because of the low production in this district.

We quote dealers' asking prices per gross ton f.o.b. Buffalo as follows:

Heavy melting steel	\$12.00 to \$14.00
Low phosph., 0.04 and under	17.00 to 18.00
No. 1 railroad wrought	16.00 to 18.00
Car wheels	18.50 to 17.50
Machine shop turnings	7.50 to 8.00
Cast iron borings	7.00 to 8.00
Heavy axle turnings	10.50 to 11.50
Grate bars	12.00 to 13.00
No. 1 bushing	10.00 to 11.00
Stove plate	15.00 to 16.00
Bundled sheet stampings	8.00 to 9.00
No. 1 machinery cast	17.00 to 18.00
Hydraulic compressed	10.50 to 11.50
Railroad malleable	13.00 to 14.00

Cincinnati

CINCINNATI, Jan. 24.

Pig Iron.—The market continues quiet. Although a slight increase in activity is to be noted, nothing approaching a buying movement has developed, and while some big inquiries are current in connection with the New York tunnel project, the trade as a whole is not very optimistic as to any of this business being placed so far West. One of these inquiries from a nearby melter calls for 20,000 tons. Other inquiries include one of 1000 tons from a local melter, 300 tons of low phosphorous from a Tennessee melter, and 100 tons from a central Ohio manufacturer. A Louisville melter is expected to buy 500 tons of foundry iron during the week, and a deal for 200 tons of charcoal iron will be closed to-day. Sales during the week were mostly of Southern iron in lots up to 100 tons, the prices ranging from \$15.60 to \$16, Birmingham, the former price being made by a furnace which has a slight freight advantage over Birmingham. The Southern market is weak at \$16, and it is said that a desirable tonnage might be placed at less, though on business offered Alabama furnaces have not quoted lower than \$16. In the North Chicago and lake furnaces iron is said to be available at \$18.50, and this price has been quoted. Southern Ohio furnaces are quoting \$19.50 to \$20, and have booked some orders at these figures. The minimum figure is being quoted in competitive territory, and it is said furnaces in the Ironton district have no disposition to shade this figure.

Based on freight rates of \$4.50 from Birmingham and \$3.52 from Ironton, we quote f.o.b. Cincinnati:

Southern coke, sil. 1.75 to 2.25 (base)	\$20.50
Southern coke, sil. 2.25 to 2.75 (No. 2 soft)	21.00
Ohio silvery, 8 per cent sil.	32.02
Southern Ohio coke, sil. 1.75 to 2.25 (No. 2)	22.02
Basic, Northern	22.02
Malleable	22.52

Finished Material.—A Southern railroad has bought 400 tons of steel bars at 1.50c., Pittsburgh. The same road is also reported to have placed approximately 3500 tons of splice bars with an unnamed producer. With these exceptions, orders for finished materials during the week were rather light, although an order for 300 tons of wire products was placed by a manufacturer in this district. A local fabricator is figuring on two oil storage tanks in the Southwest which will take approximately 1000 tons of plates. Inquiries for the most part are confined to carload lots, although in some instances 100 tons are asked for. The market on the whole is not showing the activity that was expected, though bookings are showing a gradual increase. No price changes are reported on business done in this district, bars, shapes and plates still being quoted at 1.50c., Pittsburgh, and black and galvanized sheets at 3c. and 4c. respectively. While reports are current of lower prices on wire nails, this may be accounted for by a number of mills which are quoting \$2.50 per keg at mill. There has been little new activity in the structural field. The Columbus, Ohio, board of education is getting bids on a high school which will take 200 tons. The U. S. Engineer's office, Louisville, Ky., will close bids on Feb. 17 for furnishing and delivering a steel maneuver boat hull for dam No. 48 on the Ohio River. The American Creosoting Co., Louisville, Ky., has placed 60 tons with the McGinnis-McCord Co. for a building at New Haven, Conn. This is the only

award reported in this district for last week. The structural steel for the Gibson Hotel addition will probably be let this week. A number of projects are taking more definite shape, including an addition to the Business Men's Club in Cincinnati and a building for the Chamber of Commerce. The Queen City Club is also expected to erect a new club house, work to begin early in the spring. A number of reinforced concrete projects are also expected to develop shortly. Bids will close on Feb. 28 for a \$500,000 high school at Middletown, Ohio, and the contract has been awarded for a \$200,000 building for the Home of the Friendless at Cincinnati.

Warehouse Business.—Warehouse sales show a slight improvement, although orders are for the most part small and for immediate delivery. Some business developed in cold rolled products, mostly from automobile accessory manufacturers. No further price changes are reported.

Iron and steel bars, 2.75c. base; hoops and bands, 3.35c. base; shapes and plates, 2.85c. base; reinforcing bars, 2.82½c. base; cold rolled rounds, 1½ in. and larger, 3.50c. base; under 1½ in. and flats, squares and hexagons, 4c.; No. 10 blue annealed sheets, 3.60c.; No. 28 black sheets, 4.25c.; No. 28 galvanized sheets, 5.25c.; wire nails, \$3.00 per keg base; No. 9 annealed wire, \$2.85 per 100 lb.

Coke.—The spot market on coke is showing only fair activity, but there has been some contracting for the year's requirements. Prices are unchanged, Connellsville foundry coke being quoted at \$3.75 to \$4.25, Wise County foundry \$5 to \$5.50, New River \$7 to \$7.50, and by-product fuel at \$6, Connellsville basis.

Old Material.—There is very little movement in scrap materials, and the market is inclined to weakness. Very little material is coming out, but dealers' yards are pretty well stocked against the time when improved demand sets in. While prices are softer, quotations are unchanged in the absence of trading.

We quote dealers' buying prices, f.o.b. cars:

Per Gross Ton	
Bundled sheets	\$3.50 to \$4.00
Iron rails	12.00 to 12.50
Relaying rails, 60 lb. and up	25.00 to 26.00
Rerolling steel rails	10.50 to 11.00
Heavy melting steel	9.00 to 9.50
Steel rails for melting	9.00 to 9.50
Car wheels	12.00 to 13.00

Per Net Ton	
No. 1 railroad wrought	8.50 to 9.50
Cast borings	3.00 to 3.50
Steel turnings	2.00 to 2.50
Railroad cast	12.00 to 12.50
No. 1 machinery	13.50 to 14.50
Burnt scrap	7.50 to 8.00
Iron axles	15.50 to 16.50
Locomotive tires (smooth inside)	9.50 to 10.00
Pipes and flues	4.00 to 4.50

Birmingham

BIRMINGHAM, ALA., Jan. 24.

Pig Iron.—Third week of January was more nearly satisfactory than its two predecessors. The Birmingham market resisted effort at forcing lower prices and hardened at \$16. Many firm offers of \$15.50, which were declined, came back for booking at \$16. At the close of the week, the \$16 base was seemingly entrenched. One maker did a very good business in small tonnages scattered over the South, Middle West and Southwest with some in the East. Lots of 100 tons were placed in Michigan, Ohio, Indiana and Baltimore territory. Total bookings of one company were around 1500 tons. Silicons are strictly maintained both above and below base, a lot of high silicon selling at \$18.50. Pipe makers are not in the market owing to the slowness of new business to develop. Makers report moving of the make and one maker is moving more than make. Practically all business is for prompt movement. Larger machine shop operators have been very little in the market for many months and are still seldom heard from.

We quote per gross ton f.o.b. Birmingham district furnaces as follows:

Foundry, silicon 1.75 to 2.35	\$16.00
Basic	15.50
Charcoal, warm blast	13.50

Cast Iron Pipe.—Sanitary and high pressure pipe markets report little new business. The leading interest is shipping 1000 tons to the Pacific Coast following more than 5000 tons from several shippers in Decem-

ber. This year for Mobile at one-half the rail rate. The McWane Cast Iron Pipe Co. will soon ship special high pressure pipe makes to Honolulu. New sanitary base is \$37 for standard. High pressure base is nominal at \$28.

Finishing Mills.—The Tennessee company has only one idle finishing mill this week. All except the plate mill at Fairfield are in operation, the structural mill resuming Monday. The Bessemer plate mill is operating. It is presumed that the Ensley rail mill will get the greater part of the 85,000 tons of rails to be placed by the Southern Railway, in which case its known bookings for this year will carry the plan well beyond the first half at a steady pace of 6000 tons a week. Wire mills report greater interest in nails and wire. Sheet steel is continuously active.

Coal and Coke.—The Barrett Co. is turning out 100 tons of pitch coke per day in the leased beehive ovens of the Republic Iron & Steel Co. It is regularly entrenched in the foundry trade. Base is \$8. It is 98 per cent carbon. Other cokes are ruling at \$5.25 to \$5.50.

Old Material.—Scrap dealers report very little activity following temporary withdrawals of demand from pipe shops. Prices remain rather firm than not.

We quote per gross ton f.o.b. Birmingham district yards as follows:

Steel rails.....	\$11.00 to \$12.00
No. 1 steel.....	10.00 to 11.00
No. 1 cast.....	14.00 to 15.00
Car wheels.....	13.00 to 14.00
Tramcar wheels.....	12.00 to 13.00
No. 1 wrought.....	12.00 to 13.00
Stove plate.....	11.00 to 12.00
Cast iron borings.....	6.00 to 7.00
Machine shop turnings.....	6.00 to 7.00

Cleveland

CLEVELAND, Jan. 24.

Iron Ore.—Ore firms do not look for any activity in the ore market before May. General conditions in the trade are about the same as a year ago, although the outlook is better in one respect in that while at this time last year ore consumption was declining from month to month, it is now on the increase. A canvass of many consumers indicates that on the average furnace companies with present operations have about enough ore to last them until August. Furnaces are showing more interest in the freight rates than in ore prices. Nobody is attempting to make an accurate guess on probable prices for the season because ore prices this year will depend to a considerable extent on what, if any, action is taken by the Interstate Commerce Commission in making a general reduction in rail rates. Lower rail rates on coal and other supplies will reduce mining costs as well as the cost of shipping ore from the mines to the upper lake ports, this rail charge being figured in the price of ore, which is sold f.o.b. lower lake port. It is stated that blast furnaces are showing less interest this year than a year ago in trying to obtain information as to probable prices to be used in carrying their inventories, as few made a profit during the past year and consequently do not feel the need of showing losses on ore inventories to offset against profits in income tax returns.

We quote delivered lower lake ports: Old range Bessemer, 55 per cent iron, \$6.45; Old range non-Bessemer, 51½ per cent iron, \$5.16; Mesabi Bessemer, 55 per cent iron, \$6.20; Mesabi non-Bessemer, 51½ per cent iron, \$5.55.

Fig Iron.—Interest during the week centered on numerous inquiries from foundries that are planning to bid on the segments for the New York vehicular tunnel. These inquiries ranged from 25,000 to 60,000 tons and came from foundries in the East, the Pittsburgh territory, and as far west as Cleveland. However, the feeling here is that Eastern foundries have the best chance of getting the business. The inquiries are for both No. 2 and No. 3 iron. Furnaces and prospective purchasers seem unable to agree on any selling arrangement mutually satisfactory. Foundries want a fixed price for a period of about 15 months, objecting to paying market prices at time of shipment, as that would not permit them to figure their costs. Furnaces, on the other hand, generally are not inclined to sell at a fixed price for longer than a three months' period.

One was asked to quote a flat price for delivery through the present year, but declined. The market was rather quiet in actual sales during the week. Two or three Ohio consumers placed 500-ton lots of foundry iron with a Cleveland furnace at \$19 to \$20 for No. 2 for the first quarter's delivery and another lake furnace reports a number of small lot sales of foundry iron aggregating 1000 tons at the same range in prices, the price depending on delivery point. A sale to a Cleveland consumer is reported at \$20.50 at furnace. Some business was taken by a western Pennsylvania furnace on the basis of \$19, Valley, for foundry iron, or 50c. below the price regularly quoted by furnaces located in the Valley district. A few small lot sales of Southern iron were made on the basis of \$16 for 1.75 to 2.25 per cent silicon iron.

Quotations below are f.o.b. local furnace for Northern foundry iron, not including a 50c. switching charge. Other quotations are delivered Cleveland, being based on a \$1.95 freight rate from Valley points, a \$3.86 rate from Jackson and a \$6.67 rate from Birmingham:

Basic.....	\$20.21 to \$20.71
Northern No. 2 fdy., sil. 1.75 to 2.25.....	19.00 to 20.00
Southern fdy., sil. 1.75 to 2.25.....	21.87
Ohio silvery, sil. 8 per cent.....	22.86
Standard low phos., Valley furnace.....	33.00

Wire Products.—The arbitrary differential announced last week on basic and Bessemer wire for Cleveland delivery in place of the freight rate from Pittsburgh, has been extended by the American Steel & Wire Co. to cover nails, but so far has not been applied to the other products of this company's Cleveland plants. The differential is 10c. per 100 lb. and means the equalizing of the freight rate from Youngstown or the absorbing by the mill of practically half the freight rate from Pittsburgh. The customer will be charged the Pittsburgh base price plus 10c. per 100 lb. instead of the present Pittsburgh-Cleveland freight rate of 21c. per 100 lb. as figured on the combination short haul basis. It should be noted that these prices, which are for both jobbers and manufacturers, are for Cleveland delivery only. Orders from outside of Cleveland placed directly with the mill or through a Cleveland jobbing house for direct mill shipment to an out-of-town customer, will carry the usual Pittsburgh price, plus the freight from Pittsburgh to destination.

Sheets.—The demand for sheets has broadened materially, increasing the number of orders, which are all for small lots. The Detroit automobile manufacturers have withheld purchases this month until they received reports of sales from some of the automobile shows, but more activity is expected from this source during the week. Prices are being firmly maintained.

Semi-Finished Steel.—The market is very dull and prices are not clearly defined. While \$29 is the usual quotation, the belief is general that both sheet bars and slabs can be bought at around \$28.

Finished Material.—Orders for finished steel have improved somewhat and inquiries are more plentiful, but buying is only in small lots. Prices seem to be generally maintained at 1.50c. for steel bars, plates and structural material, although in some cases these prices have been shaded \$1 to \$2 a ton. Some of the smaller plate mills have been adhering to 1.60c., but at least one of these has been forced down to the 1.50c. price. However, sales of boiler plate are still being made at 1.60c. No new developments have appeared in the lake shipbuilding industry, although lake shipyards have quotations out on one or two freight boats. Little activity has appeared so far this year in structural work in this territory. The new building for the Union Trust Co., Cleveland, will require 1000 tons of sheet steel piling, which will be placed shortly, provided the bank goes ahead this year with the erection of its building. Steel for the building was placed and fabricated last year, but construction was postponed until building costs went down. The bank is now asking for bids for the general contract and if prices are satisfactory, the work will go ahead. Ohio fabricators are preparing to bid on the Union Station, Chicago, requiring 16,000 tons of steel, and a bridge across the Missouri River at Booneville, Mo., requiring 2000 tons. The outlook in the agricultural implement industry is not prom-

(Continued on page 308)

Prices Finished Iron and Steel, f. o. b. Pittsburgh

Freight Rates

Freight rates from Pittsburgh on finished iron and steel products, in carload lots, to points named, per 100 lb., are as follows:

Philadelphia, domestic	\$0.26	Kansas City	\$0.815
Philadelphia, export	0.265	Kansas City (pipe)	0.77
Baltimore, domestic	0.35	St. Paul	0.665
Baltimore, export	0.265	Omaha	0.815
New York, domestic	0.38	Omaha (pipe)	0.77
New York, export	0.285	Denver	1.35
Boston, domestic	0.405	Denver (wire products)	1.415
Boston, export	0.285	Pacific Coast	1.665
Buffalo	0.295	Pacific Coast, ship plates	1.335
Cleveland	0.24	Birmingham	0.765
Detroit	0.325	Jacksonville, all rail	0.555
Cincinnati	0.325	Jacksonville, rail and water	0.46
Indianapolis	0.345	New Orleans	0.515
Chicago	0.38		
St. Louis	0.475		

The minimum carload to most of the foregoing points is 36,000 lb. To Denver the minimum loading is 40,000 lb., while to the Pacific Coast on all iron and steel products, except structural material, the minimum is 30,000 lb. On the latter item the rate applies to a minimum of 50,000 lb., and there is an extra charge of 9c. per 100 lb. on carloads of a minimum of 40,000 lb. On shipments of wrought iron and steel pipe to Kansas City, St. Paul, Omaha and Denver the minimum carload is 46,000 lb. On iron and steel items not noted above the rates vary somewhat and are given in detail in the regular railroad tariffs.

Rates from Atlantic Coast ports (i.e., New York, Philadelphia and Baltimore) to Pacific Coast ports of call on most steamship lines, via the Panama Canal, are as follows: Pig iron, 55c.; ship plates, 75c.; ingot and muck bars, structural steel, common wire products, including cut or wire nails, spikes and wire hoops, 75c. sheets and tin plates, 60c. to 75c. rods, wire rope, cable and strands, 51c. wire fencing, netting and stretcher, 75c. pipe, not over 8 in. in diameter, 75c.; over 8 in. in diameter, 2 1/2c. per in. or fraction thereof additional. All prices per 100 lb. in carload lots, minimum 40,000 lb.

Structural Material

I-beams, 3 to 15 in.; channels, 3 to 15 in.; angles, 3 to 6 in., on one or both legs, 1/4 in. in thick and over, and seas, structural sizes, 1.50c. to 1.60c.

Sheared plates, 1/4 in. and heavier, tank quality, 1.50c.

Wire Products

Wire nails, \$2.50 base per keg; galvanized, 1 in. and longer, including large-head barbed roofing nails, taking an advance over this price of \$1.25 and shorter than 1 in., \$1.75; bright Bessemer and basic wire, \$2.25 per 100 lb.; annealed fence wire, Nos. 6 to 9, \$2.25; galvanized wire, \$2.75; galvanized barbed wire, \$2.15; galvanized fence staples, \$2.15; painted barbed wire, \$2.65; polished fence staples, \$2.65; cement-coated nails, per count keg, \$2.00, these prices being subject to the usual advances for the smaller trade, all f.o.b. Pittsburgh, freight added to point of delivery, terms 30 days, net, less 2 per cent off for cash in 10 days. Discounts on woven-wire fencing are 65 to 70 1/2 per cent off list for carload lots, 67 to 69 1/2 per cent for 1000-rod lots, and 66 to 68 1/2 per cent for small lots, f.o.b. Pittsburgh.

Bolts and Nuts

Machine bolts, small, rolled threads, 70, 10 and 5 to 70, 10 and 7 1/2 per cent off list.
Machine bolts, small, cut threads, 70 and 5 to 70 and 10 per cent off list.
Machine bolts, larger and longer, 65, 10 and 5 to 70 and 10 per cent off list.
Carriage bolts, 1/2 in. x 6 in.; smaller and shorter rolled threads, 65, 10 and 10 per cent off list.
Cut threads, 65 and 10 to 70 per cent off list.
Longer and larger sizes, 65 and 10 to 70 per cent off list.
Lag bolts, 70 and 10 to 70, 10 and 5 per cent off list.
Plow bolts, Nos. 1, 2 and 3 heads, 80 and 10 per cent off list.
Other style heads, 80 per cent extra.
Machine bolts, c.p.c. and t. nuts, 1/2 in. x 4 in.; smaller and shorter, 65 and 5 per cent off list.
Larger and longer sizes, 65 per cent off list.
Hot pressed sq. or hex. blank nuts, 35.50 off list.
Hot pressed nuts, tapped, 35.00 to 45.25 off list.
C.p.c. and t. sq. or hex. blank nuts, 35.25 off list.
C.p.c. and t. sq. or hex. blank nuts, tapped, 35.00 off list.
Semi-finished hex. nuts: 1/2 in. to 1 1/2 in. inclusive, 80, 10 and 10 per cent off list.
Small sizes S. A. E., 80, 10 and 10 per cent off list.
1/2 in. to 1 in. inclusive, U. S. S. and S. A. E., 70, 10 and 10 per cent off list.
Above bolts in packages, 80, 10 and 5 per cent off list.
Above bolts in bulk, 80, 10 and 7 1/2 per cent off list.
Tire bolts, 65, 10 and 10 per cent off list.
Track bolts, carloads, 30 to 32.5c. base.
Track bolts, less than carloads, 40 to 42.5c.

Upset Square and Hex. Head Cap Screws

1/2 in. and under, 80 and 10 per cent off list.
5/16 in. to 1 in., 80 and 10 per cent off list.
Upset Set Screws: 1/2 in. and under, 80, 10 and 5 to 35 per cent off list.
5/16 in. to 1 in., 80, 10 and 5 to 35 per cent off list.

Milled Square and Hex. Cap Screws

All sizes, 75 and 10 per cent off list.
Milled Set Screws: All sizes, 70 and 10 per cent off list.

Rivets

Large structural and ship rivets, 62.25.
Large boiler rivets, 2.35.
Small rivets, 70, 10 and 10 to 70, 10 and 5 per cent off list.

Wire Rods

No. 5 common basic or Bessemer rods to domestic consumers, \$36 to \$38; chain rods, \$36 to \$38; screw stock rods, \$41 to \$43; rivet and bolt rods and other rods of that character, \$36 to \$38; high carbon rods, \$42 to \$50, depending on carbons.

Railroad Spikes and Track Bolts

Railroad spikes, 5/16-in. and larger, \$2.15 to \$2.30 base per 100 lb. in lots of 200 kegs of 200 lb. each or more; spikes, 1/2-in., 3/4-in. and 7/16-in., \$2.25 to \$2.30 base; 5/16-in., 65.25 to \$2.30 base. Boat and barge spikes, \$2.25 to \$2.30 base per 100 lb. in carload lots of 200 kegs or more, f.o.b. Pittsburgh. Track bolts, 2c. to 2.25c. base per 100 lb. Tie plates, \$2 per 100 lb. Angle bars, \$2.40 per 100 lb.

Terne Plates

Prices of terne plates are as follows: 8-lb. coating, 200 lb., \$9.30 per package; 8-lb. coating, 1 c., \$9.50; 15-lb. coating, 1 c., \$11.80; 20-lb. coating, 1 c., \$12; 25-lb. coating, 1 c., \$14.25; 30-lb. coating, 1 c., \$16.25; 35-lb. coating, 1 c., \$18.25; 40-lb. coating, 1 c., \$21.25 per package, all f.o.b. Pittsburgh, freight added to point of delivery.

Iron and Steel Bars

Steel bars, 1.50c. to 1.60c. from mill. Refined bar iron, 2c. to 2.10c.

Welded Pipe

The following discounts are to jobbers for carload lots on the Pittsburgh basing card:

Butt Weld			Iron		
Inches	Steel		Inches	Black	Galv.
1/2 to 1	54 1/2	28	1/2 to 1	3 1/2	+22 1/2
1 to 2	60	33 1/2	1 to 2	3 1/2	18 1/2
2 to 3	65	50 1/2	2 to 3	4 1/2	27 1/2
3 to 4	68	55 1/2	3 to 4	4 1/2	29 1/2
4 to 6	71	58 1/2	4 to 6	4 1/2	29 1/2

Lap Weld			Lap Weld		
Inches	Steel		Inches	Black	Galv.
1/2 to 1	64	51 1/2	1/2 to 1	39 1/2	25 1/2
1 to 2	68	55 1/2	1 to 2	42 1/2	29 1/2
2 to 3	65	51 1/2	2 to 3	40 1/2	27 1/2
3 to 12	64	50 1/2	3 to 12	40 1/2	27 1/2

Butt Weld, extra strong, plain ends			Butt Weld, extra strong, plain ends		
Inches	Steel		Inches	Black	Galv.
1/2 to 1	50 1/2	38	1/2 to 1	4 1/2	+37 1/2
1 to 2	56	43 1/2	1 to 2	35 1/2	25 1/2
2 to 3	62	50 1/2	2 to 3	42 1/2	29 1/2
3 to 4	67	55 1/2	3 to 4	44 1/2	30 1/2
4 to 6	69	57 1/2	4 to 6	44 1/2	30 1/2
6 to 8	70	58 1/2	6 to 8	44 1/2	30 1/2

Lap Weld, extra strong, plain ends			Lap Weld, extra strong, plain ends		
Inches	Steel		Inches	Black	Galv.
1/2 to 1	62	50 1/2	1/2 to 1	40 1/2	27 1/2
1 to 2	66	54 1/2	1 to 2	42 1/2	29 1/2
2 to 3	68	56 1/2	2 to 3	42 1/2	29 1/2
3 to 4	61	47 1/2	3 to 4	35 1/2	25 1/2
4 to 12	58	44 1/2	4 to 12	30 1/2	18 1/2

To the large tubing trade the above discounts are increased by one point, with supplementary discounts of 5 and 2 1/2 per cent.

Boiler Tubes

The following are the discounts for carload lots f.o.b. Pittsburgh:

Lap Welded Steel			Seamless Steel		
Inches	Steel		Inches	Black	Galv.
1 1/2 in.	36 1/2	1 1/2 in.	1 1/2 in.	15	15
2 to 2 1/2 in.	41	2 to 2 1/2 in.	2 to 2 1/2 in.	25	25
2 1/2 to 3 in.	43	2 1/2 to 3 in.	2 1/2 to 3 in.	30	30
3 to 12 in.	47	3 to 12 in.	3 to 12 in.	32	32

Standard Commercial Seamless Boiler Tubes

New discounts have been adopted on standard commercial seamless boiler tubes, but manufacturers have not yet ready to announce them for publication, and for that reason we publish no discount this week.

Sheets

Prices for mill shipments on sheets of standard gauge in carloads, f.o.b. Pittsburgh, follow:

Cold Rolled			Hot Rolled		
No.	Thickness	Price	No.	Thickness	Price
No. 8 and heavier	1/8 in.	2.50	No. 11 and 12	1/8 in.	2.25
No. 9 and 10 (base)	1/8 in.	2.25	No. 13 and 14	1/8 in.	2.25
			No. 15 and 16	1/8 in.	2.25

See Annealed, Cold Rolled Steel

Cold Rolled			Hot Rolled		
No.	Thickness	Price	No.	Thickness	Price
No. 17 to 21	1/8 in.	2.25	No. 22 (base)	1/8 in.	2.25
No. 22 to 24	1/8 in.	2.25	No. 25	1/8 in.	2.25
No. 25 and 26	1/8 in.	2.25	No. 27	1/8 in.	2.25
No. 27	1/8 in.	2.25			

Galvanized

Cold Rolled			Hot Rolled		
No.	Thickness	Price	No.	Thickness	Price
No. 10 and 11	1/8 in.	2.00	No. 12 and 13	1/8 in.	2.25
No. 12 to 14	1/8 in.	2.25	No. 15 and 16	1/8 in.	2.25
No. 15 and 16	1/8 in.	2.25	No. 17 to 21	1/8 in.	2.25
No. 17 to 21	1/8 in.	2.25	No. 22 to 24	1/8 in.	2.25
No. 22 to 24	1/8 in.	2.25	No. 25	1/8 in.	2.25
No. 25 and 26	1/8 in.	2.25			

Galvanized

Cold Rolled			Hot Rolled		
No.	Thickness	Price	No.	Thickness	Price
No. 10 and 11	1/8 in.	2.00	No. 12 and 13	1/8 in.	2.25
No. 12 to 14	1/8 in.	2.25	No. 15 and 16	1/8 in.	2.25
No. 15 and 16	1/8 in.	2.25	No. 17 to 21	1/8 in.	2.25
No. 17 to 21	1/8 in.	2.25	No. 22 to 24	1/8 in.	2.25
No. 22 to 24	1/8 in.	2.25	No. 25	1/8 in.	2.25
No. 25 and 26	1/8 in.	2.25			

NON-FERROUS METALS

The Week's Prices

Cents Per Pound for Early Delivery

	Copper, New York	Electrolytic	Straits Tin	Lead	Zinc
	Lake	Refined	New York	New York	New York
Jan. 18	13.87%	13.82%	32.84%	4.70	5.07%
19	13.87%	13.82%	32.84%	4.70	5.07%
20	13.87%	13.82%	32.84%	4.70	5.07%
21	13.87%	13.82%	32.84%	4.70	5.07%
22	13.87%	13.82%	32.84%	4.70	5.07%
23	13.87%	13.82%	32.84%	4.70	5.07%
24	13.87%	13.82%	32.84%	4.70	5.07%

*Refinery quotation

New York

NEW YORK, Jan. 24.

There is no improvement in demand for most of the metals. Buying of copper is extremely light and quotations are lower. The tin market has been fairly active but prices dropped suddenly yesterday. Lead is the only market which maintains its strength. Demand for zinc could hardly be less and as a consequence prices have fallen off.

Copper.—Large consumers of copper remain out of the market, due largely to the heavy purchases which they made in the last quarter of last year. As a result the light demand is easily taken care of by large and small dealers and some small producers who are ready to meet bids under the market. As a result electrolytic copper is available from such sources at 13.50c., refinery, or 13.75c., delivered, for the first quarter, and at 13.87½c. or 14c., delivered, for second quarter, some light sales having been made at these prices for these positions. The market is entirely without feature. Lake copper is slightly lower at 13.75c., New York or delivered.

Tin.—The activity last Tuesday, Jan. 17, referred to in this market, details of which are now available, amounted to sales of 400 to 500 tons of Straits tin and was the most active day in the past week, dealers buying in good volume. On that day January metal sold at 32.12½c. This activity on the part of dealers continued until Jan. 21, the total sales, including those referred to, amounting to 800 to 900 tons. The feature of the present market is the premium on spot and January delivery, amounting in some cases to ½c. per lb. over futures. This is due either to a scarcity of metal or to the fact that prompt supplies are in strong hands. Yesterday the London market broke \$4 per ton, but this had no effect in causing buyers to be interested, the market being stagnant. To-day the London market was only slightly below that of Monday, with spot standard selling at \$158 10s., future standard at \$160 and spot Straits at \$160 10s., all about \$5 per ton below prices a week ago. Quotations for spot Straits tin here to-day were 31.25c., New York. A feature of the London market yesterday and Monday was the large volume of business, sales amounting those two days to 2390 tons, mostly futures. It is interesting to note that there are offerings now of Chinese tin here at low prices, Chinese sellers being eager to make transactions on the approach of the Chinese new year. Arrivals thus far this month have been 3535 tons, with 4935 tons reported afloat.

Lead.—There is no change in either demand or prices, both being steady with that of the leading interest at 4.70c., New York and St. Louis, and that of the independents at 4.40c., St. Louis, and 4.70c. to 4.75c., New York and Eastern points. Demand is reported good from battery and pigment interests and there is a good inquiry for future shipment.

Zinc.—The market is reported as quiet as at any time last summer, sales being few and far between and confined in most cases to carload lots to meet cash needs of consumers. As a result prime Western for early delivery has declined to 4.45c., St. Louis, or 4c., New York, or a fall of ½c. per lb. from the past week. There are still those who feel that future conditions may result in some export-shipment to England as the result of a possible scarcity there.

Antimony.—The market is quiet and wholesale lots for early delivery are quoted at 4.45c. per lb., New York, duty paid.

Aluminum.—Wholesale lots of virgin metal, 98 to 99 per cent pure, are quoted by the leading interest at 19c. to 19.10c. per lb. f.o.b. plant, depending on the quantity, while the same grade is offered by shippers at 17.50c. to 18.50c., New York, duty paid.

Old Metals.—The market is very quiet. Holders are generally unwilling to sell at concessions, and consumers waiting to see what the new metal market will do. Dealers' selling prices are as follows:

	Cents Per Lb.
Copper heavy and crucible	13.25
Copper, heavy and wire	12.50
Copper, light and bottoms	10.00
Heavy machine composition	10.75
Brass, heavy	8.00
Brass, light	6.00
No 1 red brass or composition turnings	5.25
No 1 yellow red brass turnings	6.25
Lead, heavy	4.25
Lead, tea	3.25
Zinc	3.00

Chicago

JAN. 24.—While there has been no particular pressure to sell, such sales as have been made have been at concessions. In the virgin metals declines are recorded in copper, tin and spelter and most grades of old metals are lower. We quote in carload lots: Lake copper, 13.75c.; tin, 32.50c.; lead, 4.50c.; spelter, 4.75c.; antimony, 6.50c., in less than carload lots. On old metals we quote: Copper wire, crucible shapes and copper clips, 10c.; copper bottoms, 7.50c.; red brass, 7.50c.; yellow brass, 5.75c.; lead pipe, 3.25; zinc, 2c.; pewter, No. 1, 22c.; tin foil, 23c.; block tin, 25c.; all buying prices for less than carload lots.

St. Louis

JAN. 24.—The market for lead and zinc is unchanged. We quote lead at 4.40c., carlots, and slab zinc at 4.80c. On old metals prices are: Light brass, 3.50c.; heavy red brass and light copper, 7c.; heavy yellow brass, 4c.; heavy copper and copper wire, 7.50c.; zinc, 2c.; pewter, 15c.; tin foil, 16c.; tea lead, 2c.; aluminum, 9c.

Warning as to Strike

WASHINGTON, Jan. 24.—Warning sounded last week by Secretary Hoover that a coal strike of bituminous miners now seems likely, was made as a suggestion to industrial and other consumers so that they may be given opportunity to lay in a stock of supplies for use during the strike, if it occurs. Wage agreements with operators expire on April 1, and producers have announced that a reduction in wages is necessary. Vigorous opposition is being made by operators. Anthracite miners at the same time are asking for a 20 per cent increase in wages. It remains to be seen whether consumers of soft coal will stock up. One discouraging feature is the high freight rates and it is not expected that even if they are reduced as a result of the rate hearing now under way by the commission, the lower levels will become effective before April 1.

Mechanical Engineers' Activities

Germans may now apply for membership in the American Society of Mechanical Engineers. The council of the society at a meeting at Norfolk, Va., voted that hereafter there will be no discrimination among applicants because of citizenship, now that friendly relations have been resumed between the United States and nations with which it was recently at war.

A resolution was passed advising that the American Engineering Council make an investigation of a basis for wages in industry.

A committee has been appointed on research on riveted joints as follows: Allen D. Risteen, Sherwood P. Jeter, Alphonse A. Adler, Norman Slee and John F. Fairfield.

ROCHESTER SELECTED

American Foundrymen's Association Will Meet in That City, June 5

CHICAGO, Jan. 24.—C. E. Hoyt, secretary, announces that final arrangements have been made for holding the annual convention and exhibit of the American Foundrymen's Association and allied societies in Rochester, N. Y., the week of June 5, instead of in Cleveland as previously scheduled. This decision was reached following conferences on Jan. 18 and 19 with Mayor Kohler of Cleveland, at which time it was learned that due to the incomplete condition of the new public hall, uncertainty as to when it would be open to the public, and the manner in which it would be operated, it would be impossible for the city to give a lease for any specific date in 1922, and further, that because of these conditions the present administration could not honor the agreements which the previous administration had entered into with the foundrymen's association.

All the activities of the association will be centered at Exposition Park, Rochester's million dollar show place, located only a mile and a half from the center of the city. Comfortable and commodious assembly rooms for general and auxiliary meetings are available, while buildings Nos. 3, 4 and 5, all directly connected, afford better accommodations for all classes of exhibits than have been found in any other city where exhibits have been held. Rochester would have been first choice for two previous fall conventions had it been able to offer a greater number of hotel rooms.

For a June convention it has been possible for the Rochester citizens to increase their guarantees, and the committee feels certain that all members and guests can be comfortably taken care of. A plan is being worked out for handling all reservations through a hotel committee, to which each hotel has pledged a large quota of rooms. Reservation and application blanks with complete information will be issued as soon as the hotel committee is organized.

Results of Tariff Referendum

The Chamber of Commerce of the United States has announced the result of its referendum on the tariff. On the question of "reasonable protection for American industries," the affirmative vote was 1840 and the negative 27. On the creation of a tariff adjustment board to administer adjustable rates, the affirmative vote was 1379 and the negative 481. On maintaining the anti-dumping legislation, 1840 voted yes and 37 no. The chamber committee had recommended that the present system of valuation for levy of ad valorem duties should be maintained and stated that votes in opposition to this recommendation would be interpreted as in favor of American valuation. The vote was 979 yes and 838 no, but the vote in favor of the present system of valuation did not have a large enough majority to commit the chamber. On the question of postponing general tariff legislation until conditions in international trade and finance are sufficiently stabilized to form a basis for legislation possessing permanent value, 784 voted yes and 1110 no.

The committee on railroads of the Chamber of Commerce of the United States in its report to the board of directors, which is to be considered at the meeting of the National Council in Washington Feb. 8 and 9 recommends legislation authorizing the President to appoint and prescribe the compensation of a special administrative officer with the title Commissioner General of Transportation, whose duties it will be to promote and develop transportation facilities of the country in the light of the people's interest. It is not intended that the new officer is to take the place of the Interstate Commerce Commission, but he may conduct separate investigations to determine the facts as to pending matters.

FOREIGN RAILROADS BUY

Rails for Manchuria — Tin Plate, Wire Rods, Nails and Sheets for Japan

New York, Jan. 24.—Export inquiries during the past week have been largely dominated by foreign railroad buying. From the Far East, China continues to inquire for small lots of various kinds of material. A Japanese company is in the market for about 20,000 base boxes of oil size tin plate and there are a number of sheet inquiries active. M. W. Kellogg & Co., New York, who received the contract for fabricating the five pipe lines of 50-in. to 54-in. pipe for Formosa, has practically closed for the plate tonnage involved, about 2400 tons, all to be delivered in Formosa before Jan. 1, 1923.

The National Railways of Mexico are negotiating for the purchase of about \$800,000 worth of machine tools and the South Manchuria Railway Co. has issued an inquiry, closing the end of this month, for about 40 miles of 100-lb. rails, between 6000 and 7000 tons, with accessories. Bids are being obtained through exporters to the Far East, particularly Japanese export houses, but the South Manchuria Railway Co.'s office in New York may be made a buying office in the near future. Bids for furnishing this rail tonnage are also being received from British and Continental mills. German agents in this country were desirous of submitting bids, but the stipulation that delivery must be made in June, c.i.f. Dairen, Manchuria, prevented this competition. British sellers are reported to have quoted about £2 5s. under the American market price.

Among the active iron and steel items in Japanese inquiries are wire, wire rods, and wire nails. A fairly large tonnage of wire rods has been inquired for and several exporters have quoted on a total of several thousand kegs of nails. There is fairly steady buying of copper.

Brier Hill Steel Co.'s Heavy Loss

YOUNGSTOWN, OHIO, Jan. 24.—At the annual meeting of the Brier Hill Steel Co. to-day, stockholders were informed that the company sustained a total loss in 1921 of \$3,874,475, reducing its surplus as of the end of the year to \$17,652,082. James B. Kennedy, chairman of the board of directors, announced that the Brier Hill company has been engaging in merger discussions with six other independent interests and thought such a combination would prove a stabilizing influence. No report from the merger committees on valuation and plan of amalgamation has yet been made, it was stated. The past year was one of extremely adverse conditions, he said, but all economic indications point to nearby improvement. The company has little forward business on its books. The volume of business the past year was declared to be 38 per cent of capacity. The Brier Hill company has purchased an iron ore mine of 8,728,000 tons on the Mesabi range. Gross sales in 1921 of \$12,525,837 compare with \$44,222,219 in 1920. Payroll of \$4,695,000 was over 35 per cent of sales receipts last year. Production in 1921 was 203,545 tons and shipments 226,787 tons.

The company's repair account for the year totalled \$1,172,000. Among items that contributed to surplus reduction were a loss of \$1,172,574 encountered in conduct of business; writing down inventory \$758,867; depreciation \$761,989; shutdowns \$773,128. Dividend payments during year aggregated \$648,986. An estimated saving of about \$500,000 was made by operating properties rather than suspending, said the chairman, and in addition plants are in improved condition. The company has maintained quoted prices even to the extent of losing business, and any price cutting was to meet competition, it was declared. Directors and officers were re-elected.

Memberships in the American Electrochemical Society on Jan. 1 totaled 2354. In 1921 there were 140 new members brought in and 150 old members dropped, resigned or died. The membership on Jan. 1, 1921, was 2364 making a net loss of 10 for the year.

PERSONAL

B. G. Roos, chief engineer in charge of passenger car design for the Pierce-Arrow Motor Car Co., Buffalo, has resigned to become connected with the Locomobile Co. of America, Bridgeport, Conn., in a like capacity. He will succeed A. L. Riker, who has been chief engineer for many years and who becomes a member of the board of directors.

At the annual meeting of the Victor Tool Co., Waynesboro, Pa., Jan. 12, H. C. Geist was re-elected president; Frank Barnett, vice-president; and R. G. Mumma, secretary. John Warehime has been succeeded as treasurer by J. G. Mumma, connected with the Landis Machine Co., but will remain on the board of directors. J. G. Mumma, S. F. Newman and Crawford Kirkpatrick are new members of the board of directors, all being connected with the Landis Machine Co.

George C. Mills, for the past 17 years affiliated with Naylor & Co., New York, most of that time as Pittsburgh district sales manager, has become associated with the recently organized firm of Lippincott Mills & Co., Inc., New York and Cleveland, as Pittsburgh resident manager, with offices at 976 Union Arcade, Pittsburgh.

Kenneth Scaver, who has been identified with the Harbison-Walker Refractories Co., Pittsburgh, for the past 19 years, latterly in the capacity of assistant general manager of sales, has been promoted to the position of general manager of sales, succeeding Judd J. Brooks, Jr., who has been appointed to the position of assistant to the president. Mr. Scaver graduated with the degree of civil engineer from the Massachusetts Institute of Technology and before joining the Harbison-Walker company, was with the Pennsylvania and Baltimore & Ohio railroads and also for a short time with the American Bridge Co.

G. E. Wilson, formerly of Toledo, has been appointed general manager of the Milan Machine & Tool Co., Milan, Mich.

H. M. Lee has been elected president and general manager of the Duplex Truck Co., Lansing, Mich.

Earl L. Smitherman, well known in Detroit as a foundry manager and plant superintendent for several large companies, has become associated with the Great Lakes Distributing Co., Detroit, and will have charge of sand and fire brick sales.

Franklin G. Smith, president Osborn Mfg. Co., Cleveland, sailed from New York Jan. 18, on a two or three months business trip abroad. He will visit England, France, Germany and Belgium.

A. M. D. Martin has resigned from the position of assistant general manager of the Adria Motor Car Corporation, Batavia, N. Y.

John E. Schindler of the Garden City Foundry Co., Chicago, has been elected president of the Chicago Foundrymen's Club for 1922. George E. Carlin of the United Boiler & Foundry Co., Hammond, Ind., was elected vice-president, and George H. Manlove, Penton Publishing Co., was re-elected secretary-treasurer. Retiring directors were re-elected for two years.

O. A. Brock, advertising manager of the Keystone Steel & Wire Co., Peoria, Ill., has been elected president of the Peoria-Chillicothe Electric Railway Co.

J. R. Stroh, manager of the mining and transportation departments of the Brier Hill Steel Co., Youngstown, Ohio, resumed his duties last week after a month's illness.

G. B. LeVan has severed his connection as vice-president and general manager of the La Belle Iron Works and plans to spend several months with his family in Florida.

L. E. Salom has been appointed district representative in New York for the Cleveland electric tramrail

division of the Cleveland Crane & Engineering Co., with headquarters at 59 Church Street, New York.

W. D. Blatz has been appointed general sales manager of the Bridgeport Brass Co. He joined the marketing organization of the Bridgeport Brass Co. in 1915.

T. J. Dillon was recently elected president and general manager of the Abendroth Brothers, Port Chester, N. Y., representing new interests which have taken over that plant. This concern was established in 1840 and makes soil pipe and fittings, gas ranges and heaters.

Alexander Glass, chairman Wheeling Steel Corporation, accompanied by Mrs. Glass, is at Winter Park, Fla., for a brief vacation.

Frank A. Weidman, for the past twelve years affiliated with the American Sheet & Tin Plate Co., in the special agent's department at Pittsburgh, has joined the Inland Steel Co., Chicago, as special representative.

S. H. Farkas has resigned as vice-president and director of the Exeter Machine Works, Inc., West Pittston, Pa.

C. B. Wilson, for several years engaged as pig iron salesman for Rogers, Brown & Co., New York, has accepted a similar position with Reed, Fears & Miller, New York.

OBITUARY

JOSEPH T. SLINGSBY, president Aborn Steel Co., 22 Clarke Street, New York, died by accident, Jan. 22. Mr. Slingsby was a resident of Rutherford, N. J. He was born in 1881 at Riverside, a suburb of Providence, R. I. He became connected with the Midvale Steel & Ordnance Co., in New York and in 1915 resigned to organize his own company, the Aborn Steel Co., representing the Century Steel Co. and the Ontario Electric Steel Co., both of Poughkeepsie, N. Y. He was New York representative of the Standard Gage Steel Co., Beaver Falls, Pa., and the United Alloy Steel Corporation, Canton, Ohio. Mr. Slingsby was a Mason and from 1920 to 1921 was president of the National League of Masonic Clubs.

THOMAS CLARK DILL, whose sudden death at 56 years of age on Jan. 6 was noted last week, will be succeeded as president of the T. C. Dill Machine Co., Inc., Philadelphia, by his widow, Mrs. Matilda J. Dill. A daughter, Mrs. Matilda Dill Moore, has been the company's secretary for several years. Mr. Dill was best known through the slotter which bears his name, but prior to patenting the slotter, he had manufactured and marketed a connecting rod patent. The business was established in 1888.

CHRISTOPHER MINER SPENCER, Hartford, Conn., inventor of the Spencer repeating rifle and the first automatic screw machine, died at the home of his son, Roger M. Spencer, Hartford, Jan. 14, after a very brief illness. Mr. Spencer had been sick only a few days, suffering from a general breakdown due to a cold. He was 88 years old, and was active in his work right up until his illness. Mr. Spencer was one of America's best-known inventors. Burial was in Windsor, Conn.

ARCHIBALD A. HUTCHINSON, who died on Jan. 19 at his home in Englewood, N. J., in his eightieth year, was one of the pioneer operators in the coke districts of western Pennsylvania. He owned the Standard and the Globe coal mines, and at the time of disposing of his interests to H. C. Frick in 1883 had 220 bushels ovens. He leaves his wife, a son and a daughter.

JOHN GOERGEN, founder of the Goergen-Machwirth Co., sheet metal contractor, Buffalo, N. Y., died Friday, Jan. 20. He was born in Germany and went to Buffalo 31 years ago.

HARRY ASA GRAMMES senior member L. F. Grammes & Sons, Allentown, Pa., died on Jan. 16.

Iron and Steel Markets
(Continued from page 303)

ising. With the irregularity in soft steel bars, hard steel reinforcing bars have settled down to a 1.40c. price and this possibly could be shaded. Hot-rolled strip steel in the wider sections and heavier gages that compete with steel bars are quoted as low as 1.85c. While the 3.50c. price on cold-rolled strip steel seems to be maintained, some mills are reported to be waiving extras on this material.

Jobbers quote steel bars 2.36c., plates and structural shapes, 2.46c.; No. 9 galvanized wire, 3.25c.; No. 9 annealed wire, 2.75c.; No. 28 black sheets, 3.75c.; No. 28 galvanized sheets, 4.75c.; No. 10 blue annealed sheets, 3.10c.; hoops and bands, 2.96c.; cold-rolled rounds, 3.25c.; flats, squares and hexagons 3.75c.

Bolts, Nuts and Rivets.—The improvement in the demand for bolts and nuts noted last week continues, but buying is mostly in small lots. However, a few fair sized orders have been placed by automobile manufacturers. Prices appear to be fairly firm, local makers showing no disposition to go below regular quotations. The demand for rivets has quieted down after a little spurt of buying, but makers are getting some small lot inquiries. The market is not firm, some makers shading from \$1 to \$2 a ton the regular price of 2.25c., Pittsburgh, for structural and 2.35c. for boiler rivets.

Coke.—The demand for foundry coke in small lots continues fairly active as some foundries are either stocking up or placing orders for February shipment. A possibility of a coal strike has caused many foundries to stock up on coke. Prices are unchanged at \$4 to \$4.25 for standard Connellsville foundry cokes.

Old Material.—A Cleveland mill during the past few days purchased 7500 tons of machine shop turnings for a blast furnace at \$8 per ton. Orders for this material went to Cleveland dealers, but it is understood that most of the scrap will come from Detroit. There was also some activity during the week for machine shop turnings for Youngstown shipment, sales to dealers being reported at around \$9.75, Youngstown. Outside of machine shop turnings, the market was quiet during the week, but prices are firm. Dealers report some scarcity of turnings, but expect that the supply of this material will become plentiful now that the Detroit automobile manufacturers have increased operations.

We quote per gross ton, f.o.b. Cleveland as follows

Heavy melting steel	\$12.00 to \$12.50
Steel rails, under 3 ft	12.50 to 13.00
Steel rails, rerolling	14.00 to 14.50
Iron rails	12.00 to 12.50
Iron car axles	18.00 to 19.00
Low phosphorus melting	13.00 to 13.50
Cast borings	8.80 to 9.00
Machine shop turnings	8.00 to 8.25
Mixed borings and short turnings	8.60 to 9.00
Compressed steel	9.00 to 9.50
Railroad wrought	12.00 to 12.50
Railroad malleable	12.50 to 13.00
Light bundled sheet stampings	6.00 to 7.00
Steel axle turnings	9.00 to 10.00
No. 1 cast	15.00 to 16.00
No. 1 bushing	8.25 to 8.75
Drop forge flashings, over 10 in.	7.50 to 8.00
Drop forge flashings, under 10 in.	7.50 to 8.00
Railroad grate bars	12.75 to 13.00
Stove plate	13.00 to 13.25
Pipes and flues	8.50 to 9.00

Blast Furnace Activities

PITTSBURGH, Jan. 24.—The Jones & Laughlin Steel Co. yesterday put on the blast at one of its Eliza furnaces and now has six of its 12 furnaces making iron, three being in blast at its Woodlawn, Pa., works. It is probable that one of the two idle furnaces at the latter works will be blown in this week, at first on pig iron but later on ferromanganese. The American Steel & Wire Co. has one of its stacks at Donora, Pa., down for relining, but is making iron in the other Donora furnace and also in its two stacks at the Schoenberger works Pittsburgh. Of the 140 merchant and steel works furnaces in the territory bounded by Johnstown, Pa., Portsmouth, Ohio, and Warren, Ohio, 52 now are making iron. This is the same number as a month ago, the starting up of one of the Jones & Laughlin Steel Co. furnaces and one of the Trumbull-Clegg furnaces at Warren, Ohio, being offset by the blowing out of one Donora furnace and the banking of one Pittsburgh Steel Co. stack.

British Iron and Steel Market

England Selling Pig Iron to Continent — More
Furnaces Blowing—Steel Position
Gradually Improving
(By Cable)

LONDON, ENGLAND, Jan. 24.

Realizing that further early price concessions are improbable, pig iron consumers are placing orders. Sales have been made to both Scandinavia and Germany. Two more Cleveland furnaces have been put in blast. Hematite demand is moderate, with prices weakening; one additional furnace is operating.

Foreign ore is quiet. Bilbao Rubio is quoted at 26½s. (\$5.59) c.i.f. Tees. Durham coke is priced at 26½s. (\$5.59) delivered.

After twelve months of inactivity, the Lanarkshire Steel Co. is re-opening. Steel demand generally is improved, but orders are still inadequate fully to employ the plants.

Ship repairers are well occupied. Scottish makers of bar iron have reduced export extras 50 per cent.

Sambre Moselle has secured orders from the Argentine for 45,000 tons of rails.

Belgian merchant bars are quoted at £8 (1.51c. per lb.) f.o.b., for April and May delivery. German merchant bars are held at £7 17½s. to £8 (1.49 to 1.51c. per lb.) f.o.b., for April and May shipments. Luxembourg merchant bars are quoted at £7 10s. to £7 17½s. (1.41 to 1.49c. per lb.) f.o.b., for March, April and May delivery. French merchant bars are held at £8 to £8 15s. (1.51 to 1.65c. per lb.) f.o.b., for April and May shipments.

Belgian wire rods are quoted at £8 15s. (\$36.92) f.o.b., for April and May delivery. Belgian angles are quoted at £7 12½s. (1.44c. per lb.) f.o.b., for March and April shipment.

Tin plate is easier under the stimulus of cheaper steel. February and March positions are being sold at 19s. (\$4.01) basis, f.o.b., but the works generally are holding out for 19½s. (\$4.06) basis, f.o.b. Oil plate consumers are reported covered to the end of April. The home trade is taking small quantities of odd sizes.

Galvanized sheets are weak. Business is done below £16 (3.01c. per lb.) f.o.b. Some makers are asking up to £16 5s. (3.06c.) per lb.

Welsh works have sold black sheets, to Japanese specifications, at £16 10s. (3.11c. per lb.) f.o.b. France is buying fair quantities of C A sheets, down to £12 10s. (2.35c. per lb.) f.o.b., being accepted.

We quote per gross ton, except where otherwise stated, f.o.b. maker's works, with American equivalent figured at \$4.22 per \$1 as follows:

Durham coke, delivered	£1 5s. to £1 7s.	\$5.22 to \$5.70
Cleveland No. 1 foundry	4 15	\$0.95
Cleveland No. 3 foundry	4 10	\$0.89
Cleveland No. 4 foundry	4 7½	\$0.86
Cleveland No. 4 forge	4 10	\$0.89
Hematite	7 0*	\$2.54*
East Coast mixed	4 15	\$0.85 to \$0.87
Ferromanganese	15 0	\$1.19*
Rails, 60 lb and up	8 0	\$3.38 to \$3.99
Billets	7 0	\$2.94 to \$3.65
Sheet and tin plate bars, Welsh	7 5	\$3.60 to \$4.12
Tin plate, base box	0 19	\$0.10 to \$0.17
C. per lb.		
Ship plates	9 0	\$1.76 to 1.99
Boiler plates	13 10	\$2.85 to 3.04
Bars	9 10	\$1.73 to 2.07
Channels	8 15	\$1.65 to 1.92
Beams	8 5	\$1.57 to 1.85
Round bars, 2½ to 3 in.	10 20	\$2.12 to 2.31
Galvanized sheets, 24 g.	16 0	\$3.35 to 3.64
Black sheets	15 0	\$3.26 to 3.55
Steel hoops	13 0	\$2.54 to 2.81*
Cold rolled steel strip, 20 g.	24 0	\$4.57

*Export price.

IRON AND INDUSTRIAL STOCKS

Erratic Price Movements of Steel Shares Attract Attention

The erratic price movements of some of the steel shares have attracted attention. Nothing has developed in the market for steel mill products or is likely to develop within the near future to warrant such advancing prices and subsequent declines in values as have been noted of late. But investing sentiment, like going business moves up and down in turn. Fundamental industrial and money conditions continue to mend, although slowly. In the mean time shortages in many lines of commodities are more and more apparent, although they do not show on the surface because of the quietness of general business. That condition is becoming apparent in the raw wool market and even with our large visible supplies the price of wheat responds quickly when buying appears. There are some evidences of shortages in sugar also. It is only fair to assume shortages in steel products, leather products and in a great many other lines exist.

The range of prices on active iron and industrial stocks from Monday of last week to Monday of this week was as follows:

Allis-Chal com	39 1/2 - 45	Lack Steel	46 1/2 - 50
Allis-Chal pf	90 - 92	Midvale Steel	30 1/2 - 32 1/2
Am Can com	33 1/2 - 34 1/2	Nat Acme	11 1/2 - 13 1/2
Am Can pf	96 - 97 1/2	Nat B & S com	31 1/2 - 37 1/2
Am C & F com	146 - 148	Nat B & S pf	82 1/2 - 89
Am C & F pf	118 - 118 1/2	N Y Air Brake	60 1/2 - 61 1/2
Am Loco com	105 - 108 1/2	Nova Scotia Steel	24 1/2 - 28 1/2
Am Loco pf	115	Press Steel com	64 - 66
Am Rad com	32 - 33	Press Steel pf	92 1/2 - 93
Am Stl F com	32 1/2 - 33 1/2	Ry Stl S com	96 1/2 - 100 1/2
Am Stl F pf	96 1/2 - 98 1/2	Replieg Steel	27 1/2 - 41
Bald Loco com	95 1/2 - 98 1/2	Republic com	52 1/2 - 56 1/2
Bald Loco pf	106	Republic pf	86 - 87 1/2
Beth Steel com	54 - 56 1/2	Sloss com	37 1/2 - 44
Beth Stl Cl B	57 1/2 - 61 1/2	Sloss pf	74 - 75
Beth Stl 8% pf	108 1/2 - 109	Superior Steel	26 1/2 - 31 1/2
Chic Pneu Tool	61 - 63	Uni Alloy Steel	26 1/2 - 30
Col Fuel	24 1/2 - 29 1/2	U S Pipe com	16 1/2 - 20
Cruc Steel com	57 1/2 - 65	U S Pipe pf	51 - 59
Cruc Steel pf	80 - 84	U S Steel com	84 1/2 - 88
Gen Electric	140 - 144 1/2	U S Steel pf	116 1/2 - 118
Gt N Ore Cert	31 1/2 - 32 1/2	Vanadium Steel	31 1/2 - 37 1/2
Inf Steel	52 1/2 - 60 1/2	Va I C & C	87 1/2 - 94 1/2
Int Har com	82 1/2 - 85 1/2	Westinghouse Elec	50 1/2 - 51 1/2
Int Har pf	108 - 110 1/2		

Industrial Finance

The annual report of the National Enameling & Stamping Co. which will be published about the middle of February will show a deficit for the year ending Dec 31 after dividends of close to \$3,000,000. Earnings in 1920 after fixed charges were \$3,361,352, equal to \$17.07 a share on the \$15,591,800 common stock. Inventories at the close of 1920 were \$3,867,700. Part of the deficit to be shown this year will be the write-off for inventory depreciation. Dividends on the common stock have been passed by the St. Louis Coke & Chemical Co., which is largely owned by the National Enameling & Stamping Co.

The Louisville Sheet Steel Co., Louisville, Ohio, has been placed in the hands of Hubert C. Pontius as receiver as a result of bankruptcy proceedings brought by creditors in the Federal Court in Cleveland. It is stated that the liabilities are \$345,000 and the assets \$300,000.

George H. Williams has been appointed receiver of the Aetna Brass Mfg. Co., Cleveland, operating a brass foundry making automobile parts. The operation of the plant will be continued for the present.

The Deep Drawn Metal Corporation, 30 Church Street, New York, has filed notice of increase in capital from \$30,000 to \$100,000.

Creditors of the American Motors Corporation, Plainfield, N. J., have agreed to accept in full of \$1,000,000 for the personal property of the company tendered by the American Motors Reorganization Syndicate, represented by Comus B. Penney, Greenboro, N. C. An initial payment of \$1,000 has been made and the remainder will be made on Feb. 1, March 15 and April 15, with amounts of \$500,000, \$250,000 and \$250,000, respectively.

The Endicott Forging & Mfg. Co., Indio, N. Y., has filed notice of increase in capital from \$300,000 to \$500,000.

The Cribben & Sexton Co., 680 North Sacramento Boulevard, Chicago, manufacturer of stoves, ranges, etc., has filed notice of increase in capital from \$300,000 to \$1,300,000.

The Lodge Transfer Mfg. Co., Victor, N. Y., has filed notice of increase in capital.

The Wire Goods Co., Worcester, Mass., wire goods manufacturer, has increased the capital stock of the company from \$125,000 to \$1,000,000, same to be used mainly in taking over three large Western wire plants by the Wire Goods Co. The

three concerns are the Cassidy-Fairbanks Co., Chicago, Andrews Wire & Iron Works, Rockford, Ill., and the Andrews Wire Works Ltd., Walford, Ontario, Canada. Reginald Washburn, president of the company, returned last week from the West, and it is expected to close all details at a stockholders' meeting to be held this week. The Wire Goods Co. was incorporated in 1882.

The Virginia Iron Coal & Coke Co. has declared a dividend of 50 per cent on the common stock payable in 5 per cent cumulative preferred stock on Feb. 15 to stock of record Feb. 1. At the conclusion of this operation the company will have outstanding \$10,000,000 of common stock, par \$100 and \$5,000,000 of cumulative preferred stocks as well as \$1,521,000 of first mortgage 5 per cent bonds, due March 1, 1949.

Trade Changes

The American Brass & Aluminum Founders Co., Chicago, has filed notice of change of name to the American Castings Co.

An agreement has recently been reached between the East Jersey Pipe Co., New York, and the Ritter Conley Co., Pittsburgh, whereby Lock Bar steel pipe, which has been exclusively controlled by the East Jersey Pipe Co. since its introduction into this country in 1910 and has been hitherto manufactured by the East Jersey Pipe Co. at its plant at Paterson, N. J., will be hereafter fabricated in the Pittsburgh district by the Ritter Conley Co. at its Leetsdale plant. This will permit considerable saving in freight rates and economy in manufacturing. The sale of "Lock Bar" steel pipe will continue to be exclusively in the hands of the East Jersey Pipe Co.

C. H. Ketterling, president of the Delco Corporation and vice president of the General Motors Corporation, has been elected a director of the Davison (Ohio) Fan & Motor Co. The Davison company reports it is operating at full capacity and has sufficient orders booked to keep it running full time for six months.

W. H. Stackhouse, manager of the Springfield plant of the French & Hecht organization, has been appointed general manager of the entire organization with plants in Springfield, Ohio, and Davenport, Iowa. Mr. Stackhouse is one of the three principal partners in the company, which manufactures 75 per cent of the steel wheels used in the making of agricultural machinery in the United States and Canada. Mr. Stackhouse will in the future make his home in Davenport. H. J. Rober has been appointed as plant manager at Springfield.

C. D. Watson has retired as vice president and director of the Sheet Metal Mfg. Co., Youngstown, Ohio, having disposed of his interest in the company to T. J. Farrell, president. He plans to re-engage in the jobbing of sheets. The sheet metal company was organized three years ago and has a warehouse in Youngstown.

Financial and industrial interests of Youngstown, Ohio, have formed the Youngstown Equipment Co., which has taken over under lease the car shops of the Erie railroad at Kent, Ohio. Following a period of idleness, the plant has been started. It employs 700 men when operating normally. William Wilkoff, president of the Youngstown Steel Car Co., heads the equipment company.

Sydney Flayer, Joseph N. Bethel, Richard S. Staples, Herbert S. Indge and Alfred I. Box have left the Taft-Peirce Mfg. Co., Woonsocket, R. I., machinery designer and builder to become en bloc stockholders and executives in the reorganized Warren F. Fraser Co., Westboro, Mass. The Warren company, which was incorporated in 1914, manufactures cylindrical grinding machinery, plain cylinder grinders of all types, special machine tools and metal products. The reorganized company is placing on the market a new automatic cylindrical grinder. The officials of the reorganized Warren F. Fraser Co. are as follows: Warren F. Fraser, president, a member of the American Society of Mechanical Engineers and inventor of the new Fraser automatic cylindrical grinder; Joseph N. Bethel, vice president; Sidney Flayer, vice president and general manager for 10 years, factory manager of the Newall Engineering Co., London, previous to his becoming production manager of the Taft-Peirce plant a year ago; Joseph N. Bethel, vice president and sales manager for 23 years with the Taft-Peirce Mfg. Co. in various capacities; Maurice J. Cashman, treasurer; Richard S. Staples, assistant treasurer and metallurgist; Herbert S. Indge, consulting engineer; Alfred I. Box, factory superintendent.

The Universe Corporation, 341 East Ohio Street, Chicago, Ill., expects to build its own refrigerators and do its own machine work. It has already arranged for all the equipment it will require for a period of about six months. The company is also preparing to manufacture mechanical refrigerators and cooling devices for office use.

IDEAL INDUSTRIAL RELATIONS

Milwaukee Declaration of Principles Protecting Both Labor and Capital

MILWAUKEE, Wis., Jan. 20.—Thirty-one industrial groups, including the Metal Trades and Founders' Association, Automotive Manufacturers' Association, Iron and Steel Fabricators' Society, Sheet Metal Manufacturers and Contractors' Association, Chandelier Manufacturers' Association, Brass Founders and others, are now embraced by the Milwaukee Employers' Council, which was organized late in 1920 and began functioning at the beginning of 1921. The first annual meeting, held Jan. 17, resulted in the election of the following officers:

President, Herman A. Wagner, president Wisconsin Bridge & Iron Co.; vice-president, Richard P. Tell, president and general manager National Brake & Electric Co.; treasurer, Harold H. Seaman, president Seaman Body Corporation; secretary and manager, Joseph McC. Bell, 288 East Water Street, Milwaukee.

With virtually every major industry in its membership, and a number of minor lines of manufacturing and employment classes in Milwaukee, the council has assumed an important and definite leadership in industrial relations. Its aims and purposes are enunciated clearly in the following formal "Declaration of Principles" upon which it was founded and is carrying forward its work:

The principles and ideals of the Milwaukee Employers' Council are embodied in those of the founders of this nation, as expressed in the Declaration of Independence and the Constitution of the United States: viz., that all men, without regard to race, color, or previous condition, are entitled to an equal right and op-

portunity to enjoy life, liberty and the pursuit of happiness, and that this should be exercised by each individual in a spirit of fairness and recognition of the rights of every other individual.

The application of these ideals in industry establishes a system spoken of in industrial terms as "the open shop"—a system prevailing in shops, factories, stores and on contract work, etc., under which men and women are employed on a basis of ability and honesty, without regard to their affiliations, religious, political, union or otherwise, and under which no discrimination is practiced as to such affiliation.

The council expresses its disapproval of any industrial system which does not provide to every man and woman equal rights and opportunities, or which imposes unnatural limitations upon his or her efforts to attain success.

It holds that fairness, forbearance and good will are the pre-requisites of peace and harmonious co-operation in all the social and economic relations of men; that the interests of the employee and employer are reciprocal; that the success of industrial processes is the result of co-operation between employee and employer, and that their attitude must be that of friends and not of foes. To this end the council hereby reaffirms its policies and principles as set forth in its constitution and by-laws, which are as follows:

1. To promote, on a fair and equitable basis, industrial peace and prosperity in the community, and the steady employment of labor.
2. To provide proper safeguards for the health and safety of the employees.
3. To secure for employer and employee alike freedom of contract in the manner of employment.
4. To discourage strikes, lockouts, and unfair demands by either employer or employee.
5. To uphold the principle of the open shop.

Gain in Metal Working at Milwaukee

MILWAUKEE, Wis., Jan. 21.—"The gain in iron and steel, while confined to a few plants, is a cheerful indication," says *Business and Financial Comment*, issued by the commercial service department of the First Wisconsin National Bank of Milwaukee, speaking of a gain of 6.2 per cent in the number of persons employed in the iron, steel and machinery industrial group of the city during December, compared with November. A gain of 5.07 per cent in the automobile parts and accessories industry also is reported. In a general way, the number employed in Milwaukee county at the close of last month was 5.7 per cent greater than at the close of November, which showed a loss of 3.02 per cent from October. The review says further: "Production and sales of many lines of industry in Milwaukee indicated a lull in December which was characteristic of industrial activity all over the country. Firms making automobile accessories and parts for popular-priced cars have large orders on hand for late winter and spring delivery. The automobile truck industry is still quiet, but should receive stimulation from the prospective activity and construction this year."

Fewer Steel Workers at Higher Wages

Iron and steel plants, according to figures of the Bureau of Labor Statistics, show for December a loss of 232 employees from November in 120 establishments. This loss of 0.2 per cent is accompanied by a gain of 5 per cent in the amount of the payroll, and by an advance from \$42.46 to \$44.66, or 5.2 per cent, in the average pay envelope. Automobile building, on the other hand, has fallen off, both in number of employees and in total and average wage. There were 2742 fewer men (8 per cent), and the average pay was \$2.53 (4½ per cent) less per half-month. Men engaged in building and repairing railroad cars have increased 1822 in number (3.2 per cent), but the average wage has decreased 17c. for the half-month (0.8 per cent).

Although the steel worker is the only one of the

three groups receiving an increased average pay in December, the other two, averaging \$58.13 to his \$44.66, were getting 30 per cent more than he.

To the figures as furnished by the bureau have been added totals for the three metal-working branches covered by the bureau. These total figures show a loss of 1152 in number of employees, compared with November, but the average pay has increased 14c. (0.3 per cent). In the table, figures for December, 1920, are compared with those for the two last months of 1921.

Period	Number of Establishments	Number of Men	Half-Month Payroll	Average Half-Month Pay
Iron and Steel				
December, 1920.	121	177,016	\$13,755,557	\$77.70
December, 1921.	120	124,871	5,578,970	44.66
November, 1921.	120	125,103	5,812,453	45.46
Automobiles				
December, 1920.	52	94,475	5,745,809*	60.82
December, 1921.	51	37,323	5,009,052*	57.08
November, 1921.	51	30,575	5,394,942*	59.56
Car Building and Repairing				
December, 1920.	61	72,465	5,385,217	73.22
December, 1921.	61	56,354	3,437,622	59.77
November, 1921.	61	56,523	3,368,556	59.94
Metal Working Plants†				
December, 1920.	234	344,946	24,226,593	72.15
December, 1921.	232	271,058	14,073,845	51.58
November, 1921.	232	272,310	14,095,951	51.75

*Equivalent half-month payroll; 2 1/6 times the weekly figure quoted by the bureau.

†Sum of the three groups detailed above.

More Unemployment in Illinois

Employment in Illinois industries declined in December for the third consecutive month, according to statistics compiled by the general advisory board of the Illinois Department of Labor. Signed reports from 731 firms in all parts of the State show a reduction that runs throughout the range of industries and varies from 2.5 per cent in the metal machinery and conveyance group to 15.4 per cent in the stone, clay and glass products group. The reduction in the volume of em-

employment for industries amounts to 4 per cent. The December slump follows reductions of 0.9 per cent in November and 2.6 per cent in October. The drop in the number of employees in down-State cities was more pronounced than in Chicago. Reports from 836 Chicago firms show only 2.7 per cent fewer employees on Dec. 31 than on Nov. 30, as contrasted with the 4 per cent drop for the State at large.

Cost of Living Stationary

Monthly figures of the Bureau of Labor Statistics show the wholesale price of all commodities during December to be 49 per cent above the average for 1913, compared with 49 per cent in November and 50 per cent in October. There was a slight drop in farm products, in cloths and clothing, in food and in drugs and chemicals. Building materials are up 6 points, to 208, and fuels and miscellaneous items have advanced. Metals are stationary, at only 19 per cent above 1913; house furnishings are also stationary, but stand at 218, or more than double 1913.

Our table shows the figures for the two most recent months, for December, 1920, and the peak of 1920. It shows also the amount of liquidation, between the peak price and the present, of the excess of the peak price over the average of 1913. Metals have been liquidated 80 per cent, only one group (farm products) showing a higher degree of liquidation.

Index Numbers of Wholesale Prices, by Groups of Commodities

(1913 equals 100)

	1920— Peak	1920— Decem- ber	1921— No- vember	1921— Decem- ber	Liqui- dation, Per Cent
Farm products.....	246	165	114	113	90.1
Food, etc.....	237	195	142	139	79.1
Cloths and clothing....	356	234	186	185	66.8
Fuel and lighting.....	284	253	186	187	52.7
Metals and metal prod- ucts.....	195	170	119	119	80.0
Building materials.....	341	274	197	203	57.3
Chemicals and drugs....	222	207	162	161	50.0
House-furnishing goods..	371	369	218	218	56.5
Miscellaneous.....	247	220	145	148	67.3
All commodities.....	272	207	149	149	71.5

In the Field of Labor

The New London Ship & Engine Co., New London, Conn., has received a Government contract that will keep a large part of the plant operating on its present scale during 1922. It is planned to slightly increase the number of employees.

The plants of the General Electric Co., at Bridgeport, Conn., formerly the wartime plant of the Remington Arms Co., have been gradually increasing the working force during the past six or seven weeks until now more than 1500 hands are employed steadily.

In its move toward economy, the Western Maryland Railway, Baltimore, has leased its shops to the man who has been employed as the general foreman. A number of the positions which existed while the shops were operated by the railroad are to be abolished. The men who are retained by the contractor will be hired at a lower wage scale.

Crane Co., Chicago, and Bridgeport, Conn., has reduced the wages of shop forces 12½ per cent. This is the first reduction by Crane Co. from the wartime wages. Its plants are operating at 50 per cent of capacity.

Employees of the Belvidere Screw & Machine Co., Belvidere, Ill., unanimously adopted a resolution on Dec. 31, in support of a protective tariff and the American valuation plan. Copies of the resolution were sent to the United States senators from Illinois as well as to the district representative in Congress.

In the interests of the employees of the Central Region of the Pennsylvania Railroad System the *Pennsylvania News*, a four-page newspaper, has been started. It contains many photographs and feature stories.

HOW LABOR CAN HELP BUSINESS*

Economics of Labor Returns Pointed Out— —Greater Production Helps Everybody

When opening up the Miami mine in Arizona, some 14 years ago, we did the work with the small one-man air-drills. Previous to that time all operating in Arizona had been with the larger drill, requiring two men. The miners objected to this one-man drill, saying that we were throwing one man of every two out of work.

But every time I went underground I impressed upon my men the fact that the material being developed had in the past not been considered ore, because of its low grade; that to make it available it must be mined cheaply; that if two men were put on a drill the material was not pay ore, but that if each man operated his own drill, then the material was pay ore; and that, far from throwing one man of every two out of work, I was finding new places for two.

It did not take very long to sell this idea to them, and in a few months it would have been impossible to get the men back to the use of the old drills requiring two men. Most of the work was done on contract, and each man felt that he got paid for what he did, and was not responsible for a helper who might perhaps not co-operate with him, or in fact might even retard his work.

Among the responsibilities of labor is that of increasing production. Among the unenlightened, the idea that there is a fixed amount of work to be done in the country, and that the less a man does the longer the work lasts and the more men are employed, is of course an economic fallacy held by a great many men. There never was a greater fallacy than this, and the best minds in labor circles realize its fallaciousness. Still, it must not be forgotten that labor has had many sad experiences in the last 80 years, in which the result of increased effort, mental and physical, has not been rewarded as it should have been, but has been entirely appropriated by capital.

We must, however, realize that there is a happy medium. If, for example, the cost of producing any article of vital use to the community is cut in two, or even down to one-tenth of its original cost, it is uneconomic that the laborer or the capitalist, or both, should retain for themselves this entire saving. The proper end is that the selling price of the article be reduced, with a consequent greater consumption and necessary advantage to the consumers as a whole.

Fortunately, competition and the laws of trade to a large extent govern this, but the basic thing to remember is that wages are not paid by money, but by the goods and services rendered by all. The more goods produced and the more services rendered, the more there is for everyone to receive.

Unemployment in British Steel Industry

Except for the tin plate activity in South Wales, it is estimated that the British steel industry is operating at only one-quarter to one-third of normal. In a report of the United States Trade Commissioner, London, to the Department of Commerce, the number of unemployed in the iron, steel and allied engineering trades in various centers includes 61,000 in Newcastle, 40,000 in Middlesbrough, 40,000 in Sheffield, 20,000 in Glasgow, 17,000 in Sunderland. The total is more than 200,000, when Birmingham and Barrow are included; and the number of people involved, including dependents, is probably 1,000,000.

Among those reported as employed, many thousands were working part time, some of them only two days a week. Many of the blast furnaces have been idle since the first day of the coal strike, last April, there being only 70 furnaces in blast at the end of November, as compared with 235 a year previous.

*From an address on Waste in Industry, by J. Parke Channing, at Cleveland, Jan. 13, before national convention of Associated General Contractors.

Machinery Markets and News of the Works

LARGE MEXICAN INQUIRY

National Railways Want to Buy \$300,000 Worth of Machine Tools

Little Prospect of Business Being Closed on Credit Terms Offered—Trade Improving Slowly

An inquiry for \$300,000 worth of machine tools, about 120 items, from the National Railways of Mexico, with offices in the Woolworth Building, New York, has not attracted the attention that might be expected, as the railroad's representatives are seeking to buy on two-year open credit. An effort has been made to place the business with one large machinery company, but the few to which the proposal has been made do not seem anxious to sell on the terms suggested.

In some sections a slightly improved demand for machine tools is in evidence. Activity is more marked in the Central West than in the East. An inquiry for 10 machines, six cranes and six triplex hoists comes from Heaters, Inc., St. Paul, Minn. A Detroit dealer is in the market for several used machines for customers. The Arvac Mfg. Co., Anderson, Ind., manufacturer of universal joints, has bought several drilling machines and is in the market for 18 small turning

lathes and two or three milling machines. The Fisher Body Ohio Co., Cleveland, within the past two or three weeks has added to its equipment of drilling machines and presses. Warren Webster & Co., Camden, N. J., manufacturers of heating apparatus, have bought 10 screw machines, both hand and automatic. An Indiana manufacturer is inquiring for six engine lathes.

Railroad buying is not important, but some orders for single machines are being placed. The Chesapeake & Ohio has issued a new list of several tools. The Illinois Central is preparing a budget of its machine-tool requirements for the next three years and plans to buy a part of the list every six months.

Contractors bidding on the cast iron segments for the New York-New Jersey vehicular tunnel are inquiring for molding machines, one such inquiry asking bids on eight or 10 machines. Other foundries are also in the market for new casting equipment.

Export demand is not active, hence some importance attaches to revived inquiry under consideration by Cincinnati manufacturers for about 15 tools, totaling \$60,000 in value.

The Wheeling Steel Corporation will soon inquire for 10 or 12 cranes, including two 150-ton ladle cranes, for improvements at its Steubenville and Portsmouth, Ohio, works.

New York

NEW YORK, Jan. 24.

The National Railways of Mexico, with New York offices in the Woolworth Building, have sent out an inquiry for about 120 machine tools, entailing an expenditure of \$300,000. There is some doubt, however, as to the business being placed as the Mexican interests desire to buy on open credit terms of two years. An effort is also being made to pace the order entirely with one company, but those which have been approached do not appear anxious to book the order on the terms offered. Among the machines inquired for are the following: 42-in. coach wheel lathe, 60-in. horizontal boring machine, two electric cranes, 50-ton capacity, one electric crane, 15-ton capacity, 96-in. vertical boring and turning mill, 60-in. multiple spindle cylinder boring, tapping and milling machine, 50-ton hydraulic bushing press, 42-in. vertical boring and turning mill, 24-in. back-gear shaper, 48-in. single-end vertical punch, 5-ft. radial drill, 42-in. coach wheel lathe, 850-lb. steam hammer, 300-ton hydraulic car wheel press, flue welder, 4-ft. radial drill, pneumatic hoists, car axle lathe, 96-in. locomotive wheel lathe, 400-ton hydraulic car wheel press, and many other items.

Warren Webster & Co., manufacturers of heating apparatus, Camden, N. J., have bought about 10 screw machines, both hand and automatic. Not much new inquiry has come into the market the past week. Inquiries are mostly for single machines and no marked improvement either in inquiries or orders is noted.

No change is reported in the crane market. There is a slight increase of activity in electric and hand power hoists. One manufacturer, who recently placed a new electric hoist on the market has booked orders for about 200 of ½-ton and 1-ton capacities in the past three months. The 40-ton overhead electric crane inquired for by the New York Central & Hudson River Railroad recently will probably be placed soon. Several electric cranes of small capacity are pending. Niles-Sement-Rond Co., has placed two 100-ton electric cranes with a Southern company.

Thomas J. McManus & Sons, 33-35 Moultrie Street, Brooklyn, operating an automobile machine and repair works,

have filed plans for a two-story factory addition, 25 x 100 ft., to cost about \$14,000, exclusive of equipment.

The Lion Brewery, 108th Street and Columbus Avenue, New York, has awarded contract to Cunningham & Foley, Inc., 217 West 116 Street, for additions and improvements in its two-story machine shop, to cost about \$25,000.

The Erie Railroad Co., 50 Church Street, New York, is concluding arrangements with the Youngstown Equipment Co., Youngstown, Ohio, for the operation of its car shops at Kent, Ohio, giving employment, normally, to about 700 men. The road has awarded a contract to the Dickinson Construction & Repair Co., Youngstown, for its maintenance of way work from Salamanca, N. Y., to Marion, Ohio, about 400 miles. J. B. Dickson is president of the latter organization.

The U-Need Ice Co., 2150 Amsterdam Avenue, New York, is taking bids for a two-story ice-manufacturing plant, 157 x 214 ft., at Mt. Eden and Inwood avenues, estimated to cost about \$175,000, including machinery. Koch & Wagner, 32 Court Street, Brooklyn, are architects.

The Tunnel Garage, G. L. Stevers, president, 3 Charlton Street, New York, has preliminary plans under way for a new repair and service building at Broome and Thompson streets, to cost about \$75,000.

Charles Cohen, 308-10 Oakland Street, Brooklyn, operating a plant for the manufacture of automobile bodies, has filed plans for a one-story addition, 25 x 100 ft.

The New York Central Railroad Co., Grand Central Terminal, New York, W. C. Bower, purchasing agent, is taking bids until Feb. 3 for a quantity of wire fencing, track bolts, splice bars, frogs, switches, etc.

Merkel Brothers, Sutphin Boulevard, Jamaica, L. I., are having plans prepared for a three-story refrigerating and cold storage plant, 60 x 75 ft., on Chichester Avenue. Louis Allmendinger, 20 Palmetto Street, Brooklyn, is architect.

Mouritz F. Westergren, Inc., 213 East 144th Street, New York, manufacturer of sheet metal products, has awarded a contract to the Cauldwell Wingate Co., 431 Fourth Avenue, for the erection of a two-story plant addition, 25 x 50 ft., estimated to cost approximately \$30,000.

H. Steel & Sons, Inc., 153 West 182d Street, New York, recently incorporated with a capital of \$50,000, to manu-

facture iron and steel products, has filed plans for a one-story machine and forge shop, 50 x 200 ft., on Vernon Avenue, Long Island City.

Louis Fishman, New York, has leased the one-story building on site, 100 x 150 ft., at 140-50 West 145th Street, for an automobile repair and service works.

The K. & O. Co., Inc., 366 Butler Street, Brooklyn, manufacturer of metal products, has commissioned Frank Quimby, 110 William Street, New York, architect, to prepare plans for extensions and improvements in its five-story factory. E. Oldendusch is president.

The Metropolitan Roofing Material Co., 214 East 135th Street, New York, has awarded contract to the Schwab building Co., 223 South Fifth Avenue, Mt. Vernon, N. Y., for a new one-story and basement building on 137th Street.

An electrically operated pumping plant to cost about \$110,000 with machinery is being planned by the city of Orange, N. J., in connection with a trunk sewerage system. Walter L. Hull is city engineer.

The Morse Rogers Steel Co., 1038 South Kolmar Avenue, Chicago, has leased property at the new Shupe Terminal plant, Lincoln Highway and the Passaic River, for an Eastern works. The Martin-Parry Corporation, 560 Jackson Avenue, Long Island City, manufacturer of automobile bodies, with headquarters at York, Pa., has also recently leased a building at this location. The Shupe Terminal Corporation, operating the terminal, will develop the property for industrial service. William F. Shupe, head of the William F. Shupe Co., 85 Day Street, Orange, N. J., is president of the corporation.

The Kelsey Motor Co., 25 Branford Place, Newark, N. J., will soon commence the installation of machinery at the first unit of its new plant on Washington Avenue, Belleville, N. J., for the manufacture of motor trucks and parts. The unit nearing completion approximates 34,000 sq. ft. of floor space and will cost about \$150,000. It will have a capacity of about 3000 cars a year. The company has 7½ acres at this location to provide for additional units.

Thomas L. Raymond, director, Department of Streets and Public Improvements, City Hall, Newark, will receive bids until Jan. 30, for equipment for the repair plant of the department at 9-11 Jay Street, including one electric-driven blacksmith forge, with tuyere iron complete; one electric-driven post drill, with motor; tire bender; nut and bolt cutting machine, with taps, dies and friction countershaft; electric-driven emery machine with two grinding wheels, and motor; 240 lb. blacksmith anvil; one 3-hp. motor. On another specification, the department at the same time will receive bids for a quantity of horseshoe nails and other horseshoe material. Specifications are on file at room 309, City Hall.

Philadelphia

PHILADELPHIA, Jan. 23.

The Pennsylvania Equipment Co., 1120 Chestnut Street, Philadelphia, is in the market for fifteen or twenty Roger convertible ballast cars, center and side dump type, 80,000-lb. capacity.

The Acme Motor Truck Corporation, Philadelphia, has leased the two-story building at 131-33 South Twenty-fourth Street, for a truck repair and service works.

The John T. Lewis & Brothers Co., Lafayette Building, Philadelphia, will soon break ground for a two-story power plant on Aramingo Street, estimated to cost about \$100,000. The Turner Construction Co., 1713 Sansom Street, is contractor.

The Colonial Electric Co., Philadelphia, has leased two floors in the four-story building at 932 Arch Street, totaling about 6000 sq. ft. of floor space, for local works.

The John A. Roebling's Sons Co., Trenton, N. J., manufacturer of wire, cables, etc., will soon commence operations at its addition on Lalor Street, now nearing completion. A number of present departments will be transferred to the building and a few additions made to the working force.

The Standard Tank & Seat Co., Camden, N. J., is taking bids for a new building at 320 North Front Street. O. M. Hokanson, Bailey Building, Philadelphia, is architect.

Otto R. Helligman, receiver for the Winfield Barnes Co., Philadelphia, manufacturer of steel products, has disposed of the plant at Erie Avenue and Twentieth Street to B. Foster and associates for \$86,030. The property consists of a number of buildings on site 241 x 330 ft.

The Lanston Monotype Machine Co., Twenty-fourth and Locust streets, Philadelphia, is perfecting plans for the manufacture of the Barrett adding, listing and calculating

machines, following the recent acquisition of the Barrett Machine Co., 1214 Race Street, Philadelphia.

The Bessemer Motor Truck Co., Grove City, Pa., is arranging for the removal of its works to Holmesburg, Philadelphia, where headquarters in the future will be conducted. The new plant is located on a tract of eighteen acres, and has been designed for a capacity of 3000 motor trucks per year. Additional units will be built when necessary. I. M. Lewis is president of the company.

The Pennsylvania Edison Co., Easton, Pa., has completed plans for a one-story addition to its generating plant, 30 x 56 ft., estimated to cost about \$50,000. It will also erect a two-story shop building, 40 x 64 ft., on Dock Street. A portion of the building, which is estimated to cost about \$35,000, will be used for office service.

Fire, Jan. 18, completely destroyed the plant and machinery of the Boyertown Planing Mill Co., Boyertown, Pa., with loss estimated at about \$50,000. A. P. Griffith is treasurer and general manager.

The Loch & Battista Mfg. Co., Berwick, Pa., manufacturer of flush tanks, is arranging for increased production to total about 1500 tanks per month. Additions will be made to the working force.

The Auto Radiator Service Co., Cameron and Mulberry streets, Harrisburg, Pa., has completed plans for enlargements and work will be placed under way at once. Additional machinery will be installed for sheet-metal working and repair of automobile radiators, fenders, bodies, etc. Edward J. Sherman and Harry W. Hass head the company.

Fire, Jan. 13, destroyed the plant and machinery of the Mercer Flooring Co., Cunningham Street, Mercer, Pa., with loss estimated at about \$150,000.

The Middletown Ice Co., Middletown, Pa., recently organized, has tentative plans under way for a new ice-manufacturing plant. Charles Myers is president and L. J. Borges secretary and treasurer.

The Philadelphia & Reading Coal & Iron Co., Reading Terminal, Philadelphia, is planning for an addition to the power house at its Locust Spring colliery, to double the present capacity.

New England

BOSTON, JAN. 23.

Machine-tool prospects of any importance whatever are developing slowly. Companies having purchases of equipment under consideration apparently are no nearer closing than they were a week ago. Unless the unexpected happens, bookings by New England dealers for January will fall considerably below predictions made early in the month. During the past week there has been more or less interest shown in equipment by small manufacturers, who are governed more by price than by requirements of machines, and shopping by these interests is carried to extremes, especially in the used machine tool market.

Sales the past week disclose a further shrinkage in volume of turnover and cash. They include a 3½-ft. radial drill to a Massachusetts maker of textile machinery; special production machinery to a Portland, Me., manufacturer of marine hardware; small grinding equipment to the American Steel & Wire Co., Worcester, a No. 2 Pratt & Whitney die sinker to a Rhode Island manufacturer; a 12-in. x 5-ft. lathe, to a Worcester manufacturer of musical instruments; 16-in. x 12-ft. lathe to a textile machinery interest, and a 20-in. upright drill and tool grinder to a Medford, Mass. garage, all new machinery; a four-spindle Prentice sensitive drill to a Middleboro manufacturer; special lathe for crankshaft turning, to a Waltham automobile manufacturer; and four small milling machines to a local maker of fountain pens, the last six pieces of equipment selling out of the used tool market. A limited list of light equipment for a small experimental shop to be started in Massachusetts, and a cutting off machine for the General Electric Co., Pittsfield, are the only new prospects in sight.

Dealers in new equipment have developed some prospects, however, but because such business is not competitive little in the way of detail is forthcoming. They deal largely with special production equipment and drilling machines. The same firms admit that lathe prospects which looked promising earlier in the month, have been placed in the doubtful files. A few individual firms report a better demand for hand tools, notably portable electric drills.

Several New England builders of machine tools, to keep plants operating at the highest ratio during the present depression, have gone or are going into the manufacture of new lines, such as a level for truing up machine tools, portable drills, testing cylinder gage, small grinding machines, wood-working machinery, and one company is about to turn

over a large part of its plant to the manufacture of spinning machinery, the order for which runs close to \$1,000,000. The development of new machine tools is not neglected in the meantime, however. During the past few months New England makers have turned out many newly designed tools and 1922 promises other machinery developments. Makers of railroad shop tools in this section have secured sufficient business to warrant increased activities, but operating schedules are still far below normal.

At the moment a decided improvement in the demand for gears is noted. Manufacturers of Mass gears have put out more quotations the past ten days than in a long time. The interest shown by makers of rolling mills and users is especially good. One local gear maker has about all the business he can handle, and many other Massachusetts companies are doing much better than a month ago. Small gears are not only wanted for new machinery, but for replacements as well. One gear maker in this section recently was obliged to buy new metal-working equipment.

The Segal Metal Products Co., Springdale, Conn. has awarded contract for a manufacturing unit.

The foundry of White & Warner Co., Tremont Street, Taunton, Mass. recently was damaged by fire with an estimated loss of \$50,000.

The Stamford Rolling Mills Co., Springdale, Conn., has sent out inquiries for complete oil engine power equipment with electrical generators for its two mills at Stamford and Springdale, Conn. Each power house will be approximately 2500 hp. and will supply motors on a rolling mill load, which are now installed. C. F. Hunter is general purchasing agent.

A vocational department will be installed in the new three-story high school, 70 x 188 ft., now being erected at Manchester, N. H., and estimated to cost in excess of \$900,000. C. F. Whitchee, 814 Elm Street, Manchester, is architect; R. D. Kimball, 6 Beacon Street, Boston, is engineer.

Walter W. Field, 39 Hayward Street, Cambridge, Mass., has filed plans for rebuilding the portion of his machine shop recently destroyed by fire. The work, exclusive of equipment, will cost about \$10,000.

The E-Z Fold Ironing Table Co., Westboro, Mass., recently organized, has taken over the former plant of the Forbes Sleigh Co., Summer Street, and will operate at this location. George W. Lewis heads the company.

A vocational department will be installed in the new two-story high school, 225 x 245 ft., to be erected by the Town School Board, Stratford, Conn., estimated to cost about \$450,000. Frank Irving Cooper Corporation, 172 Tremont Street, Boston, is architect.

A vocational department will be installed in the new junior high school to be erected at Westville, Conn., to cost about \$200,000. H. M. Greist, of the Greist Mfg. Co., is chairman of the building committee; Brown & Von Beren, 185 Church Street, New Haven, Conn., are architects.

The Waterbury Mfg. Co., 236 Grand Street, Waterbury, Conn., manufacturer of sheet brass goods, etc., recently purchased a factory on College Street, Middletown, Conn., from William E. Stroud. It is 50 x 102 ft. and will be used for the manufacture of its products. An addition is contemplated later.

A vocational department is planned for the new high school to be erected at Belchertown, Mass. The architect has not yet been selected but sketches have been submitted. Wilbur F. Nichols is chairman of the building committee.

Cleveland

CLEVELAND, Jan. 23.

The proposed New York-New Jersey vehicle tunnel has brought out inquiries for eight or ten large molding machines from foundries planning to bid on the cast iron segments, and a fair volume of inquiry for molding machines has come out this month from other foundries engaged in work outside of the automotive field, making the outlook in molding machine lines much better than it was late last year.

The machine tool market shows improvement in the number of inquiries, but orders have not increased, as prospective purchasers are very slow in closing deals. The Fisher Body Ohio Co. is adding equipment to its Cleveland plant, having placed several small orders for drilling machines and presses, aggregating about a dozen tools, in the past few weeks. The Arvac Mfg. Co., Anderson, Ind., maker of universal joints, has purchased several drilling machines and has inquiries out for 18 turret lathes, 18 small turning lathes and two or three milling machines. The machinery equipment of the American Ball Bearing plant, Cleveland, of the Standard Parts Co., will be sold at auction Jan. 26. It is stated that this is attracting little interest, as practically all the machines that were in fair condition have been sold.

The demand for locomotive cranes shows no change over the past few months. Makers are getting a few single machine orders both for export and domestic use.

The Rose Machine & Spring Co., Canton, Ohio, formerly the Buckeye Machine & Spring Co., has been incorporated with a capital stock of \$50,000. D. H. Rose, who has operated the plant of the Buckeye company for several years, will be head of the new company.

The Miami Tractor Co., Celima, Ohio, recently organized, is planning to add a foundry and other extensions to its present plant. It will have a capital stock of \$2,000,000, of which \$1,500,000 will be preferred stock. V. A. Conover is president.

The main building of the plant of the Glass & Machine Works, Jewitt, Ohio, was burned recently. It is stated that it may not be re-built.

The Ohio Structural Steel Co. has established a plant at Newton Falls, Ohio. M. H. Stauffer, formerly with the Niles Forge & Mfg. Co., Niles, Ohio, is president and general manager.

The Steel City Iron Co., Youngstown, Ohio, is being organized with a capital stock of \$150,000 by A. W. Lau, formerly of the Lau Iron Works, and others. It contemplates establishing a plant for fabricating general structural work and ornamental iron work.

The Nichols-Lintern Co., 3404 Lorain Avenue, Cleveland, manufacturer of railroad equipment, has awarded a contract to the Austin Co., 16113 Euclid Avenue, for a one-story addition, 60 x 65 ft., estimated to cost about \$65,000.

The Stahl Auto Body & Wagon Co., 6533 St. Clair Avenue, Cleveland, manufacturer of automobile bodies, is having plans prepared for an addition, including improvements in present buildings, estimated to cost about \$40,000.

The Glenwood Motor Car Co., East Seventy-first Street and Euclid Avenue, Cleveland, is completing plans for the erection of a new one-story plant at Findlay, Ohio, 90 x 570 ft. J. B. Cline is president.

The K. W. Brick Co., 607 Home Savings & Loan Building, Youngstown, is completing plans for a one and two-story brick and tile manufacturing plant at Warren, Ohio, 70 x 150 ft., estimated to cost close to \$40,000. J. Whitaker is president.

Baltimore

BALTIMORE, JAN. 23.

The Spanish-American Cork Co., Westport, near Baltimore, has plans under way for rebuilding the portion of its plant on the Fish House Road, recently destroyed by fire. It is estimated to cost about \$45,000. O. J. Harms is president.

The Board of Awards, City Hall, Baltimore, will take bids until Feb. 1 for furnishing and erecting two 2,000,000-gal. electrically operated centrifugal pumps, with electrical equipment, for the Belair Road pumping station. William A. Megraw is engineer, and William F. Broening is president of the Board of Awards.

The Board of Education, Baltimore, has acquired 14 acres between West Forest Park and Arlington for a new senior-junior co-educational high school, to include vocational department. Plans will be prepared by Parker, Thomas & Rice, Union Trust Building, Baltimore. It will cost in excess of \$500,000.

The Friedman Ice & Cold Storage Co., Savannah, Ga., is completing plans for rebuilding its ice-manufacturing and cold storage plant, recently destroyed by fire. It will cost about \$50,000. S. Friedman is president.

Fred Foster, Radford, Va., has plans under way for a new one-story machine shop.

Fire, Jan. 14, destroyed a portion of the woodworking plant of the A. T. Griffin Mfg. Co., Goldsboro, N. C., with loss estimated at about \$50,000, including machinery.

The Universal Service Station, Front Royal, Va., is planning the establishment of a one-story machine shop for automobile repair work and parts manufacture.

The Brunswick Cross Arm Co., Brunswick, Ga., P. N. Coleman, Box 167, president, is contemplating the immediate erection of a new plant, 80 x 210 ft., to replace its works recently destroyed by fire. Equipment to be installed includes boring machines, band saws, edgers, shapers, planers and other wood-working machinery.

The Tyler Machine Co., Florence, S. C., is planning to rebuild its machine shop, recently destroyed by fire. L. Tyler heads the company.

F. M. Hatch, Albany, Ga., has acquired a site at the Bank's mill pond, Milledgeville, Ga., for a new hydroelectric generating plant.

A vocational department will be installed in the new

high school to be erected at High Point, N. C. A bond issue of \$750,000 is being arranged.

D. C. Elphinstone, 408 Continental Building, Baltimore, is making inquiries for an auto crane, caterpillar or road wheel type.

Lyon, Conklin & Co., 13 Balderstone Street, Baltimore, manufacturer of sheet metal products, will break ground in the spring for its new four-story plant at McComas and Donaldson streets, 66 x 75 ft., and estimated to cost \$350,000, including machinery. George B. Monmonier & Son, 1711 McCulloch Street, have the building contract.

The Alexander Granite & Land Co., Statesville, N. C., is planning for the operation of a rock quarry in the vicinity of Hiddenite, N. C., and will install an electrically operated crushing plant. J. M. Deaton is president.

A vocational department will be installed in the new high school to be erected at Southport, N. C., bids for which are being asked. W. J. Wilkins & Co., Wilmington, N. C., are architects.

The American Furniture Co., Martinsville, Va., is perfecting plans for a new power house, estimated to cost \$50,000. A. D. Witten is engineer.

The School Board, Rockingham, N. C., is planning for the erection of a new high school to cost close to \$100,000. A vocational department will be installed.

Fire, Jan. 8, destroyed the machine and repair department, and adjoining sections of the automobile works of George C. White & Sons, Richmond, Va., with loss estimated at about \$50,000.

The Gulf Refining Co., Pittsburgh, Pa., is contemplating the construction of a steel tankage plant on Hutchinson Island, Savannah, Ga., to have a capacity of about 55,000 bbl., and estimated to cost approximately \$100,00.

The Lock Joint Pipe Co., Baltimore, has leased a site for a plant to manufacture pipe. A. M. Hirsh is president.

The Parker Metal Decorating Co., North Gay Street, Baltimore, whose factory was recently damaged by fire, is said to be arranging to locate at the plant formerly occupied by the Union Smelting & Refining Co., Inc. Howard and Ostend streets, where an addition will be erected. E. A. Parker is president.

The American Wood-working Corporation, 5 Uhler Street, Baltimore, will build a three-story addition, increasing the floor space to 35,000 sq. ft. Additional equipment will be installed. Arthur Pierson is president.

Hackney Brothers, Wilson, N. C., manufacturers of carriages will rebuild their burned plant and install new equipment.

The Maryland Steel Rolling Co., Fidelity Building, Baltimore, will build a one-story factory, 66 x 228 ft., to cost \$10,000.

Cincinnati

CINCINNATI, JAN. 23.

Chief interest in the machine tool market the past week, centered in the revival of an inquiry for 15 tools, valued at approximately \$60,000 for shipment to Japan. This inquiry was put out last summer, but has since been revised and heavier types of machines specified. It is expected that the order will be placed within the next two weeks. An Indiana manufacturer is in the market for six lathes and the Chesapeake & Ohio Railroad has also issued a list for several tools. Orders booked the past week were usually for single machines but in larger number than the previous week and manufacturers are more encouraged as a result. Used machinery dealers report business as only fair.

Frank P. Shaw, Chicago, representative of an unnamed automobile concern, was the highest bidder for the plants and equipment of the Allen Motor Car Co., in Columbus and Bucyrus. Mr. Shaw's bid was \$570,000 and it will likely be accepted. It is understood that as soon as the deal is closed, operations will be resumed at the Allen plants.

The Dayton Malleable Iron Co., Dayton, Ohio, which recently purchased the plant of the Timkin Detroit Axle Co., Canton, Ohio, has closed a contract with the Timkin company for its entire malleable iron castings requirements. The Dayton company will take control of the Canton plant on Feb. 1 and will operate it for automobile and railroad work.

The Ramey Mfg. Co., Columbus, Ohio, manufacturer of electric cleaners, saw mill blowers and furnaces, has taken a long term lease on the Immel Auto Body plant, 8 East Livingston Avenue and is making alterations preparatory to establishing headquarters there by Feb. 15. The company expects to largely increase its output of furnaces and will practically double the force employed. E. J. Ramey is president.

The City of Corbin, Ky., is receiving bids on \$60,000 worth of light and water bonds and is planning to build a municipal light and water plant. John C. Myers is city clerk.

The City Commissioners of Newport, Ky., have passed an ordinance providing for the issuance of \$150,000 in bonds for installing a new pump at the waterworks plant to supply a minimum of 6,000,000 gal. of water daily. Mayor J. H. Hermann is chairman of the commission.

William Gilbert, president, Buckeye Foundry Co., Cincinnati, has acquired the controlling interest in the Holliman-Wilson Foundry Co., 500 East Front Street. It is the intention later to make alterations and additions.

Pittsburgh

PITTSBURGH, JAN. 23.

Machinery activities have been even more limited the past week, both sales and inquiries having dwindled. The Brown-Zortman Machinery Co. has sold two 34-in. boring machines to the Erie Ball Engine Co., Erie, Pa. This constitutes the most important business of the week, although most dealers and agencies are getting occasional orders for individual tools, which not infrequently are shipped out of stock. The railroads still are out of the market and outside of the Wheeling Steel Corporation, most of the inquiries emanating from steel companies seem to be either finding out present prices against old projects or for estimating purposes in connection with the asking of appropriations. The Wheeling Steel Corporation, which is to spend about \$5,000,000 on plant extensions and improvements at its Steubenville and Portsmouth, Ohio, works and which recently closed for much mill equipment, is expected to shortly take bids on 10 or 12 cranes, including two 150-ton ladle cranes for the Steubenville plant, and later for the lighter machinery. This business, however, is prospective and current trading in both light and heavy machinery is small. The United Engineering & Foundry Co. has not yet closed for a 10-ton crane with 5-ton auxiliary, although an award is looked for soon. Neither the Ellwood City Forge Co. nor the Elliott Co. seem to be in a hurry to close on the cranes they inquired for sometime ago. Competition for orders is so sharp that prices approximating those of pre-war times now are being made and salesmen report that buyers are taking advantage of this.

The Westinghouse Electric & Mfg. Co., East Pittsburgh, has taken bids for a four-story addition, 100 x 200 ft., at Lang and Susquehanna streets, Homewood section. Bernard H. Prack, Keystone Building, is architect.

The Thermatomic Carbon Co., Pittsburgh, a new organization, is arranging for the construction of a plant in the vicinity of Sterlington, La., and has secured a site. It is headed by R. H. Uhlinger, 3612 Bates Street, Pittsburgh.

The W. H. Smith & Sons Co., Johnstown, Pa., will install new lathes, planers, bandsaws, grinding machines, morticing machines and other woodworking equipment at its new plant, now in course of erection. It will replace a mill recently destroyed by fire.

A ventilating system to cost about \$500,000, including mechanical fans, blowers, etc., will be installed by the County officials, Pittsburgh, in connection with the Liberty twin tubes now being constructed through the South Hills. The County Engineering Department is in charge.

A vocational department will be installed in the new two-story high school, 75 x 110 ft., to be erected at Harrisville, W. Va. S. W. Ford, Clarksburg, W. Va., is architect. S. O. Prunty is president of the Board.

The Kanawha Equipment Co., Charleston, W. Va., is making inquiries for a 30 to 40-hp. locomotive type marine boiler for river boat service.

The Guyan Machine Shops, Logan, W. Va., are planning for the installation of new pulleys, belting and other transmission equipment.

The Stonecrete Corporation, 6023 Pennsylvania Avenue, Pittsburgh, has completed plans for a machine shop in connection with its new two-story plant at Cheswick, Pa.

The Wheeling Motors Corporation, Wheeling, W. Va., is planning for a two-story machine shop, 40 x 50 ft., estimated to cost about \$22,000. M. B. Morgan is head.

The American Car & Foundry Co., 185 Broadway, New York, has preliminary plans under way for additions to its works on Third Street, Huntington, W. Va., estimated to cost in excess of \$250,000. A new car shop will be built at a cost of about \$150,000, including equipment. J. W. Ensign is district manager at Huntington.

The Raleigh-Wyoming Coal Co., Professional Building, Charleston, W. Va., will build a new one-story machine shop at its properties, vicinity of Glen Rogers, W. Va. A

new railroad coaling department, stand pipe and other structures will be erected. G. T. Harris is secretary and treasurer.

The new ice-manufacturing plant to be constructed by the Diamond Ice & Coal Co., 912 Bullitt Street, Charleston, W. Va., will cost in excess of \$100,000, instead of about one-half this amount. It will be two-stories, 100 x 100 ft. Plans are being completed by A. C. Bishop, 427 Guardian Building, Cleveland, architect and engineer, and work will commence at an early date.

The Northwestern Coal Co., Keyser, W. Va., recently organized, is planning for the installation of electrically operated mining machinery at its local properties. C. W. Siener is president, and George Wagener, vice-president and general manager.

Buffalo

BUFFALO, Jan. 23.

The Binghamton Heat, Light & Power Co., Binghamton, N. Y., has been granted permission to construct and operate a new electric light and power plant.

The Board of Education, Buffalo, is conferring with the City Council for the adoption of an intermediate trade school program, providing for an appropriation of \$10,000,000 for the erection and equipping of a number of trade and vocational schools.

The Johnson City Motor Car Co., Johnson City, N. Y., has rejected all bids for its proposed one-story service and repair works, 72 x 115 ft., and will call for new bids later. Charles A. Conrad, Phelps Building, Binghamton, N. Y., is architect.

The Merchants Dispatch Transportation Co., East Rochester, N. Y., has completed plans for a new one-story plant, 80 x 560 ft., for the manufacture of railroad equipment. L. E. West is in charge.

The Wiggler Corporation, Buffalo, recently incorporated with a capital of \$50,000 to manufacture signal devices, has established an assembling plant at 2355 Main Street, with daily capacity of about 3000 signals.

Chicago

CHICAGO, Jan. 23.

The improvement in buying which became apparent early this year, has been sustained. Purchases of single machines predominate and it is notable that buyers are looking for bargains, with the result that they often show a preference for used machinery. Current auction sales are well attended and most of the equipment offered is disposed of. During the past week two local sales were held, one at the plant of the Isko Co., manufacturer of refrigerating machinery, and the other at the factory of Knisley Brothers, manufacturer of cornices, fire proof sashes, metallic window frames, etc. Relatively better prices were obtained at the latter sale, because the equipment offered consisted of sheet metal-working machinery, including large bending brakes, punch presses, shears, etc., offerings of which are less frequent than of standard types of machine tools.

The railroads have made no further purchases of machine tools, but have closed for a considerable quantity of miscellaneous shop supplies. The Illinois Central is preparing a large budget covering its machine tool requirements for three years, a program which will call for purchases about twice a year during that period. The Santa Fe has put out an inquiry for two Hisey-Wolf Machine Co. combination internal and parallel grinding machines, type 3 B X D, with one-half horse-power motors arranged either for 220-volt direct current, or 110-volt single phase 60-cycle alternating current.

An encouraging number of inquiries are coming from miscellaneous sources. Heaters, Inc., 1927 Dayton Avenue, St. Paul, Minn., has put out the following list:

- One hydraulic pump for press 200 ton pressure.
- One 10-in. x 10-in. air compressor, belt drive.
- One 24-in. to 30-in. throat punch, capacity $\frac{1}{4}$ -in. in $\frac{1}{4}$ -in.
- One 4-ft. to 6-ft. squaring shear for eight-gage stock.
- One Hanna hull riveter, 76-in. throat, 30 to 70 tons.
- One bevel shear.
- One power roll for six gage, 7-ft. long.
- One light power punch, any throat.
- One angle roll.
- One rotary shear, throatless preferred.
- Six under-hung cranes, with trolleys, 4-ft. high x 10-ft. to 4-ft. reach.
- Six one-ton triplex hoists.

The H. Mueller Mfg. Co., Decatur, Ill., manufacturer of water plumbing and gas brass goods, desires circulars on

drill presses, especially 12-spindle machines for $\frac{1}{4}$ -in. hole and 12-in. diameter circles.

D. E. Morand, machinery dealer, Detroit, is in the market for the following machines for which he has prospective customers:

Three blanking presses, with 6 to 8-in. stroke, 30 to 40-in. wide, 12 to 14-in. height of die space; one single-action press, 7 ft. between uprights, 35 in. depth of ram, 10-in. stroke, 20 in. height of die space; one 50-in. gap press, 4 or 5-in. stroke, 15 to 20-in. depth of ram, similar to "25B" Bliss press; one open-side press similar to Bliss 22; one knuckle joint No. 663 Toledo press. The Pioneer Mfg. Co., Waterloo, Iowa, manufacturer of concrete pipe machines is in the market for a used square or rotary shear for cutting sheet metal. The Standard Automatic Parts Co., Muskegon, Mich., manufacturer of valve and tappet guides, is in the market for a used Pratt & Whitney 6 x 14-in. threadmill.

Two further price changes are reported. The Valley City Machine Works, Grand Rapids, Mich., has reduced milling machines 10 per cent. The Loebhough-Jordan Tool & Machine Co., Elkhart, Ind., has made a reduction of 10 per cent on punch presses, effective Feb. 1.

Edwin Schultz has purchased the interest of Earl H. Renn in the Renn & Schultz machine shop, on South Main Street, Belvidere, Ill.

Plans will soon be completed for a manual arts building, to be added to the Ashland High School, Ashland, Wis. The addition was made possible by the will of the late Charles F. Latimer of that city, who set aside \$50,000 for the purpose.

The McLough Foundry & Machine Co., Marine City, Mich., an institution hardly three months old, is now running at full capacity with a force of 40 men. It is manufacturing automobile pistons.

The Fanyo Garage, Watseka, Ill., was destroyed by fire on Jan. 11, with a loss estimated at from \$60,000 to \$75,000.

The Central Cornice Co., 107 North Twenty-ninth Street, Billings, Mont., manufacturer of ventilating systems, skylights, metal flumes, cornice work, etc., has secured a site on Montana Avenue between North Twenty-ninth and Thirtieth Streets, for a new plant 25 x 130 ft.

Bids are being received by the city engineer of Centralia, Ill. on a new power house.

The Niagara Radiator & Boiler Co., Tonawanda, N. Y., has let contract for a one-story foundry and machine shop, 140 x 175-ft. at 1101 to 1113 East Eighty-third Street, Chicago, to cost \$150,000. A four-story warehouse to cost \$100,000 will be built later. Clark & Walcott, 8 East Huron Street, Chicago, are associate architects in charge of the design of the plant and the Sumner Sollitt Co., 225 North Michigan Avenue, has the contract.

The Western Instrument Co., 1001 Washington Boulevard, Chicago, recently incorporated to manufacture surgical, veterinary, dental and electrical instruments, dies, tools and patterns and to do brass finishing, polishing and plating, has acquired 8000 sq. ft. of factory space at the address given and will require the following equipment: Ten hand screw machines, eight punch presses, eight milling machines, 12 drill presses, and 10 speed lathes. The officers include William Ganschow, president; Julius Severus, vice-president and general manager; Charles F. Johnson, secretary and Louis D. Mahon, treasurer.

The Dependable Mfg. Co., Streator, Ill., has taken over the plant and business of the Gahm-McCormick Co., and will manufacture automobile accessories, including spring steel bumpers, oscillating sedan seats, front splash aprons, radiator supports, and rear fittings. Incorporators include C. A. McCormick, M. E. McCormick and W. H. McCormick.

A group of Southern lumbermen, whose identity has not been disclosed has purchased 36 acres as the site for a \$250,000 plant for the construction and repair of freight cars. The tract lies between Forty-eighth and Fifty-second avenues and the west fork of the south Branch of the Chicago River. In the negotiations James N. Litsey, Chicago, represented the purchasers and title was taken by the Greenebaum, Sons Bank & Trust Co. as trustee.

A vocational department will be installed in the new North high school to be erected at Omaha, Neb., and estimated to cost \$750,000. John Latenser & Sons, Peters Trust Building, are architects. W. T. Bourke, 603 My Hall is secretary.

Frank D. Chase, Inc., 644 North Michigan Avenue, Chicago, engineer, has construction under way on a new one-story and basement foundry at Cadillac, Mich., 37 x 100 ft., estimated to cost \$150,000, including equipment. It will be owned and occupied by a new company being organized by R. J. Tester of the Mitchell Diving Iron Co., Cadillac.

The American Car & Foundry Co., West Twenty-fourth

and South Paulina Streets, Chicago, has tentative plans under way for an addition for the construction of steel cars. The site requires filling in and eliminating a slip now used for docking purposes. An application for permission to carry out this feature of the work is said to have been refused and the company proposes to seek another site, possibly outside of Chicago.

The City Council, Boone, Iowa, has directed the early completion of plans for the proposed municipal hydroelectric generating plant on the Des Moines River, estimated to cost in excess of \$100,000. Burns & McDonnell, 402 Interstate Building, Kansas City, Mo., are consulting engineers.

The Board of Education, Clarinda, Iowa, Homer S. Stephens, secretary, is taking bids until Feb. 3, for a new two-story and basement high school, to include a vocational department, estimated to cost about \$200,000. Keffer & Jones, 204 Masonic Temple, Des Moines, Iowa, are architects.

The Central South

St. Louis, Jan. 23

The Stafford Motor Works, Twenty-second and Campbell streets, Kansas City, Mo., has awarded contract to Harvey Silver, Shubert Building, for a one and two story machine shop, 65 x 130 ft., estimated to cost about \$27,000. R. A. Curtis, 536 Lee Building, is architect.

The G. G. Hoffman Magneto Co., 3932 Olive Street, St. Louis, is having plans prepared for a new one story works, 100 x 234 ft., at 3892 Washington Street, estimated to cost about \$50,000. E. Lantz, 600 Post Dispatch Building, is architect.

The Board of Education, Library Building, Kansas City, Mo., will call for bids in February for a four story addition to the manual training high school at Fifteenth and Forest avenues, 111 x 115 ft. C. A. Smith, 602 Finance Building, is architect. J. A. Brady, Library Building, is mechanical engineer, and J. B. Jackson, secretary of the Board.

The Dixie Coal, Lime & Clay Products Co., Dayton, Tenn., recently organized with a capital of \$750,000, is contemplating the construction of an electric power plant and electrically-operated pumping plant at Graysville, Tenn. It has plans in preparation for the establishment of a brick and tile manufacturing plant with initial capacity of about 50,000 brick per day. A 50 ton hydrate lime manufacturing plant will also be built. O. E. Thomas is president and manager, and Fred A. Brian, vice-president.

The Rock Asphalt Building Block Co., 638 Stahlman Building, Nashville, Tenn., is arranging for the installation of new equipment at its plant to include a gyratory crusher of about 150 tons daily capacity, revolving screen, 40 in. by 16 ft., pulverizing machinery, friction hoist, elevators, transmission and other machinery. A. J. Bright is chief engineer in charge.

The American Cornice Works, 237 North Water Street, Wichita, Kan., is planning for the erection of a one-story and basement addition, 25 x 140 ft.

A vocational department will be installed in the three story high school, 90 x 129 ft., to be erected at Humboldt, Kan., estimated to cost about \$125,000. T. W. Williamson & Co., 312 Central Bank Building, Topeka, Kan., are architects. W. A. Redfield is clerk.

The Hurricane Light & Power Co., Waverly, Tenn., has plans under way for a new hydroelectric generating plant with initial capacity of about 1500 hp., to be increased later to 5000 hp. The company was organized recently with a capital of \$1,000,000. E. T. Stanfield and Roy Carter are heads, both of Little Rock, Ark. The first noted will act as engineer.

The Keethler Quarries Co., Fayetteville, Tenn., is planning for the installation of new equipment, including a gyratory crusher, with daily capacity of about 150 tons jaw crusher of 100 tons capacity, pulverizing equipment conveying machinery, etc. T. Keethler heads the company.

A vocational department will be installed in the two-story and basement high school, 125 x 130 ft., to be erected at Lexington, Ky., and estimated to cost \$175,000. The Frankel-Curtis Co., Ben All Theatre Building, is architect. J. C. H. Smarall, McClelland Building, is clerk of the Board. Brown & Moore, Camden, Ark., will build a new one-story factory to manufacture spokes for automobile wheels. Plans have been completed.

The Signal Mountain Portland Cement Co., James Building, Chattanooga, Tenn., will commence work in March for a new plant in this vicinity, estimated to cost in excess of \$500,000. J. L. Senior is president.

The Board of Trustees, University of Missouri, Columbia, Mo., will soon take bids for its one-story and basement

power plant, 50 x 200 ft., estimated to cost about \$250,000 complete. James P. Jamieson, Security Building, St. Louis, is architect.

The Process Refining Co., Oklahoma City, Okla., recently organized, has acquired the oil refinery of the Pirtle-Pittman Refining Co., Newkirk, Okla., and will take immediate possession. A number of improvements will be made, including the installation of new machinery. A. C. Heiden is vice-president and C. H. Hyde, secretary, treasurer and superintendent.

A vocational department will be installed in the three story junior high school to be erected at Maplewood, Mo., estimated to cost about \$160,000. Bids will be asked in the spring. William B. Ittner, Board of Education Building, St. Louis, is architect.

The Klein Motor Co., 919 South Third Street, Louisville, is planning to rebuild its machine repair and service works recently destroyed by fire with loss estimated at about \$50,000, including equipment.

A one story power house will be installed in the new six story service building to be erected by the Missouri Athletic Association, 407 Washington Avenue, St. Louis, estimated to cost about \$100,000. W. C. Hoising is president. C. I. A. Bruggeman, Liberty Central Bank Building, is architect.

The Polar Wave Ice & Fuel Co., Grand and Olive streets, St. Louis, has foundation work under way for its new two and three story ice manufacturing plant on Gravois Street, estimated to cost approximately \$500,000, with machinery. H. S. Clymer, Wainwright Building, is architect.

The Muskogee Sand & Gravel Co., 805 Barnes Building, Muskogee, Okla., recently organized is planning for the construction of a sand and gravel producing plant on property in this section lately acquired. The installation will comprise crushing and screening machinery, stiff leg derrick, clam shell conveying equipment, hoists, cars, oil-operated engine and other power and operating equipment. O. M. Drake is vice president and manager.

The Cumberland & Manchester Railroad Co., Barboursville, Ky., is planning for enlargements in its car and locomotive shops. Additional equipment will be installed. Charles F. Heldrick is general manager.

The Belknap Hardware & Mfg. Co., Second and Washington streets, Louisville, is taking bids until Jan. 30, for its proposed addition, 204 x 245 ft., estimated to cost about \$1,000,000. Graham Anderson, Probst & White, Railway Exchange Building, Chicago, are architects. William Heybourn is president.

Detroit

DETROIT, Jan. 24

The Bradt Wheel Co., Pontiac, Mich., which will manufacture disk wheels and mountable rims for motor cars, has been organized by Harold Bradt, Rochester, Mich., and is seeking a temporary building. Associated with Mr. Bradt are P. C. Raymond, Rochester, and T. B. Leland, Detroit.

The Simplex Ignition System Co., Chicago, is seeking a site in Marine City, Mich., for the erection of a factory.

The Crodious Steam Pressed Brick Co., Pontiac, Mich., is planning the construction of a new plant.

The Gary Granzow Machine Co., Benton Harbor, Mich., is contemplating the erection of an addition.

Bernard and E. R. Stroh have organized the Strolumium Co., Detroit, to manufacture molded aluminum cooking utensils. It is an outgrowth of the Stroh Castings Co., maker of automobile parts and manufacturing will be done in the casting plant on Chene Street. William Roe, general manager, Stroh Castings Co., will have charge of production with Bernard and E. R. Stroh in executive capacity.

Henry Ford has bought the mill site and water rights at Pinckney, Mich., and his engineers are preparing for the construction of a plant at that place.

The Auto Specialties Mfg. Co., St. Joseph, Mich., will build a \$150,000 addition, construction to begin within 30 days. It will give the company 65,000 additional sq. ft. of space.

Construction has been started on the new boiler room of the Mac Sim Bar Paper Co., Osego, Mich. It will be 60 x 126 ft. and 79 feet from basement to roof and when completed will represent an expenditure of about \$300,000, including equipment.

The American Furnace & Foundry Co., Milan, Mich., is contemplating an addition to its factory to care for increased business.

A. F. Lavine & Sons, Dayton, Ohio, have purchased the plant and business of the Riv. City Spring & Mattress Co. A new building will be erected.

The University of Michigan, Ann Arbor, Mich., S. W. Smith, secretary, will call for bids in the spring for engineering and mechanical shops and laboratories, estimated to cost about \$750,000, including equipment. Smith, Hinchman & Grylls, Washington Arcade Building, Detroit, are architects.

The Lincoln Mfg. Co., 2620 Erskine Street, Detroit, manufacturer of electric lighting fixtures and parts, has work under way on a three-story addition, 30 x 115 ft., estimated to cost about \$100,000, including equipment. Upon completion, the company will extend its line and expects to double the present output. Robert S. Aspinwall is president.

A vocational department will be installed in the new high school to be erected at Albion, Mich., estimated to cost about \$150,000. R. A. LeRoy, 102 Pratt Building, Kalamazoo, Mich., is architect. Donald Harrington is school superintendent.

The Peoples Coal Mining Co., Albion, Mich., recently organized with a capital of \$350,000 to take over the Albion Mining Co., operating coal mines in this section, will electrify the entire property. A new tipples will be constructed, and hoists, pumping machinery and other operating equipment installed.

Bids have been received by the Electric Light and Water Board, Lansing, Mich., for a new municipal power plant. The Walbridge-Aldinger Co., Detroit, was low bidder at \$1,084,305.

Indiana

INDIANAPOLIS, JAN. 23

A vocational department will be installed in the new two-story high school, 170 x 215 ft., to be erected at Marion, Ind., estimated to cost about \$300,000. H. G. Bowstead, 410 Glass Building, is architect.

The Mid West Metal Products Co., Muncie, Ind., has consolidated the manufacturing department of the Kruse Electric Co., Fort Wayne, Ind., at its local works, following the recent acquisition of this branch of the Kruse business.

Fire, Jan. 13, destroyed the power house at the Little Giant Coal Mining Co., property, Linton field, near Terre Haute, Ind. It will be rebuilt.

A vocational department will be installed in the new two-story and basement high school, 55 x 125 ft., to be erected at Butler, Ind., estimated to cost about \$100,000. A. H. Elwood & Son, 201 Haynes Building, Elkhart, Ind., architects, are taking bids until Feb. 2.

The Indianapolis & Cincinnati Traction Co., Germania Building, Indianapolis, has tentative plans under way for the construction of a new one-story machine shop at Cincinnati, estimated to cost about \$60,000.

The Bloomington Nash Motor Co., Bloomington, Ind., has had plans prepared for a two-story and basement service and repair works, 85 x 130 ft., estimated to cost about \$50,000. Walter E. Hottle is head.

A vocational department will be installed in the new high school to be erected at Cayuga, Ind., two-stories and basement, and estimated to cost about \$900,000. The Board of Trustees, Eugene Township, Cayuga, is in charge. John Miller, 30 North Fourth Street, Terre Haute, Ind., is architect.

The Gulf States

BIRMINGHAM, JAN. 23.

The Kirk Refinery Co., San Antonio, Tex., has leased property from the Texas-Mexican Railway Co., Laredo, Tex., for a new oil refinery, with lubricating oil plant. Work will commence at once. It will have a daily capacity of 1200 bbl. of oil per day. E. W. Kirkland, San Antonio, is president.

J. C. Ward, Beaumont, Tex., has filed plans for a new one-story ice-manufacturing plant at Magnolia and Harrison streets, to be ready for operation in May.

A vocational department will be installed in the new three-story high school to be erected at Arlington, Tex., plans for which have been completed. Clarkson & Gaines, 606-7 First National Bank Building, Fort Worth, Tex., are architects.

The Sterling Carbon Co., Sterlington, La., is planning to rebuild its machine shop and engine house, recently destroyed by fire.

The Farmers' Co-Operative Ice & Creamery Co., Fairhope, Ala., recently organized, is planning for the erection of a one-story ice-manufacturing plant. Leonard Payne is president.

The G. R. Mueller Co., Brown-Marx Building, Birmingham,

has inquiries out for a one-story steel mill building, 70 x 80 ft. wide and 400 ft. long, to be provided with a 10-ton traveling crane.

The McKinney Compress Co., McKinney, Tex., is planning for the erection of an addition to cost about \$40,000. Additional equipment will be installed.

The Edwards Mfg. Co., 529-49 Eggleston Avenue, Cincinnati, manufacturer of sheet metal building products, is perfecting arrangements for a new branch plant at Dallas, Tex., estimated to cost about \$60,000.

The Tyler Motor Co., Tyler, Tex., has completed plans for rebuilding its repair and service works destroyed by fire several months ago with loss of about \$50,000.

The San Antonio Public Service Co., San Antonio, Tex., has plans under way for the installation of a new steam turbine, boilers and other equipment at its plant, to cost about \$500,000. It will form part of the proposed improvement and extension program of the company, estimated at \$1,500,000. E. H. Kifer is vice-president and general manager.

The Brown-Joseph Ice Co., Fort Worth, Tex., and other local interests have acquired property at Nashville Street and the Vickery Boulevard, Polytechnic, Tex., for a new ice-manufacturing plant, estimated to cost about \$75,000, including machinery.

A. D. Alessandro, Waco, Tex., has acquired a metal-working plant of 606 Webster Street, heretofore operated by local interests, and will take immediate possession. It will be arranged for the manufacture of metal display fixtures and additional equipment for plating and other work will be installed.

The Dixie Rubber Co., Memphis, Tenn., is considering plans for a branch plant at Miami, Fla., estimated to cost about \$200,000.

The School Board, Rockdale, Tex., will commence construction immediately of a new high school, to include vocational department, estimated to cost about \$75,000.

The Board of City Commissioners, Boynton, Fla., is planning for the establishment of a municipal electric lighting plant.

J. J. Kane, Galveston, Tex., and associates, have acquired property on the north side of the Government dike for the establishment of a boat building and repair plant, specializing in barges, dredges and similar vessels.

The Board of Trustees, Crescent City, Fla., A. B. Harbison, president, is making inquiries for a new water tank and steel tower, of about 75,000 gal. capacity, and 75 ft. high.

A vocational department will be installed in the new three-story high school, 155 x 225 ft., to be erected at Orlando, Fla., estimated to cost about \$300,000. Bids will be asked in February. F. H. Trimble, Orlando, is architect.

The Mosehart-Schleeter Co., 211 Caroline Street, Houston, Tex., is having plans prepared for rebuilding its automobile repair and service works, recently partially destroyed by fire, with loss estimated at about \$35,000. Alfred C. Egan, Houston, is architect. H. C. Mosehart is head.

Milwaukee

MILWAUKEE, JAN. 23.

Experience the past week has strengthened opinion that the machine-tool trade is on the way to a definite revival. While local tool builders have not been favored with any conspicuous buying, nevertheless orders for one or two machines are coming in and the time is advancing rapidly when production will be resumed on more than a minimum scale. Encouragement has been lent by the reopening of the Gisholt Machine Co.'s plant at Madison, Wis., after a long period of minimum operations, to fill a rush order for special tools for the Western Electric Co., which will keep the plant busy until May 1. Peaks and valleys in the course of production as it follows the trend of orders are gradually being evened up. The development of new designs embracing more manifold purposes and the general efficiency of tools is occupying considerable attention and serves as a good bridge to connect busy and idle periods.

The Flier & Stowell Co., Milwaukee, manufacturer of sawmill and general heavy wood-working machinery, steam engines, etc., and owner of the Beaver Mfg. Co., manufacturer of automobile motors, has started work on a new engine, 40 x 35 ft., at the main foundry. It will cost about \$25,000 and be complete.

The Dane County Board of Supervisors, Madison, Wis., has plans by Allan D. Conover, State architect, for a new power plant and boiler house, 40 x 35 ft., with a 125-ft. stack, at Waubesa, Wis., etc., to cost about \$100,000. The county engineer is in charge of the plans. Bids will be asked in February.

George Ziegler & Brothers, architects, 144 Canada Street, Milwaukee, have been engaged by S. A. Schneider to design a public garage and service building, 55 x 110 ft., two stories and part basement, to be erected at Twelfth and Harmon streets. Bids will be taken about Feb. 15.

The Perdieu Tool Mfg. Co., Milwaukee, has been incorporated with a capital stock of \$75,000 to manufacture machinery, tools, etc. The incorporators are Rugley A. Perdieu, 444 Layton Boulevard; J. B. Matthews and Benjamin Poss, attorney, 120 Wisconsin Street. Plans of the corporation have not matured sufficiently to make possible a definite statement.

The Oshkosh Tractor Co., Oshkosh, Wis., organized nine months ago with \$1,500,000 capital stock to take over the business, equipment, etc., of the LaCrosse, Wis., Tractor Co., has indefinitely postponed the construction of its proposed new plant, foundations of which have been completed. Stockholders on Jan. 16 voted to dissolve the corporation and close up its affairs, owing to the inability to properly finance the enterprise. C. C. Shanor is secretary.

The Reliance Motor Truck Co., Appleton, Wis., is preparing to engage in the quantity production of a new design of rotary snow plow to supplement its present line of motor trucks. The device consists of a steel drum, 8 ft. in diameter, containing an auger, the whole mounted on runners attachable to the front axle of a motor truck or equipped to be pulled by a tractor.

Oconto Public Service Co., Oconto, Wis., is revising plans for improvements costing \$50,000 in its hydroelectric power plant and dam at Peshtigo, Wis. It is intended to begin work about March 15 or April 1. The engineers are Messrs. Seastone, Madison, Wis. T. A. Pamperin is president of the company.

The Atkinson-Nash Co., Sparta, Wis., has plans for a two-story garage and service building, 50 x 98 ft., estimated to cost \$25,000.

The Oshkosh Auto Jack Mfg. Co., 176 Marion Street, Oshkosh, Wis., sustained an estimated loss of \$25,000 by fire which badly damaged its two-story factory on Jan. 18. It is planned to lease new quarters and purchase new equipment at once so that production may be resumed as early as possible. William Koeck is president and manager.

Canada

TORONTO, Jan. 23.

The demand for machine tools in this market is beginning to show renewed activity. Sales, however, are not numerous, but prospects for the early future have recently become very bright. Inquiries for equipment are coming forward in increasing numbers and dealers are of the opinion that it will only be a short time before buying will reach the normal stage. Manufacturers have been holding back orders for replacements purposes and have been buying only when absolutely in need of a machine, but the time is not far distant when it will be necessary to increase productive operations and have their equipment in good shape to meet competition not only from other Canadian producers but from American and European manufacturers who are making a strong bid for a hold in this market. A decided improvement has been noted in the small tool market the past week. Drills appear the main feature of demand, but other lines are also coming into more prominence.

The Beaver Machine Shop, 1110 Centre Street, Calgary, Alta., is asking for a lathe and gear cutter.

C. Lovatt, 1537 St. Denis Street, Montreal, is asking for a 25-hp. steam boiler.

The Mount Royal Arena, Montreal, is asking for equipment for an artificial ice plant.

The Union Natural Gas Co., Chatham, Ont., is in the market for piping, tools and drilling equipment for drilling wells, etc.

J. Gray, Maple Street, Collingwood, Ont., is in the market for machinery and equipment for a steel spring and steel casting factory.

The foundry of McLean, Holt & Co., Fredericton, N. B., was recently damaged \$30,000 by fire. The molding shop sustained the greatest loss.

David A. Brothers, manufacturers of copper cable, etc., have arranged for the erection of a manufacturing plant at Windsor, Ont., on which construction will start soon.

The Industrial Supply Service Co., Ltd., Vancouver,

B. C., is in the market for a double end punch and shear, capacity to $\frac{1}{4}$ -in., with about 24-in. throat; also nut making machine with capacity up to 1-in.

T. J. Moore, Warton, Ont., is the market for a double end matcher for hardwood flooring.

William Hendry and Thomas Ryan, Tacoma, Wash., propose to erect a factory at New Westminster, B. C., to cost \$9,000 for the manufacture of automobile accessories.

The Hydro Electric Power Commission, 48 Hughson Street, Hamilton, Ont., will erect an electric station on Ottawa Street, at a cost of \$100,000. Guy Long is chairman.

California

SAN FRANCISCO, Jan. 17.

August A. Wagniere, Los Angeles, has awarded a contract to the United Construction Co., 516 Baker-Detwiler Building, for a one-story machine shop, 40 x 135 ft.

The Board of Directors, Porterville Union High School District, Porterville, Cal., will build a series of vocational shops in connection with a new high school building, estimated to cost about \$275,000. Coates & Travers, Rowell Building, Fresno, Cal., are architects.

The Kroyer Motors Co., Stockton, Cal., is arranging for the erection of its new automobile plant at Los Angeles, estimated to cost in excess of \$150,000. It is said that work will commence in the spring.

The Board of Education, Long Beach, Cal., is taking bids until Jan. 30, for a new vocational building at the Polytechnic High School, estimated to cost about \$200,000. Bids for equipment will be taken later. John C. Austin, 1125 Baker-Detwiler Building, Los Angeles, and W. Horace Austin, First National Bank Building, Long Beach, are associated architects.

The Santa Fe Railway Co., Los Angeles, has completed plans for a new ice-manufacturing and car icing plant at Riverbank, Cal., 146 x 168 ft., with extension, 85 x 135 ft., estimated to cost in excess of \$75,000. The engineering department of the company is in charge.

The Joseph Musto Sons-Keenan Co., 1801 South 85th Street, Los Angeles, building stone products, has awarded contract to the Baker Iron Works, 950 North Broadway, for a new one-story mill, 114 x 157 ft. Finishing machinery, hoisting and conveying equipment will be required.

Seattle

SEATTLE, JAN. 17.

The new year has opened with a brisk inquiry in the hardware line, which has spread to machine tools without the inclusion of heavy duty machinery. Second hand stocks have become exhausted and will not interfere this season in the legitimate sale of new material. An order was placed the past week by one house for complete equipment of the B. C. Arnes line of automobile accessories.

There has been a better movement of drill presses than last year owing to the scanty shipyard stocks which are now non-competitive.

The Oriental export trade is improving, particularly in Japan, which bought a large number of air tools the past 10 days.

The Pacific States Rubber Co., Vancouver, Wash., recently organized is selecting a site for the erection of a plant. The first unit is estimated to cost about \$500,000, and the ultimate works in excess of \$1,000,000. A. M. Elliott, Vancouver, is president.

The Common Council, Bandon, Ore., has preliminary work under way for a municipal hydroelectric power plant to cost about \$80,000. The Miller Engineering Co., Burke Building, Seattle, is in charge.

The Columbia Tire Co., 1401 Northwest Bank Building, Portland, Ore., has acquired a site and plans the immediate erection of its new works. It will comprise four 80 ft. wings, with total frontage of about 350 ft., and is estimated to cost in excess of \$100,000, including machinery. R. A. Wurzburg heads the company.

The Oregon Lumber Co., Hood River, Ore. is considering tentative plans for a hydroelectric power plant for increased power supply at its works.

The Bonsteel Motor Co., Salem, Ore., will break ground in the spring for a two-story service and repair works, 40 x 120 ft.

Current Metal Prices

On Small Lots, Delivered from Merchants' Stocks, New York City

The following quotations are made by New York City warehouses.

As there are many consumers whose requirements are not sufficiently heavy to warrant their placing orders with manufacturers for shipment in carload lots from mills, these prices are given for their convenience.

On a number of articles the base price only is given, it being impossible to name every size.

The wholesale prices at which large lots are sold by manufacturers for direct shipment from mills are given in the market reports appearing in a preceding part of THE IRON AGE under the general heading of "Iron and Steel Markets" and "Non-ferrous Metals."

Iron and Soft Steel Bars and Shapes

Bars:	Per Lb.
Refined bars, base price	2.53c.
Swedish bars, base price	10.00c.
Soft steel bars, base price	2.53c.
Hoops, base price	3.38c.
Bands, base price	3.13c.
Beams and channels, angles and tees	
3 in. x 1/4 in. and larger, base	2.63c.
Channels, angles and tees under 3 in. x 1/4 in., base	2.53c.

Merchant Steel

	Per Lb.
Tire, 1 1/2 x 1/2 in. and larger (Smooth finish, 1 to 2 1/2 x 1/4 in. and larger)	2.50c.
Toe calk, 1/2 x 3/4 in. and larger	2.70c.
Cold-rolled strip, soft and quarter hard	3.20c. to 7.25c.
Open-hearth spring steel	3.55c. to 6c.
Shafting and Screw Stock:	
Rounds	3.45c.
Squares, flats and hex.	3.95c.
Standard cast steel, base price	12.00c.
Extra cast steel	17.00c.
Special cast steel	22.00c.

Tank Plates—Steel

1/4 in. and heavier	2.63c.
---------------------	--------

Sheets

Blue Annealed	Per Lb.
No. 10	3.28c. to 3.53c.
No. 12	3.33c. to 3.58c.
No. 14	3.38c. to 3.63c.
No. 16	3.48c. to 3.73c.

Box Annealed—Black

	Soft Steel (C. R. One Pass) Per Lb.	Blued Stove Pipe Sheet, Per Lb.
Nos. 18 to 20	3.55c. to 3.80c.	4.10c.
Nos. 22 and 24	3.60c. to 3.85c.	4.15c.
No. 26	3.65c. to 3.90c.	4.25c.
No. 28	3.75c. to 4.00c.	4.25c.
No. 30	3.80c. to 4.25c.	4.25c.
No. 28 and lighter, 36 in. wide, 10c. higher.		

Galvanized

	Per Lb.
No. 14	3.85c. to 4.10c.
No. 16	4.00c. to 4.25c.
Nos. 18 and 20	4.15c. to 4.40c.
Nos. 22 and 24	4.30c. to 4.55c.
No. 26	4.45c. to 4.70c.
No. 27	4.60c. to 4.85c.
No. 28	4.75c. to 5.00c.
No. 30	5.25c. to 5.50c.
No. 28 and lighter, 36 in. wide, 20c. higher.	

Welded Pipe

Standard Steel	Black	Galv.	Wrought Iron	Black	Galv.
1/2 in. Butt.	—56	—40	1/2-in. Butt.	—30	—13
3/4 in. Butt.	—61	—47	1 1/2-in. Butt.	—32	—15
1-3 in. Butt.	—63	—49	2-in. Lap.	—27	—10
3 1/2-6 in. Lap.	—60	—46	2 1/2-6-in. Lap.	—30	—15
7-8 in. Lap.	—56	—34	7-12-in. Lap.	—23	—7
9-12 in. Lap.	—55	—33			

Steel Wire

	Per Lb.
Bright basic	3.50c. to 3.75c.
Annealed soft	3.50c. to 3.75c.
Galvanized annealed	4.25c. to 4.50c.
Coppered basic	4.00c. to 4.25c.
Tinned soft Bessemer	5.50c. to 5.75c.

*Regular extras for lighter gage.

Brass Sheet, Rod, Tube and Wire

BASE PRICE

High brass sheet	17 1/4 c. to 17 1/2 c.
High brass wire	17 1/4 c. to 17 1/2 c.
Brass rod	14 1/4 c. to 15 c.
Brass tube, brazed	26 c. to 27 1/2 c.
Brass tube, seamless	18 1/2 c. to 19 c.
Copper tube, seamless	21 1/4 c.

Copper Sheets

Sheet copper, hot rolled, 24 oz., 21 1/2 c. per lb. base.	
Cold rolled, 14 oz. and heavier, 2c. per lb. advance over hot rolled.	

Tin Plates

Bright Tin	Grade "AAA" Charcoal 14x20	Grade "A" Charcoal 14x20	Coke—14-20	Primes	Wasters
			80 lb.	\$6.05	\$5.80
			90 lb.	6.15	5.90
			100 lb.	6.25	6.00
IC	\$10.00	\$8.50	IC	6.40	6.15
IX	11.25	10.00	IX	7.40	7.15
IXX	13.00	11.50	IXX	8.40	8.15
IXXX	14.75	13.25	IXXX	9.40	9.15
IXXXX	16.25	15.00	IXXXX	10.40	10.15

Terne Plates

3-lb. Coating 14 x 20

100 lb.	\$7.00
IC	7.25
IX	7.50
Fire door stock	10.00

Tin

Straits, pig	35c.
Bar	40c. to 45c.

Copper

Lake ingot	16 c.
Electrolytic	15 1/4 c.
Casting	15 1/4 c.

Spelter and Sheet Zinc

Western spelter	6 1/4 c. to 7c.
Sheet zinc, No. 9 base, casks	10 1/2 c. open 11c.

Lead and Solder*

American pig lead	5 1/4 c. to 6 1/4 c.
Bar lead	6 1/4 c. to 7 c.
Solder, 1/2 and 1/2 guaranteed	27c.
No. 1 solder	25c.
Refined solder	21c.

*Prices of solder indicated by private brand vary according to composition.

Babbitt Metal

Best grade, per lb.	80c.
Commercial grade, per lb.	40c.
Grade D, per lb.	35c.

Antimony

Asiatic	6c 1/4. to 6 1/4 c.
---------	---------------------

Aluminum

No. 1 aluminum (guaranteed over 99 per cent pure), in ingots for remelting, per lb.	26c. to 28c.
---	--------------

Old Metals

The market is sluggish with a tendency toward weakness. Dealers' buying prices are nominally as follows:

	Cents Per Lb.
Copper, heavy crucible	11.25
Copper, heavy wire	10.75
Copper, light and bottoms	8.25
Brass, heavy	5.50
Brass, light	4.75
Heavy machine composition	8.00
No. 1 yellow brass turnings	5.50
No. 1 red brass or composition turnings	7.25
Lead, heavy	3.75
Lead, tea	2.50
Zinc	2.50

THE IRON AGE

New York, February 2, 1922

ESTABLISHED 1855

VOL. 109, No. 5

Swedish Steel Belt Conveyors

Especially Adapted to Hot and Sticky Materials,
Which Cannot Be Carried on Rubber or
Fabric Belts—Lower Power Cost

BY HARRY CARLSON

IN a recent engineering publication the following statement was made: "By means of belt conveyors large carrying capacity is combined with low power consumption. Belts usually take 50 per cent of the power used by other conveyors, so the problem of the engineer is really to see whether or not belt conveyors can be employed, as all things are in their favor." It is evident from this that belt conveyors are recognized for their efficiency, and a careful study of industrial conditions reveals the fact that they have been extensively used.

When a belt conveyor is mentioned, it is natural for the engineer to picture in his mind a canvas, balata, or rubber belt, because of their universal adoption. To speak of a steel belt conveyor immediately brings one into a foreign field, and questions arise, because of the fact that they have not been used in this country. But the Sandvik Steel Works, Sandviken, Sweden, with a wide experience covering about 50 years in the cold rolling of steel, have for 12 years been making steel belts to be used for conveying purposes.

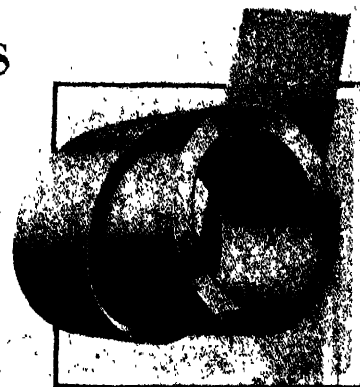
The flexible steel belt, known as the "Sandvik" belt, is made from Swedish charcoal steel with about 0.65 per cent carbon, cold rolled, hardened and tempered by a special process, which was originated by the company and perfected after years of conscientious application and experiment. The Sandvik works have always made

a specialty of cold rolled material, and for this purpose have acquired controlling interest in a number of the famous Swedish mines producing iron ores low in sulphur and phosphorus. It may be interesting to note that the expression "Swedish Steel" was originally applied to steel made from these ores.

To date, about 1300 steel belt installations have been made, for handling coal, coke, charcoal, iron ore, concentrated iron ore, copper ore, phosphate ore, sulphur ore, rock, warm calcium carbide, silica, warm dry clinker, ammonia, soda, etc., deals, battens, slabs, laths, chips and saw dust, brown sugar, sugar beet pulp, dried milk, yeast, dried vegetables, potatoes, chocolate, sacks of material, boxes, cases, packages, etc., clay, cement, and sands of various kinds.

Steel belt conveyors are especially suitable for conveying warm, sticky, sharp or abrasive material, which rubber and fabric belts cannot handle satisfactorily. The advantages of the steel belts over apron conveyors and wire woven belts are the elimination of heavy maintenance costs, power consumption and the spilling through joints and interstices.

The Sandvik belt has an especially hard, smooth



Installation of Steel Belt Conveyors at a Mine 45 Miles North of the Arctic Circle, Where Two 14-in. Belts Handle Iron Ore in Concentrate Mills



Coal Carried Up an Incline of 18½ Degrees by a Steel Belt Troughed Conveyor. Leather strips, riveted to the belt, insure against slipping

and dense surface, which accounts for its durability and high wear-resisting qualities. The belt, installed as a conveyor with standard size pulleys, is subjected to a working stress of 28,000 to 30,000 lb. per sq. in. when traveling over the pulleys. The manufacturing process also imparts properties that make it particularly adapted for conveying hot material. By special methods of heat treatment, hardening and tempering, this belt acquires better rust-resisting qualities than common cold rolled steel of similar composition.

The successful application of the steel belt in the fertilizer industry also proves that it resists chemical

with a one-sided load, so that the relatively broader part of the belt is used for carrying the load. These attributes are due to the fact that the steel belt is less flexible than the textile fabric.

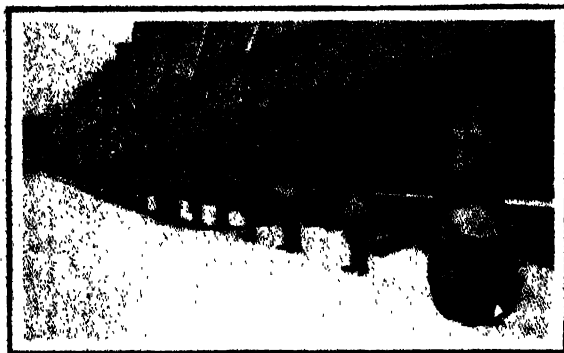
Due to the unavoidable vibration in a textile belt while running, the material conveyed has always a certain tendency to spread, and therefore the width of



Adjustable Scrapers Make It Possible to Discharge Part or All of the Load at One or More Points, as Desired

action remarkably well. However, it is a well known fact that there must not be any free sulphuric acid present, nor any soluble sulphuric salt in connection with moisture, on account of the corrosive action of a weak solution of sulphuric acid on steel, especially when warm.

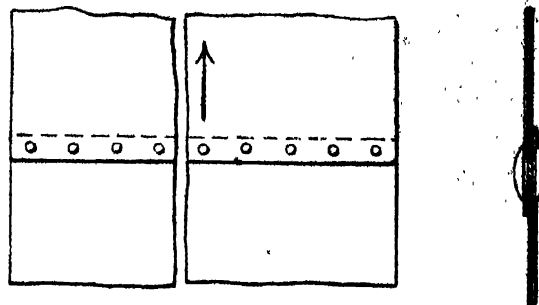
In the sugar, pulp, and lumber industries all over Scandinavia, where Sandvik conveyors are extensively used, the steel belts often run in the open air, subjected to the influence of rain, snow and sunshine, and



Steel Belt 285 Ft. Long, 16 In. Wide and 0.035 In. Thick, Weighing About 550 Lbs. This belt was cold rolled, hardened and tempered

have always been found to work well. The coating of rust that appears when such a belt is idle does not penetrate, but forms a thin film that protects the steel from further injury. When the belt is not in use for a considerable time, as is the case with the beet pulp conveyor, it may be found advisable to have it coated with a rust preventative.

As compared with flat rubber belts of the same width, the steel belt possesses greater transverse rigidity and therefore a higher capacity, as the edges, even

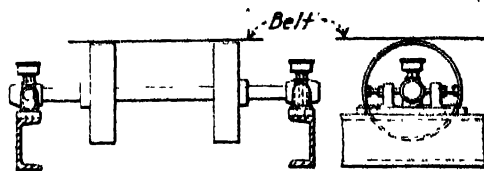


Riveted Joint for Steel Belt. The enlarged section shows form of button-head rivets

the loading area in most cases cannot exceed about one-third of the width of the belt. In the case of a steel belt, however, two-thirds of the width may be used without danger of spillage, because it runs so smoothly. This fact is also partly accounted for by the greater rigidity of the steel belt, which allows greater distances between the supporting rollers, thus less disturbance of the inertia of the material.

A special feature is the ease and simplicity with which material can be discharged at any desired point along the conveyor, without the use of cumbersome and expensive trippers. As the belt does not stretch, the tension devices are very simple, as they have to take up only trifling variations in length, caused by changes of temperature.

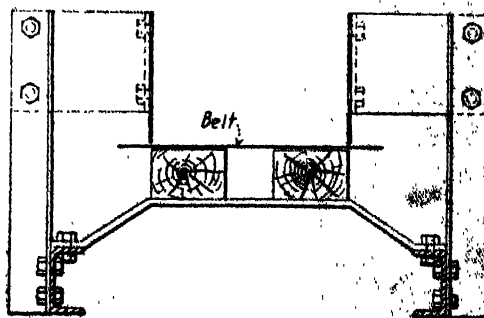
Through intimate co-operation between rolling mill, laboratory and technical men, frequently in touch with



Ordinary Type Idler Set Carrying Steel Belt

customers, manufacturing methods have been steadily improved, and the Sandvik flexible steel belt can now be obtained in one-piece lengths of up to 300 ft., with a width of 16 in. and a thickness of 0.035 in. The lateral deviation does not exceed 0.03 per cent. Before delivery all belts are carefully examined, both as to quality and straightness.

The Sandvik conveyor is designed in two ways



Section Through Sliding Trough Steel Belt Conveyor

either with the conveying strand sliding on a wooden support, sometimes fitted with skirting boards, trough-like, the return strand being supported on idlers, or else both strands of the band are carried on rollers in the usual fashion. The sliding type with or without skirting boards, is extensively used in Scandinavia

especially in saw mills and wood-pulp mills, for carrying wood of every description, such as boards, logs, chips and sawdust, also largely for charcoal, etc. Little wear is caused in this type, even for conveyors of considerable length, as the surface of the wooden band soon acquires such a polish that the friction, and consequently the power consumption, are almost negligible.

In connection with heavy, hard and abrasive materials the roller supported type is preferable, the material being placed centrally on the belt and the edges left free, as is the general practice with flat band conveyors. Steel belts cannot be troughed like textile bands, which reduces their capacity for the same width, but this is partly compensated for since, as pre-

viously mentioned, a flat steel belt has a wider loading area.

It is obvious that the introduction of the steel belt has widened the field of application of the belt conveyor, for textile and rubber belts are not suited for conveying hot and sticky materials. Such sticky material as sugar, for instance, can be cleanly and efficiently scraped off. Sharp-edged cutting materials, such as glass, can also be transported on this belt. Finally, material which on account of its high temperature cannot be handled on belts of rubber or balata, can be carried by the steel belt. All these advantages open up a wider field of usefulness for the belt conveyor, and should be welcomed by the engineer interested in the handling of materials.

Importance of Managerial Understanding of Welding

Study of the Conditions Necessary to Secure the Best Results—Checking Welders' Ability—Tests for Correct Welding

BY G. O. CARTER*

THE extent to which welding and cutting are employed in the major industries is not generally known. For example, there are 24 distinct uses of oxygen and acetylene, separately and as oxy-acetylene, in a steel mill. In some mills there are as many as 50 points where oxygen cylinders are supplied from the storehouse. Many other industries utilize welding and cutting in almost as many ways, and in many instances a single storehouse supplies a dozen or more shops of an establishment. The problems of distribution of the gases and the efficiency of application are, therefore, numerous.

Some managers may conclude, after reading this article, that welding and cutting are being fully utilized in their plants and that they are getting the best obtainable efficiency out of applications of these processes. Judging, however, from discussions of the subject with many executives, managers are just beginning to study welding and cutting. The tendency is definite, nevertheless, and it is attributable to the strides that have been made recently toward scientific standards in the matters of equipment, supplies, operative procedure and testing.

Study of established applications ought to interest almost every manager, and further use of the processes should result in large savings by replacing more expensive methods of production and by obviating the necessity for purchasing new equipment when breakdowns occur, to say nothing of reducing operating delays that are common in connection with mechanical replacements.

The whole history of welding is that its use so abundantly compensates the user that time spent in studying its applications is always paid back many times over. We must grant, however, that in the past there have been conditions which might justify managers in hesitating to use welding on some kinds of repair work, and the same considerations have warranted some doubt on their part concerning the advisability of some welding applications, such as the welding of pipe lines and pressure vessels. Fortunately, research and engineering have now surrounded welding with such practical safeguards in respect to correct practices and adequate tests that dependable results can now be definitely counted on; and the progress that has been made amply justifies conservative managers, however skeptical heretofore, in making a fresh investigation of modern welding as an operation capable

of improvement and development along standard lines of practice.

It is true that research and development have trailed behind the rapid growth in the use of welding and that the welder too often has been obliged to be a law unto himself—the judge of how his work ought to be done and of its final fitness. In the majority of establishments welding is the one industrial operation that the superintendent and master mechanic have been inclined to leave to the individual workman, or at the best to a foreman. Still, welding is very well managed in some plants and shops and it is these, rather than the less carefully managed ones, that show what welding can accomplish where correct practices are followed and when the managerial heads take advantage of late developments in welding the same as they do of advanced practice in other operations in their plants.

The day of managerial study of an attention to welding has definitely arrived, though tardily, as compared with cutting. Oxy-acetylene cutting differs from welding because the cutting jet is the equivalent of a machine tool; it will cut iron or steel where it is directed. The cutting process is one which saves a great deal of irksome manual work in cutting out rivets, severing plates, bars, shafts, etc., and, outside of its economy, is very popular with mechanics. The cutting process has quite naturally taken its place in production work in foundries, boiler shops, structural shops and similar places, and has therefore received considerable managerial attention, but even with this process altogether too much has been left to the operator.

Checking the Ability of Welders

Welders can and should be checked regarding their personal ability. Very simple tests soon indicate whether an operator of the welding torch is capable of making satisfactory welds. If he is working on steel plates, pipe or sheets, sample welds in the form of test coupons can be pulled in a physical testing machine and positive results noted. Average operators should produce welds stronger than 45,000 lb. per sq. in. and very good operators better than 55,000 lb. per sq. in., using Norway iron filling wire and joining sections of average boiler plate. What engineer would not be impressed by such results as compared with the strength of riveted construction?

Should a pulling machine not be available, a welder's coupon may be tested by bending in a vise. The weld should be level with the face of the vise and the test

*Consulting engineer, Liquid Air Products Co.

piece should be bent toward the side from which welded. A good weld will bend at least 30 deg. in heavy strips, or to 90 deg. in sheet steel welds. This test is easy to make and has been used for years in checking welding ability.

Employers should not be disappointed if their supposedly best operators sometimes fail to make good test bars. A little study will reveal the causes of failure, and point the way to avoid or correct them; and this only emphasizes the necessity for ability tests at reasonable intervals. By pursuing this course, managers can make sure that their welders are capable before assigning them to important work. But dependence on the ability of welders should be supplemented, whenever feasible, by the testing of their completed work.

It is generally admitted that welding is a thoroughly sound practice if properly done, but in some quarters there is an erroneous impression that it is almost impossible to know when welding is properly done. Therefore, although welding is giving better results than any other form for joining iron or steel pieces, it is not used to anything like the extent that it should be used. Getting proper welding is up to plant managers. Managers should make sure that their welders are capable of doing excellent work and see that they do it. Welders should be supplied the means of producing sound welds (one of the prime essentials is high-quality filler rods) and their work should be checked by as severe tests as possible. If these things are done, the high quality of the resulting work will be assured.

Welding Ammonia Receivers

As an interesting illustration, attention is called to one of the many large industries where welding has grown to be essential—making ammonia receivers for refrigeration plants. Riveted seams in ammonia receivers gave no end of trouble before welding was introduced; but, in taking up welding, the refrigeration industry had to insist on high quality work, as leakage of ammonia is very objectionable. Throughout this industry the necessity of checking the work of operations is recognized. Managers, superintendents and foremen make it their business to know about welding and the handling of welders and thus assure dependable welds. The result of this application, after the welding of tens of thousands of receivers, has been to firmly establish confidence in welding in the refrigeration field.

Welding of enameled tanks, the welding of rear axle housings for automobiles and auto trucks and many other interesting branches of industry in which welding is now a recognized production factor might be noted; but they would only serve to illustrate one of more properties that, in the welding of ammonia receivers, have been highly developed—the gas tightness of joints that must not leak, the strength of joints that must not yield under high internal pressure, resistance to fatigue and vibration under internal tension. It was but a logical step from ammonia receiver welding to general pipe welding as now practiced—the welding of gas pipe lines, oil pipe lines, water pipe lines and steam pipe lines.

Tests to Determine Correct Welding

Now let us consider some of the tests that can be employed to prove that any given piece of welding work is right. Industry is convinced that wherever hydrostatic pressure in excess of the working pressure can be applied it should be utilized as part of the test. While the pressure is on the work, repeated blows of a suitably weighted hammer should be given to the welded section. If there is a serious defect in the weld, this combined pressure and impact test will show it up. What manager would be in doubt as to the

strength and durability of welded pipe lines, storage tanks or pressure vessels that had passed a test of double the proposed working pressures and then hammered?

A feature of one other form of welding will be touched upon, as it offers big returns to the managers utilizing it. Repair welding of castings, no matter how large, can be made almost 100 per cent successful provided proper preheating and annealing facilities have been used as an important part of the work. Broken castings can thus be repaired in a fraction of the time that would be required for replacement and at a cost far less than that of replacement or of any other method of repair. There are single establishments having repair welding shops that average one big welding job a day, effecting the saving of tens of thousands of dollars yearly. Such shops should be as well organized and equipped as a machine shop or a foundry and have adequate preheating and annealing facilities.

Engineering Advice Available

Any investigation of the possibilities of the welding and cutting process as time and money savers should include the engineering advice which is available to those who seek it. Many of the manufacturing and supply companies maintain engineering and research departments. These devote their attention exclusively to the problems which come to them from the users' own work, and to the developments of the industry through aid rendered to present and potential users of gas welding and cutting. Standards of practice based on a contact with actual work being done in hundreds of plants have been well developed.

A large amount of information from these engineering and research activities as well as specific applications are featured by the trade journals which are devoted to the welding industry and other papers. These journals should be utilized for keeping abreast of current developments.

Because the oxy-acetylene process is a comparatively new tool in the hands of American industry, many users of the process are not fully aware of the tremendous strides that have been made in the direction of those standards of practice, tests, etc., which have marked the progress of other processes or operations that are to-day taken for granted as being in sound practice in every respect. There is hardly any feature of plant management and operation where time spent in study will pay as large dividends as in this field.

Luxemburg's Recovery in Iron

Luxemburg previous to the war was no small factor in the world's output of steel and iron, ranking equal to Belgium in 1912 and 1913. Like Belgium, it suffered severely from the war's devastation and its recovery in productive efficiency has been slow. In the first ten months of 1921 pig iron and steel output reached an average of 76,180 and 59,690 gross tons per month respectively. In 1920 the figures were 58,000 tons per month for pig iron and 49,000 tons for steel. In 1913, however, Luxemburg produced 209,000 tons per month of pig iron and 109,000 tons per month of steel. In the last two months reported—September and October of 1921—the recovery had reached more than 80,000 tons per month for pig iron and nearly 80,000 tons per month for steel, considerably exceeding Belgian output and nearly twice that of Canada.

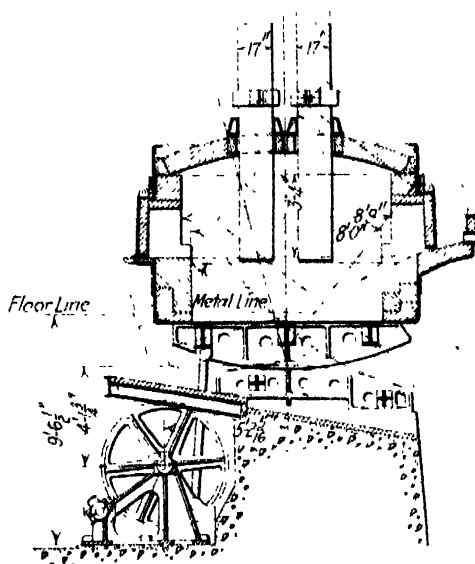
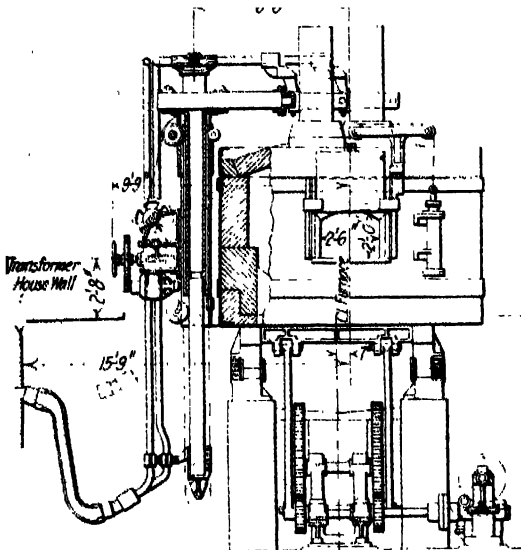
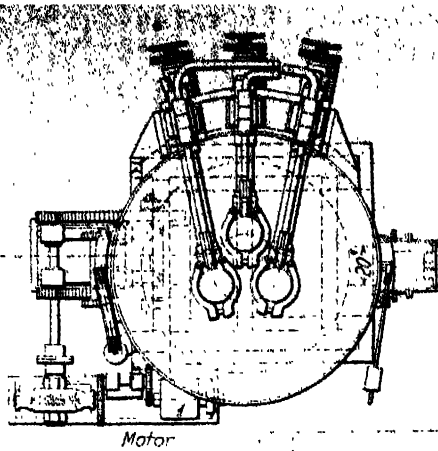
The Bessemer Limestones & Cement Co., Youngstown, Ohio, has contracted to supply the flux stone for the blast furnace of the Trumbull-Gilts Furnace Co. over the first half of the year at the rate of 2000 tons weekly. The company has sold upwards of one-third of its maximum output of cement for 1921.

NEW 7-TON HEROULT FURNACE

Details of Design Capable of Employing Mechanical Instead of Hand Charging

A new type of Heroult electric steel furnace has been designed by the American Bridge Co., 30 Church Street, New York. It is a 7-ton furnace, details of which are reproduced in the illustration. It is a departure from the other standard type of 1, 2, 3, 6 and 15-ton capacity in that arrangements are made for the use of a mechanical charger. A description of the new 7-ton type, furnished by the company, follows:

The lift of the electrode is extremely high and makes it possible to use a mechanical charger or scrap buckets without the possibility of breaking electrodes. The clearance is lower than in the



earlier furnaces and the only consideration to be taken into account for the crane height is the service for the electrodes. In case the furnace is located on a platform, the transformer can be placed underneath the furnace floor, giving a clear floor for working purposes. The furnace can be built either with the electrode supporting mast opposite the spout with two side doors or with the mast on the right or left side, with the charging door opposite the spout and one smaller side door.

The furnace shell is of the usual strong cylindrical construction, placed on rockers of special curvatures. In tilting the furnace the spout travels downward and slightly forward. It is therefore possible to rest the

ladle underneath the spout in pouring the heat. The tilting mechanism is located in a comparatively shallow pit underneath the charging level out of danger of damage. The tilting mechanism is of rugged construction, operated by a powerful electric motor. The electrode winches with their motors as usual are located on the electrode supporting mast, with the minimum length of steel cable for lifting the electrodes. This feature is important, as there must not be any lost motion between the winches and electrodes, in order to obtain good current regulation. In regulation the electrode is frequently moved only a small fraction of an inch at a time.

Inquiry as to International Harvester Co.

WASHINGTON, Jan. 31.—The Senate has adopted a resolution offered by Senator Norris of Nebraska, directing the Attorney General to inform the Senate what action, if any, is contemplated by the Department of Justice to bring about a modification of the decree of the court against the International Harvester Co. Senator Norris in his resolution contends that the consent decree agreed to on Nov. 2, 1918, by Attorney General Palmer provided that the International Harvester Co. should divest itself merely of certain minor and unprofitable properties. The resolution says that the report of the Federal Trade Commission under date of May 4, 1921, shows that the consent decree would leave the dominant elements, the McCormick and Deering plants, still in possession of the International Harvester Co., and would not result in effective competition and in reduced prices of farm implements to the farmers.

The resolution also contends that it is necessary to

procure complete separation of the McCormick and Deering interests, and calls upon the Department of Justice to make known what plans, if any, are contemplated to bring about a modification of the decree in order that it may comply with the judgment rendered by the court. In case such course is not practicable, the resolution says it is desired to know whether the Department of Justice contemplates any other independent action against the International Harvester Co. "for the purpose of eventually restoring competitive conditions between the various corporations" of the International company.

It is planned to put into operation this week two more sheet mills at the new plant of Follansbee Bros. Co., Pittsburgh, at Toronto, Ohio. This plant started up Jan. 16 with the operation of its bar mill and two sheet mills. No steel yet is being made at this plant, which for the time being is served from the company's original unit at Follansbee, W. Va.

Preparing and Distributing Powdered Coal

Modern Seamless Steel Tube Plant Adopts Pulverized Coal as a Fuel—Details of System in Use for Furnaces and Boilers

BY I. C. GRIESEN

S ELECTION of the proper fuel for a plant containing a variety of furnaces requires a thorough knowledge of the combustion of the various fuel available, temperature employed, adaptability and cost per Btu or per ton of finished product produced.

Two methods are available for obtaining approximate data, one being a careful observation and tally of data on existing installation and the other actual experiment. The Detroit Seamless Steel Tube Co. engineers chose the latter method. Pulverized coal appearing to be the fuel best adapted to meet their requirements, they installed in the early part of 1918 experimental equipment for firing one Edison annealing furnace at the West Jefferson Avenue plant. The results obtained demonstrated the advantages of pulverized coal over other forms of fuel they were using, and it was therefore incorporated in the plan for the new Warren Avenue plant. After a careful inspection of several recent pulverized coal installations the order for the complete coal crushing, drying, pulverizing, distributing, storing and burning equipment was placed with the Allis-Chalmers Co. in June 1919.

Two important factors enter into the success or failure of any installation. First the selection of the best equipment available; second the erection and operation by competent engineers. A number of charges are required on all installations of this type in order to obtain maximum efficiency; too much care cannot be taken in the selection of the engineer and operator.

A brief description of the flow of coal in this system from the truck hopper to the high pressure distributing tank is best explained by reference to the sectional diagram of the system.

From the coal car (1) the coal flows into truck hopper and thence through feed hopper onto pan conveyor (2). The latter forms a feeder for the spiked tooth crushing roll (3); the conveyor and crusher being

driven by a motor (6). The spiked tooth crushing roll reduces the run of mine coal to 1½ in. and finer.

From here the coal is spouted to elevator (7) and then into conveyor (8) which distributes the coal over bunker (10). Bin gates (11) permit the coal to flow into belt conveyor (12). The bin gates are made adjustable to regulate the height of the ribbon on the belt conveyor. At the head end of the belt conveyor is a coal disintegrator (13) which reduces the 1½-in. coal to ½ in. and finer. The coal, then being of proper size for economical drying, passes into an Elbro type dryer (14) discharging thence through hood (20) to feed pool (21).

The product of combustion are removed from the dryer by exhauster (15) and conveyed to cyclone collector (17) through a pipe. Coal dust, which is held in suspension by the draft through the dryer, is removed in the cyclone and spouted to the bin. The belt conveyor under the bunker, exhauster, disintegrator and dryer are driven through counter shaft from a motor (18).

Stack (19) has a damper, which is closed when dryer is in operation and open during standby period, to permit escape of the product of combustion. The elevator (22) driven by motor (23) raises the dried coal to dried coal bin (24). Feeder (25) regulates the flow of coal to the compub mill pulverizer (26); the pulverized coal discharging through casing (27) into pulverized coal elevator (1) through spout (30). Feeder and compub mill are driven by motor (28).

Elevator (1) driven by motor (32) raises the coal to storage bin (33), from which it flows by gravity into a high pressure coal tank (36), through rotary coal gate (34) and high pressure coal valve (35). The high pressure coal tank rests on a scale; the connections from tank to storage bin and distributing line (45) being flexible. The high pressure coal valve and ro-



Six Tube Annealing Furnaces with Storage Bins, Feeders and Air Supply Equipment Served by High-Pressure Distributing Line



FIG. 1. COAL PREPARATION PLANT

tary coal gate are operated by levers. The two-way valve (11) operated through chain (12), directs the flow of coal to either distributing line.

Distribution of the Pulverized Coal

In the plot plan are shown the distributing line leading to the various bins at the furnaces and boiler. A $\frac{1}{4}$ in. air line, with connection at intervals to the distributing line, is used to free coal line if it should become clogged. Switching valve located near storage bins permit filling of bins through branch lines. The distributing lines from the coal plant to the main building are placed underground to eliminate interference with the operation of the yard crane.

Coal for the pulverizing mill is injected into the combustion chamber by three screw-type coal feeders driven through adjustable friction disks from a common constant speed motor. Contrary to common practice, the air for combustion is supplied by one blower. A 10-ton capacity steel bin allows for sufficient storage for a day's run.

Each annealing furnace is supplied with coal from a 2 $\frac{1}{2}$ -ton bin and the necessary air for combustion for

the furnace from a single blower. The required amount of air for each furnace is regulated by means of a slide gate.

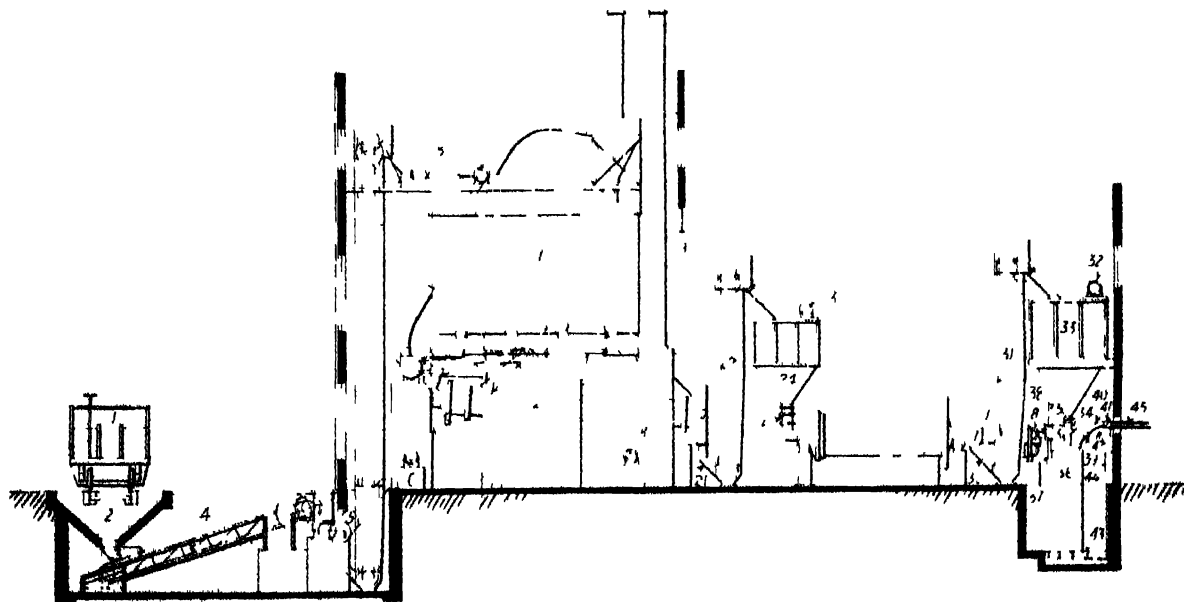
The pulverizing furnace is then supplied from a 2 $\frac{1}{2}$ -ton bin and the necessary air for combustion is furnished by a No. 4 type P. American blower Co. blower.

A 10-ton bin at the boiler supply both the 180 hp and 100 hp Erie City boiler (the 500 hp boiler being equipped for use only in case of emergency). The flues from the annealing furnaces enter into a common flue and dumps permit passing the pipe through the 100 hp boiler to the boiler. The boiler is used for heating the lading and the 180 hp boiler for supplying steam to the pumping and other pumps.

The coal pulverizing plant has a guaranteed capacity of 100 tons per hour and under normal operating conditions 10 hr. operation furnishes sufficient fuel for the entire plant for 24 hr.

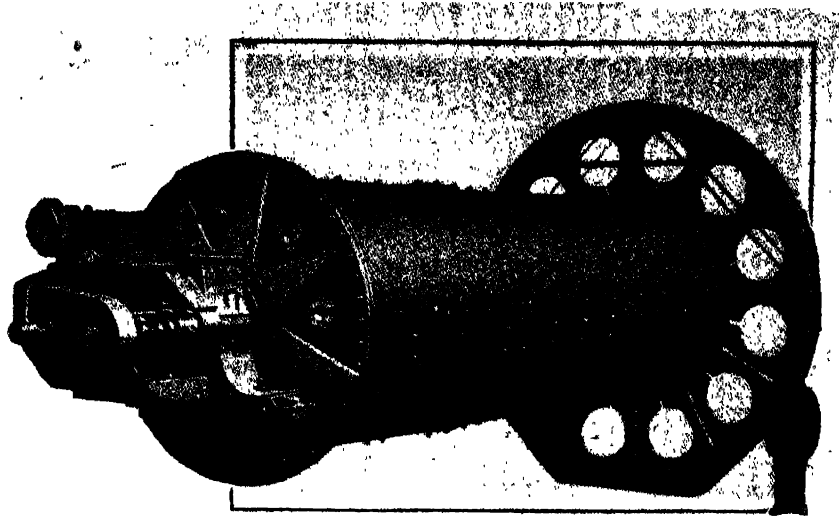
Coal Drying

The low temperature at which distillation of the volatile matter in coal takes place requires a dryer designed



Cross Section Through Preparation Plant, from Receiving Hopper at Left Through Bunker and Boiler in Center, Pulverizing Mill and Pressure Tank at Right

Some Idea of the Size of the Compeb Grinding and Pulverizing Mill May Be Obtained from the Man Alongside. The shell is made of heavily riveted steel plates

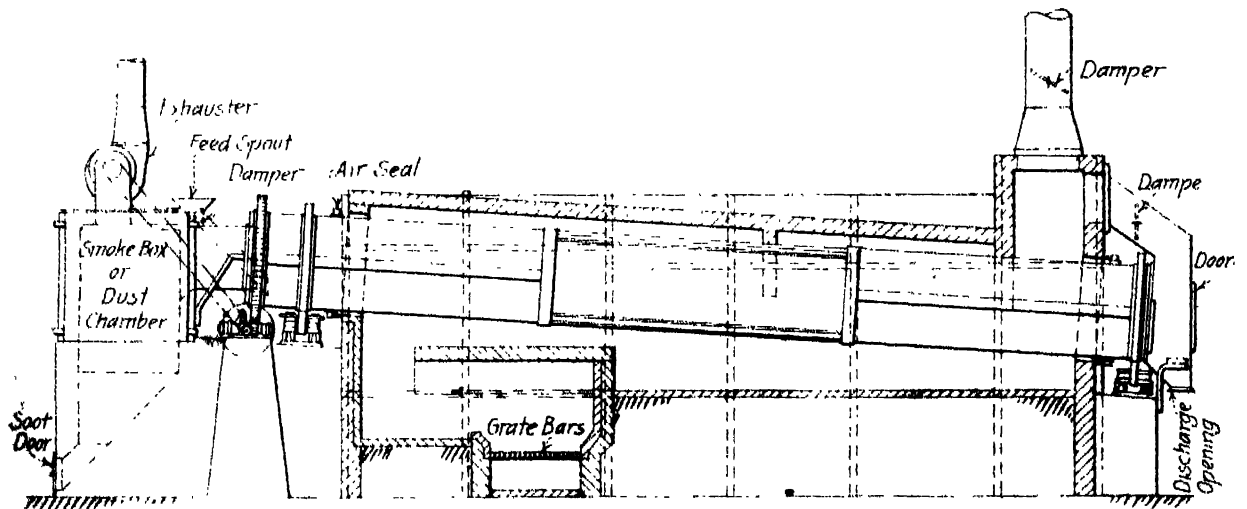


to meet this condition. In the Ebro or inclosed type of indirect-direct heat dryer, the shell is inclosed in a brick housing with the grates or combustion chamber located at the feed end of the dryer. The hottest flames are diverted from immediate contact with the shell by means of a protecting arch, and pass through the housing to the discharge end, heating the shell externally. The gases, considerably cooled, then pass

cyclone collector connected to the atmosphere by a stack.

Coal Grinding

A compeb mill, as shown, pulverizes the coal to a fineness of 90 to 95 per cent through a 100-mesh screen. The preliminary grinding compartment is lined with 3-in. chilled iron plates, the grinding media being



Ebro Type of Rotary Dryer for Pulverized Coal

to the interior of the shell through a hood at the discharge end.

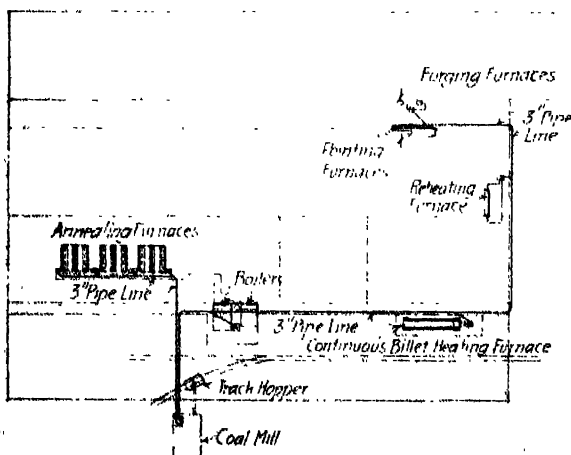
"I" beam lifters placed in the dryer shell shower the coal, thereby permitting the hot gases to come in contact with each particle of coal. The moisture laden gases are drawn from the shell by an exhauster connected to the feed end housing, and discharged into a

forged steel balls ranging in size from 2½ to 4 in. in diameter. The grid frame type division head retards the flow of coal to the finishing compartment, until it has reached a fineness that will allow it to pass through between the grid bars. The grid bars, made of tool steel with ends upset and ground for specified openings, are held in position by manganese keeper rings and manganese division plates. The cast spiral in the grid supporting frame advances the material to the lifters, which discharge the coal onto a central cone and into the finish grinding compartment.

The fine grinding compartment is lined with 1¼-in. chilled iron liners and charged with 1¼-in. diameter concave as a grinding medium. The discharge from the mill is accomplished by placing perforated manganese steel plates, lifters and a central discharge cone at the discharge end. As the mill operates in a horizontal plane, the quantity of material fed to the mill regulates the fineness, to a large extent.

Blowing the Coal

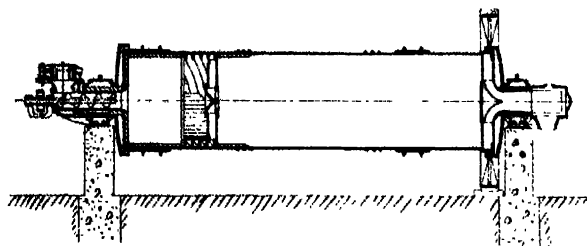
During the filling period the rotary coal gate, high-pressure coal valve and vent valve of the high-pressure blowing tank are open, the high-pressure air line valve and straight way valve being closed. When the scale indicates the required quantity of coal in the blowing tank, the rotary coal gate, the high-pressure coal valve and vent valve are closed, in the order named. The high-pressure air line valve is then opened, and pressure in tank brought up to air receiver pressure. With



Layout of Pipe Lines and Connections to Distributing System at Plant of Detroit Seamless Steel Tubes Co.

the two-way valve set for the proper distributing line, the straight way valve is opened, and coal delivered to any desired bin by setting the two-way valve at the bin before blowing.

The system works on the injector principle, the amount of air required per pound of coal being proportional to the pressure used and the distance the coal is to be transported. The outer pipe, which surrounds the injector pipe inside the blowing tank, is adjustable, and maintains a clear passage for the air

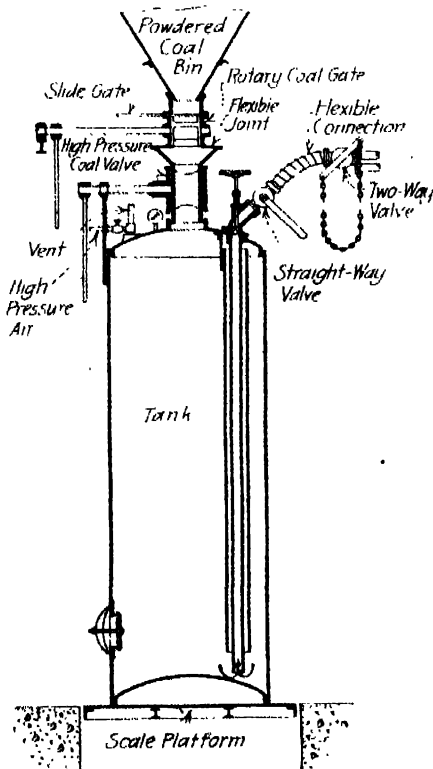


Longitudinal Section Through Compab Mill, Which Pulverizes the Coal

from the inlet valve to the injector pipe at bottom of tank. The greater the distance from the end of the outer pipe to the injector pipe, the greater is the proportion of coal to air.

To obtain maximum efficiency, adjustments should be made on each installation until only sufficient air is used to transport the coal the maximum distance without clogging the line.

If the operator wishes to transfer part of the coal



Pressure Tank and Connections, Showing Method of Operation

with the blowing tank to another bin, the straight way valve is closed and the purge line valve opened to clear the distributing line. The two-way valves at the furnaces are then adjusted and the straight way valve opened. The amount of coal conveyed to each furnace is weighed, permitting accurate records of consumption per ton of finished product for each operation.

At the regular monthly meeting of the Detroit Chapter of the American Society for Steel Treating, Monday evening, Jan. 23, Henry Traphagan, consulting metallurgist, Toledo Steel Castings Co., Toledo, Ohio, discussed "Fatigue in Steel."

Metallurgical Coke by Froth Flotation Process

The beneficial effect on the physical strength of metallurgical coke made from coking coals after treatment by the Froth flotation process of cleaning has been further demonstrated by practical trials that have taken place in South Wales under the supervision of Minerals Separation, Ltd., according to Ernest Bury in the *London Iron and Coal Trades Review*. The results of one of these tests are set out in Table I:

Table I - Test of Metallurgical Coke Made from Coking Coal Cleaned by the Froth Flotation Process

Analysis, etc.	Coal	Flotation Coke	Ordinary Coke
Ash (per cwt.)	4.50	8.00	.....
Sulphur (per cwt.)	0.97	1.14	.....
Volatile matter (per cwt.)	20.64	0.28	.....
Moisture (per cwt.)	13.45	0.86	.....
Specific gravity	.....	1.39	.....
Porosity	.....	1.40	.....
Crushing strength (lb. per sq. in.)	.....	2,076	1,500 and under

Further research has demonstrated that, where the coking properties of a coal are neutralized by the presence of fusain, differential flotation may be applied for removal of the latter, leaving a residual fuel strongly coking in character. Success in this direction is shown by the series of semi-commercial tests on Scottish coals given in Table II, which before treatment were very inferior in coking properties (the coking constituent thus separated is denominated bright in the table).

Table II - Samples of Coke Made from Scottish Coals After Treatment by the Froth Flotation Process

Material	Weight, Per Cent	Moisture, Per Cent	Ash, Per Cent	Analysis, Btu.	Volatile Matter, Per Cent	Coke
Original	100.0	...	5.74	13,273	31.32	.....
Bright..	80.0	8.0	4.34	13,760	26.12	Good
Dull...	20.0	...	10.36	12,877	25.73	.....
Original	100.0	...	15.32	12,081	22.36	.....
Bright..	70.5	18.0	4.56	13,661	26.52	Very good
Dull...	29.5	...	50.08	.....	17.92	.....
Original	100.0	...	8.30	12,877	26.54	.....
Bright..	53.7	6.4	4.90	13,273	23.60	Good
Dull...	46.3	...	11.78	12,680	22.69	.....
Original	100.0	...	8.30	13,075	34.65	.....
Bright..	63.3	...	4.34	13,850	33.37	Very good
Dull...	36.7	...	11.58	12,877	33.21	.....

This section of the research is in its early stages, and it is not yet to be inferred that the minerals separation processes are applicable to all non-coking coals for obtaining a coking product. It may, however, be taken as established that, where the non-coking properties of a coal are due to the presence of fusain, the fusain can be removed, leaving an excellent coking product.

This discovery marks a new stage of development in the preparation of metallurgical fuels. Many iron ores are at present unexploited owing to a dearth of coking coal, and the differential method may well lead to far-reaching economic developments in those countries at the moment industrially impotent in so far as concerns coking coal.

Building Construction in 1921

F. W. Dodge Co. reports that the total amount of construction contracts let in the 27 Northeastern States, during 1921, amounted to \$2,359,018,000, which is about 8 per cent less than the \$2,565,000,000 of 1920. The character of construction differed markedly from the previous year, for 37 per cent of the total, or \$880,052,000, represented residence building, an increase of 54 per cent over 1920. Industrial buildings dropped to 7 per cent of the total, at \$173,325,000.

The Kentucky Refractories Corporation, Russell, Ky., plans shortly to erect a plant at Russell. The first unit is to have a daily capacity of 75,000 standard brick. The corporation has 3000 acres of clay lands adjacent to the plant location. The officers of the corporation are: C. K. Turley, president; R. T. Hipp, vice-president and general manager, 1016 East Main Street, Massillon, Ohio, and A. J. Ivey, secretary and treasurer.

TO RELIEVE FARMERS

Many Remedies Proposed at Agricultural Conference at Washington

WASHINGTON, Jan. 31. The iron and steel industry, as is the case with regard to all other industries, as well as the financial and commercial life of the nation, recognizes the necessity of restoring the purchasing power of the farmer in order to bring about a return of normal business conditions and this is the outstanding feature which gained attention at the conference here last week of agricultural interests of the country, called by President Harding through Secretary of Agriculture Wallace. It obviously remains to be seen what the actual results of the conference may be, but there was confident hope expressed by many delegates who attended that a constructive program was adopted which at least aimed in the right direction. This opinion disregarded some of the artificial and absurd remedies suggested, and also discounts the activities of "bloes" and disgruntled groups, which, as was to be expected, were present. At the same time, there are those who have grown skeptical of the advantage to be gained in conference hearings, ms, etc. which, despite their numbers in the past, appear to be more numerous than ever until many consider there is a positive plethora of them, some of which frequently do more harm than good. It is pointed out that some of these undertakings seek to fly directly in the face of natural economic laws and consequently can do injury only, instead of either permitting such laws to work their way alone, or to assist them by sane methods.

Delegates to the agricultural conference insist that they have resorted to the latter course, and, for one, have done good by focusing the attention of the nation upon the depressed condition of agriculture as could not have been done in any other manner.

Recommendations made included:

Passage by Congress of laws providing intermediate credits for farmers through commodity financing pending which the War Finance Corporation would be continued.

Amendments to the Federal Reserve and farm loan acts to provide easier and freer money for farmers.

Investigation by Congress of the subject of crop insurance.

Constitutional amendment prohibiting issuance of tax free securities except bonds and other obligations of Federal farm loan banks.

Reenactment of an excess profits tax and equal consideration for agriculture with other industries in any tariff policy. Opposition to any consumption, sales or manufacturers' tax.

Representation by the United States "in a conference with economic and financial reconstruction of Europe" in order to learn what the United States can do regarding the reestablishing of international credit.

Reduction of freight rates on farm products, live stock and products of allied industries to the level existing before the general rate advance of Aug. 26, 1920, and restoration of certain rate-making powers to state railroad commissions.

Readjustment of rates on other commodities to follow as quickly as possible.

Legislation to prevent the railroads from including the "land multiple" in making up their revaluations.

Development of the Mississippi, Ohio and Missouri rivers as arteries of commerce and establishing of joint water and rail rates.

Opposition to repeal of the Panama canal tolls.

Development of hydroelectric power projects to make current available to the smaller consumer on the farm and in the village and closer coordination of railroad, waterway and highway transportation.

Appointment of a commission urged to work out a national land policy, including reclamation, irrigation, grazing and colonization problems in co-operation with similar bodies in the various states.

Participation by railroad labor and railroad corporations in the general price "deflation."

The last named recommendation was adopted after the conference voted to strike out a recommendation for the repeal of the Adamson eight-hour law and the "bringing down" of wages of railroad and industrial labor to a parity with returns received by farmers, which had been urged by President Stackhouse of the Implement Manufacturers' Association. President Samuel Gompers was the principal opponent to the recommendation urged through Mr. Stackhouse. The

substitute adopted was declared by one delegate as being a "milk and mush" affair.

The conference also approved a proposal that the St. Lawrence-Great Lakes waterway project be completed and after a heated debate took favorable action on the proposal to repeal the 6 per cent guarantee clause of the Esch-Cummins act.

Some of the recommendations adopted are opposed by industrial and other interests of the country and undoubtedly will be fought if they are put in the form of proposed legislation. Among them are those which are considered paternalistic and calling for distinctly class legislation. One is the recommendation for a constitutional amendment, unlikely of passage if it ever comes before Congress, prohibiting issuance of tax free securities "except bonds and other obligations of Federal farm loan banks." Another is the recommendation for reenactment of an excess profits tax while still another relates to the opposition of the conference to any consumption, sales or manufacturers' tax.

Timber Men Behind Great Southern Steel Corporation

The identity of some of those financially interested in the Great Southern Steel Corporation has been disclosed. This company, incorporated in Delaware with capital stock of \$105,000,000, and later granted a charter in Alabama with capital stock of \$500,000, as announced in THE IRON AGE on Dec. 15 and Jan. 12, plans to develop 101,000 acres of iron ore and coal lands located about 65 miles from Muscle Shoals. Among those interested in the company and mentioned as probable directors are P. M. Starnes, 208 South La Salle Street, Chicago, who has large timber holdings in various parts of the country; J. S. Stearns, lumberman with plants at Ludington, Mich.; Judge H. W. Seaman, Chicago, and John I. Beggs, head of the Milwaukee Electric Railway & Light Co., Milwaukee. A formal announcement of the names of the officers and directors, as well as details concerning the plans for the company will probably be given out within the next fortnight.

Fords Will Help Lincoln Motor Car Co.

DETROIT, Jan. 31.—Henry Ford and Edsel Ford both have stated personally that the Ford interests will come to the rescue of the Lelands and the Lincoln Motor Car Co., Detroit, which is now in the hands of a receiver. The Fords intimated that they would bid at least \$8,000,000 at the receiver's sale next month, and rumor has it that they will bid the price up to \$11,000,000, if necessary.

Both the Fords stated that if the Lincoln organization was purchased, the Lelands would be retained in their present capacities and that no changes would be made except to have the purchasing done under Ford management and to institute Ford manufacturing methods. The Lincoln cars would be sold by present distributors, except where Ford dealers were equipped to do so and could do so to advantage.

United States Exposition Building in Brazil

The contract for the construction of the exposition building to house the exhibits of the United States at the great Brazilian Exposition next September has been awarded to Dwight P. Robinson & Co., New York, which already has large construction work under way for the Brazilian Government in Northeastern Brazil. Representatives of the company and of Frank L. Packard, architect, of Columbus, Ohio, who will design the building, sailed recently for Brazil to begin the work at once. The exposition will open at Rio de Janeiro on Sept. 7 and will commemorate 100 years of Brazilian independence.

It was recently announced at the White House that the American building would be of permanent construction and so designed as to permit of its being converted into an embassy for this country's diplomatic representative after the close of the exposition.

New Blast Furnace Replaces Pioneer

Modern Equipment Provided for Warwick Furnace Plant—Pre-Revolution Activities of First Warwick Stack

CONSTRUCTION of the original Warwick furnace was started in 1737, and the plant was first operated in 1738. It was located on the south branch of French Creek in Chester County, Pa., about 10 miles southwest of Pottstown, where the remains of the furnace are still to be seen. This early plant, probably the largest operating in the Colonies, made many castings for the early husbandry. It is credited with having cast the first of the stoves invented by Benjamin Franklin.

In the Revolutionary period the furnace was actively engaged in casting cannon for the Continental army, and during the activities of Howe's troops in the vicinity of Philadelphia some of the Warwick cannon were buried for safety, on the furnace property. In the early fall of 1777, before Washington met the British at Brandywine, the American army was encamped for a time at Warwick. The subsequent operations of the furnace are woven into the early history of iron making in Pennsylvania, and the narratives of American manufacture of sixty years ago give prominence to the enterprise at Warwick. It was not until 1867 that this furnace made its last blast, its stoppage being accelerated by increasing difficulties of obtaining charcoal, and also to a great degree by its inaccessible location.

Following a successful campaign of over a century and a quarter, it seemed natural, when a new iron enterprise was formed in the vicinity, that the projectors should perpetuate the name of Warwick. Accordingly, a charter was granted March 30, 1872, to the Warwick Iron Co., headed by Jacob H. Gabel as president. Construction of the new furnace was begun in 1875, and the first blast put on in 1876. The stack, built of brick, banded with iron hoops, rested on masonry columns; its dimensions were 55 ft. in height with a bosh diameter of 16 ft. The furnace was blown with six tuyeres, the blast being supplied by a single 96 x 40 in. by 7-ft. stroke non-condensing engine, while the air was heated in two iron pipe stoves. The ores used were mainly local, and the fuel principally anthracite coal.

In 1877, Edgar S. Cook, who had displayed remarkable ability as a young man in blast furnace prac-

tice, took charge at Warwick, and installed a chemical laboratory at the furnace—one of the first steps in this direction in the East. With the aid of technical advice from the late John Birkinbine, Mr. Cook made changes in the lines of the furnace which, with other improvements, raised the production of iron from 190

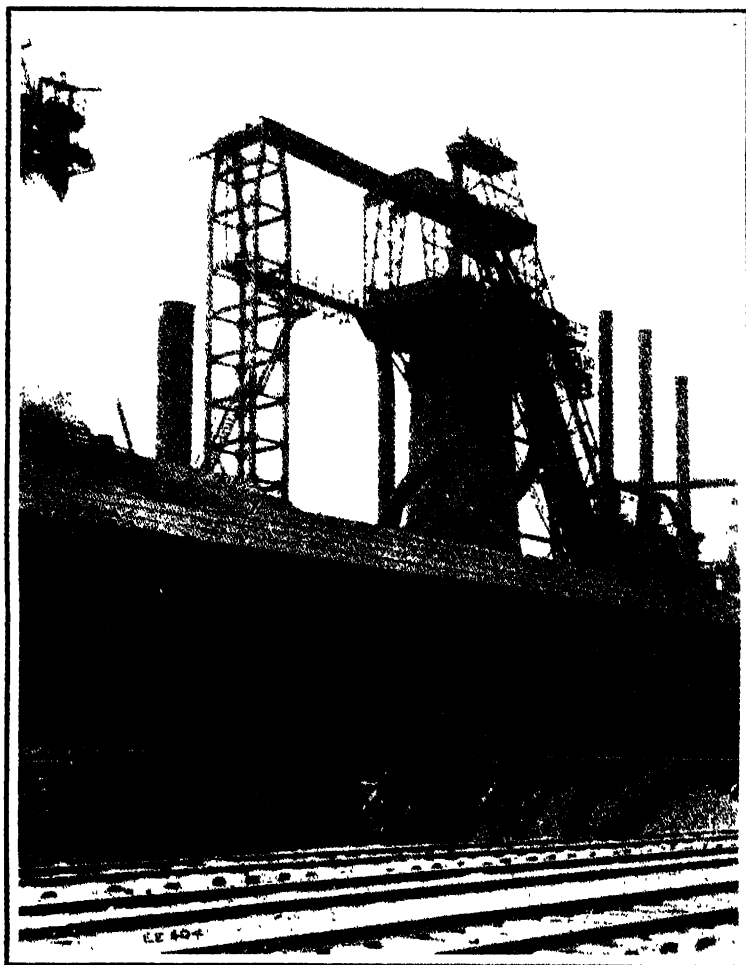
to 350 tons per week. From December, 1880, the furnace started on a campaign which lasted five years, the output averaging over 100 tons per day, and the plant proceeded upon a successful career.

In 1892, after a careful investigation of fire brick stoves then in use, Mr. Cook installed a set of three Hugh Kennedy type, each 30 by 60 ft., replacing the iron stoves of the Durham pattern. This radical change brought forth both friendly criticism and skepticism from the leading anthracite iron masters, who at that time were staunch adherents of the iron type stove. The new stoves were designed by Hugh Kennedy, then manager of the Isabella plant near Pittsburgh, and from outward appearances resembled the ordinary dome top type of the present, except

that they were surmounted by a pair of squatty chimneys which gave them an unusual look.

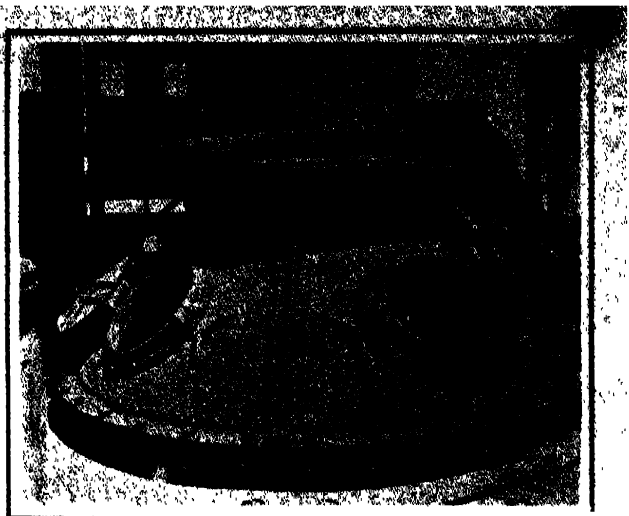
Revival of the iron business, following the long stagnation from the panic of '33, brought much expansion in the industry, and the Warwick Iron Co. was reorganized into the Warwick Iron & Steel Co. in 1899. At this time a new furnace was projected, and construction was commenced in 1900. The program included an entire new plant to supplement the existing unit, with the addition of a pig casting machine of the Uehling type. The furnace was 100 by 22 ft., with four stoves of the same height, and the stack was the first of that size to be built in the East. The lines of the new furnace were obtained by proportionate enlargement of those of the older stack, which had done such good work. But it was found in actual practice that these lines did not give the desired results, and several changes had to be made before the furnace gave satisfactory grades and output.

While the original stack had been improved by the replacement of the Hugh Kennedy stoves by stoves of larger dimensions and of a center combustion type, the



Stack Bridge Has Independent Shear Leg Support. Such tower at left supports end of trolley beams, as it from center of furnace

company felt justified in erecting a third furnace to be used as an alternate, in the event that either of the two stacks were out of blast. Accordingly, furnace "A" was constructed, of the thin-lined type, located between the two built previously, and arranged to be used with the stove and power equipment of either No. 1 or No. 2 furnaces. This unit had the general characteristics of the type much exploited some 10 years

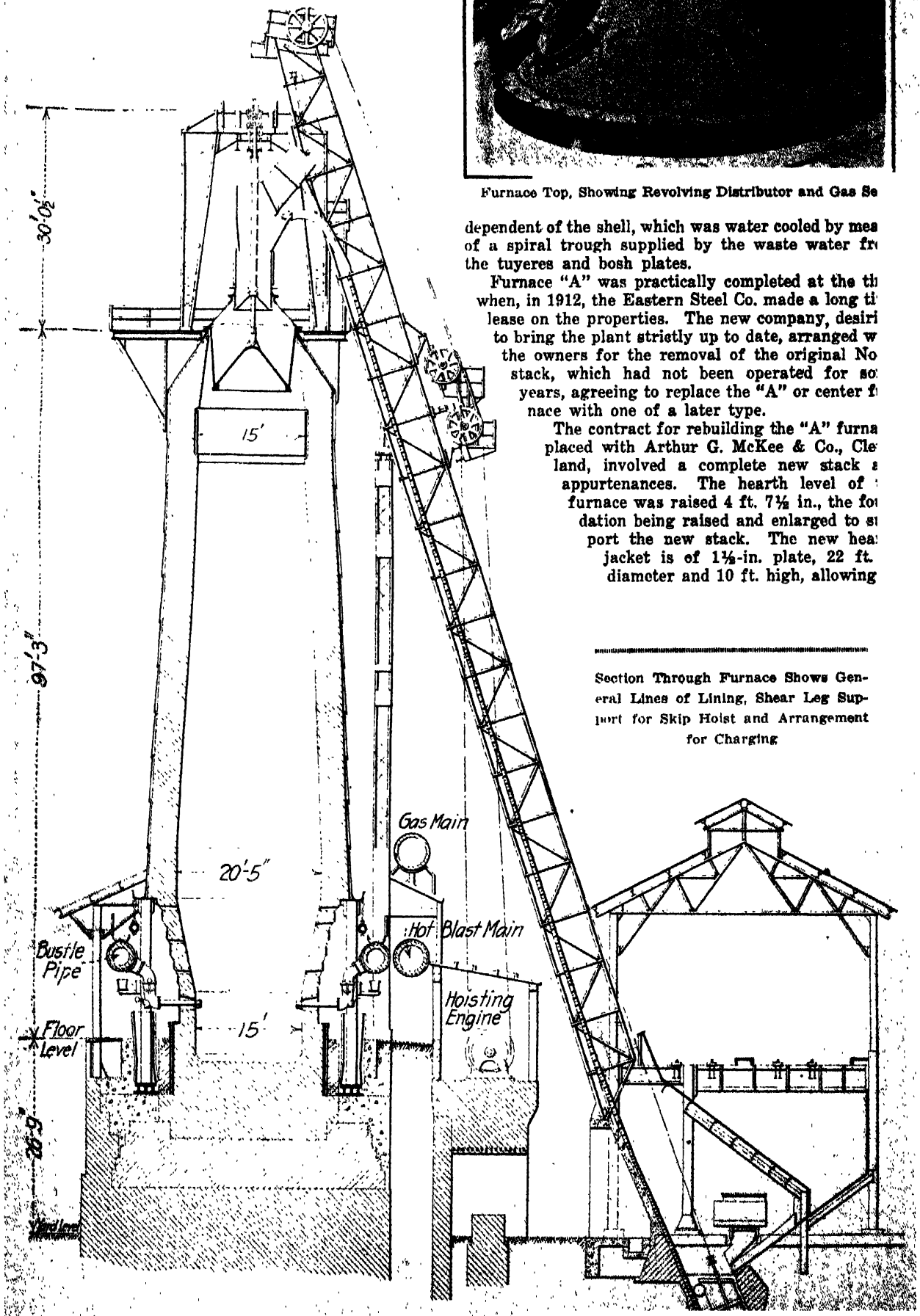


Furnace Top, Showing Revolving Distributor and Gas Seals

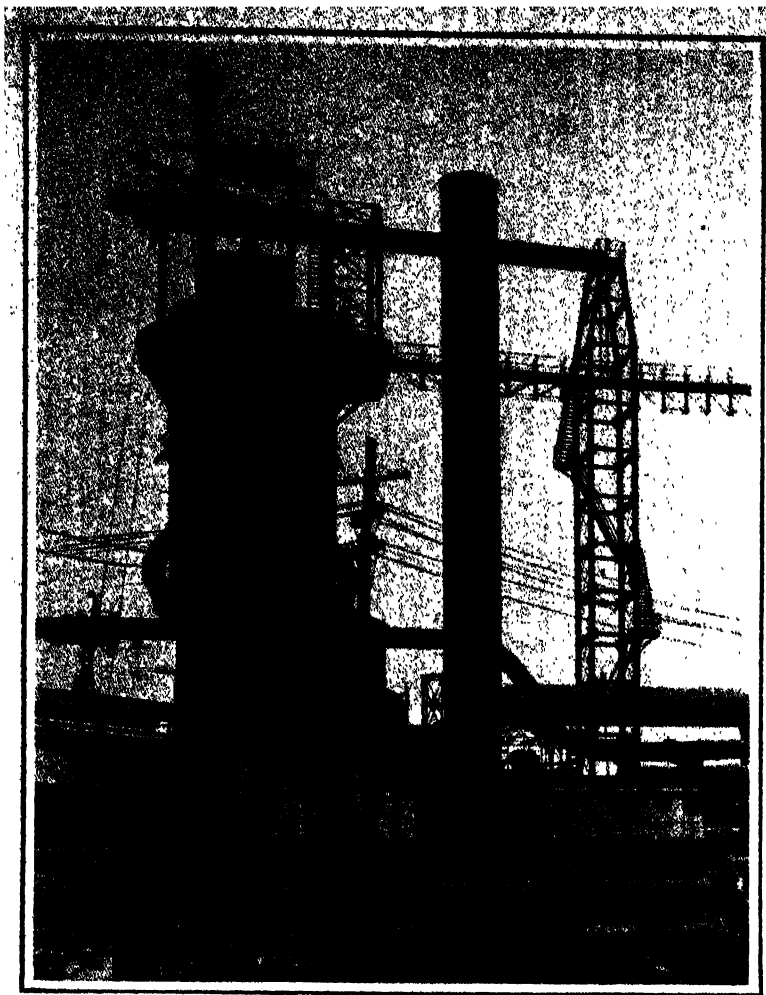
dependent of the shell, which was water cooled by means of a spiral trough supplied by the waste water from the tuyeres and bosh plates.

Furnace "A" was practically completed at the time when, in 1912, the Eastern Steel Co. made a long time lease on the properties. The new company, desiring to bring the plant strictly up to date, arranged with the owners for the removal of the original No. 1 stack, which had not been operated for some years, agreeing to replace the "A" or center furnace with one of a later type.

The contract for rebuilding the "A" furnace was placed with Arthur G. McKee & Co., Cleveland, involved a complete new stack and appurtenances. The hearth level of the furnace was raised 4 ft. 7½ in., the foundation being raised and enlarged to support the new stack. The new hearth jacket is of 1½-in. plate, 22 ft. diameter and 10 ft. high, allowing



Section Through Furnace Shows General Lines of Lining, Shear Leg Support for Skip Hoist and Arrangement for Charging



General View of Furnace, Showing Trolley Girder and Trolley at Right

hearth diameter of 15 ft., as compared with 14 ft. in the old furnace. The drawing shows the sectional elevation of the furnace, furnace top, skip bridge and stock bins. The tuyere jacket is 19 ft. 6 in. inside diameter, 4 ft. 7 in. high, of 1-in. plate. The furnace shell is of $\frac{3}{4}$ -in. plate, the mantle ring being of 1-in. plate and heavy angles.

There are eight columns, spaced alternately at 50 deg. and 40 deg. angles. This allows the uniform spacing of the twelve tuyeres, two tuyere stacks being placed in each 50 deg. and one each in 40 deg. space. The columns are of structural shapes, these being considered more reliable and less bulky than cast iron columns.

Hearth and bosh cooling system consists of eight rows of copper cooling plates. The experience of the engineers has brought out the inadvisability of cooling plates above the mantle, and the construction of recent furnaces with few exceptions bears this out. The hearth brick are also cooled by cast iron cooling plates inside the hearth jacket. The new lining consists of approximately 497,000 fire brick, 9 in. equivalents.

The furnace top was entirely rebuilt. A new platform of 5/16 in. plate with solid hand railing is supported by the cast steel furnace top ring and structural brackets. The top structure combines all facilities of a modern furnace top, with a compactness and co-relation of parts not often realized. Three structural "A" frames supporting the trolley beams are mounted on the platform, two of these forming a tower.

A novel scheme was developed to utilize the old vertical hoist tower of the furnace. This was rebuilt and equipped with stairway and platform, and so placed as to support the ends of the trolley beams, thus allowing them to extend to the unusual distance of 68 ft. from the furnace center line. The trolley has a capacity of 25 tons, sufficient to handle the load of the large bell and hopper taken together.

The large and small bell beams, as shown in the drawing, are supported by the trolley beams, and

are pivoted on a single forged steel shaft with special adjustable bearings. The large beam only is counterweighted, the additional counterweights required being provided at the bell cylinders, which are placed at the cast house level. The bell beams are connected with the bell cylinders by steel cables for closing the bells, the adjustment of counterweights being such that the bells open by gravity.

The skip bridge was raised to conform with the new furnace height, and the angle steepened from 67 deg. to 71 deg. 47 min. from the horizontal. The bridge is supported by a shear leg independent of the furnace stack, and has a plate deck under the rails. At the top of the bridge is an auxiliary trolley beam for handling the bell beams. As the hoist house is under the skip bridge, the skip ropes are brought through the bridge by guide sheaves, as shown in the drawing.

The new large bell is of cast steel, 11 ft. 3 in. in diameter, with 50 deg. slope. The large bell rod is forged steel, 5 in. in diameter. The stock distribution is accomplished by a McKee revolving distributor, equipped for automatic recurrence of a six skip, six position cycle.

Four new downcomers were provided, connecting to the old pipes. The downcomer connections at the top of the furnace are of the McKee patented type, made up of cast steel. They serve as a preliminary dustcatcher, in that the gas must turn at a sharp angle to pass the baffle and enter the vertical outlet, thus causing the particles of stock carried with the gas to strike the end of the inclined pipe, or the baffle casting, and



Furnace Top from Stair Tower, with Revolving Distributor and Downcomer Castings in Lower Part of View

roll back into the furnace. The arrangement of down-comer castings is shown on page 1539, THE IRON AGE, June 9, 1921. One bleeder 36 in. in diameter by 41 ft. high was installed.

Three 75-ton hot metal ladle cars were purchased and put in operation. These are of the mixer type and are motor operated.

SHIPBUILDING DECLINES

Falling Off in 1921 of Over 1,500,000 Gross Tons as Compared with 1920

The shipyards of the world during 1921 launched over a million and a half gross tons less of vessels than in 1920, says a statement just issued by Lloyd's Register of Shipping.

In the United States alone, it is pointed out, the decrease was 1,470,000 tons. British yards also showed a decline from the 1920 figure, but this drop of over half a million tons was largely offset by a gain for other countries of 467,000 tons.

The comparison between the launchings for the two years is shown by the following table, prepared by Lloyd's Register, giving the gross tons:

	1921	1920
United States	1,006,113	2,476,253
United Kingdom	1,538,052	2,053,624
Other countries	1,797,211	1,329,789
World	4,341,679	5,861,666

While the 1920 total of launchings by American shipyards was greater than for that of either the British yards or those of other countries, it is stated, the lead of 420,000 tons over Great Britain for 1920 was transformed to a British lead of 531,000 tons last year, while the gap of 1,146,000 tons, representing the American lead over other countries in 1920 was converted into a lead of 790,000 tons for those nations last year.

For the first time since the war, Lloyd's Register gives figures of production by German shipyards, and these explain why the aggregate for other countries than the United States and the United Kingdom increased in comparison with 1920, while the American and British totals declined.

Launchings by German shipyards during 1921 are given as 509,064 gross tons, or 42,000 tons more than the gain for all other countries than America and Britain, so that the minor nations, excluding Germany, showed an actual loss on the year's output.

The most significant feature of the German returns, however, is that they show that the shipyards of Germany have now more than regained their pre-war production. Launchings for that country during 1913 aggregated 465,000 gross tons, and as that was the record year for launchings of merchant ships in Germany, last year's total sets a new figure.

While the production during 1921 for the world was 2,803,000 gross tons less than in the record year of 1919, it was more than a million tons in excess of the 1913 world total. The output for the pre-war year and for the record year of production are shown in the following table:

	1919	1913
United States	4,075,355	276,000
United Kingdom	1,620,442	1,332,900
Other countries	1,448,722	1,124,000
World	7,144,549	3,332,900

It will be noted that while British shipyards last year launched less in actual tonnage and in the proportion of the world's total than before the war, the other countries showed gains in both respects. While the United Kingdom built considerably more than a half of the world total in 1913, the 1921 output was only slightly more than a third of the aggregate. The following shows the proportion of the annual world output by the different shipbuilding nations before and since the war (by percentages):

	1913	1919	1920	1921
United States	8.3	57.1	42.2	28.2
United Kingdom	58.0	22.6	35.1	35.4
Other countries	33.7	20.3	22.7	41.4

Within the past year, it is shown, the American

percentage of the world's total was cut almost in half. Britain's percentage gained slightly and that of the other countries almost doubled.

In some respects, the launchings for 1921 show gains over those for the previous year. Tanker construction for instance increased almost 65 per cent over the 1920 figure. Two-thirds of this class of building was done in the United States, but gains were made by Great Britain and the other countries, as the following figures, giving the launchings in gross tons of vessels of 1000 tons and over for the two years, show:

	1921	1920
United States	690,308	567,000
United Kingdom	250,868	65,400
Other countries	109,180	8,000
World	1,050,356	640,400

Increases are also shown in the number of large vessels being constructed. In comparison with 82 ships of 10,000 gross tonnage and over reported launched in 1920, there were 47 last year.

Motorship construction continues to gain. Vessels to be fitted with internal combustion engines, which were launched last year, total 306,642 gross tons, as against 189,977 tons in 1920. A decline is indicated, however, in the construction of ships fitted with turbines, the aggregate of this class of ships for 1921 being 1,195,000 tons compared with 1,825,000 tons the previous year.

About 40 per cent of the total construction in British shipyards last year was for foreign account, 591,870 gross tons being launched for buyers abroad.

Following Great Britain and the United States in the amount of tonnage launched last year comes Germany, Holland, Japan, France, Italy, and the British Dominions are next, in the order named. Japan and the British Dominions show declines from the 1920 total, but gains were made by the others. The production of these countries, for the two years, was as follows:

	1921	1920
Holland	232,402	182,149
Japan	227,425	456,642
France	210,868	93,449
Italy	164,748	133,190
British Dominions	129,675	208,644

The total of shipbuilding orders in hand at the beginning of this year, throughout the world, according to the returns of Lloyd's Register, represented 4,457,000 gross tons. As a great part of this has already been launched, however, and little in the way of new work is being placed, the 1922 total of launchings will probably be well below the 1921 figure of 4,341,000 tons.

Coal and Coke Production

UNIONTOWN, PA., Jan. 30.—Very little change is being shown in coal and coke production in the Connellsville bituminous district. While there is a continued contract inquiry, few contracts are reported and the upward turn is not being manifested so soon as many conservative observers had anticipated.

Coke production in the region, tabulated for the week ending last Saturday, was 86,550 tons.

Officials of the Frick Coke Co. entertained 40 plant officials of their Ronco plant at the Country Club here in recognition of the new regional plant production record set at Ronco in December. W. H. Clingerman, president of the company, and Clay Lynch, general superintendent, were the speakers of the evening.

Government Will Sell Steel

WASHINGTON, Jan. 31.—The Emergency Fleet Corporation will receive bids up to Feb. 8 on a tonnage of plates, shapes and bars at the Duval Corporation Shipyard, South Jacksonville, Fla., most of which is said to be in good condition. It includes 6136 tons of unpunched plates ranging from 3/16 in. to 1-in. in thickness; 535 tons of Scotch boiler plates, 117 tons of diamond floor plates, 2790 tons of fabricated material, of which 80 per cent are built-up members; 736 tons of plain angles and 211 tons of miscellaneous material, principally steel bars of different shapes and ranging from 1 in. to 3 in. in diameter.

Sulphur Obtained from Blast Furnace Slag

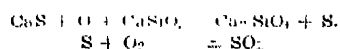
The Diehl Process and Apparatus Developed in Germany—
Yields from Slags from Steel-Making,
Foundry and Bessemer Irons

THE obtaining of sulphur from blast furnace slag is discussed by Prof. L. H. Diehl of Oberhausen, Germany, in an instructive article in a recent issue of *Stahl und Eisen*. Several paragraphs are devoted to the importance of sulphur in modern industrial life, and to the fact that before the war about 1,000,000 tons of pyrites, 250,000 tons blende and 30,000 tons sulphur were imported into Germany each year. During the war every effort was made to increase the output of German deposits of pyrites and zinc blende, and efforts were made to obtain sulphur from the large beds of gypsum and anhydrite (natural anhydrous calcium sulphate). Unfortunately efforts in these directions have not been entirely successful and there is today a scarcity of sulphur in Germany.

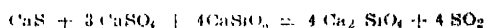
It was therefore desirable to investigate every available source of sulphur, which led the author to work on blast furnace slag. Even if its sulphur content is small the total amount is very large. The slag production in Germany before the war was approximately 20,000,000 tons, with sulphur running from 1 to 2.25 per cent and averaging 1.50 per cent. This represents

at least 300,000 tons of sulphur thrown away each year. Because of this large available supply, efforts were made to develop it and the method worked out protected by a war patent.

The Diehl process consists in obtaining sulphuric acid by oxidation of the calcium sulphide in blast furnace slag by means of air or by sulphates such as gypsum or anhydrite, with the help of air. The chemical reactions are very simple. The calcium sulphide unites with oxygen and gives lime which changes to ortho-silicate, and at the same time free sulphur is liberated. With sufficient excess of air this is burned and, if not, it passes off unburned with the gases.

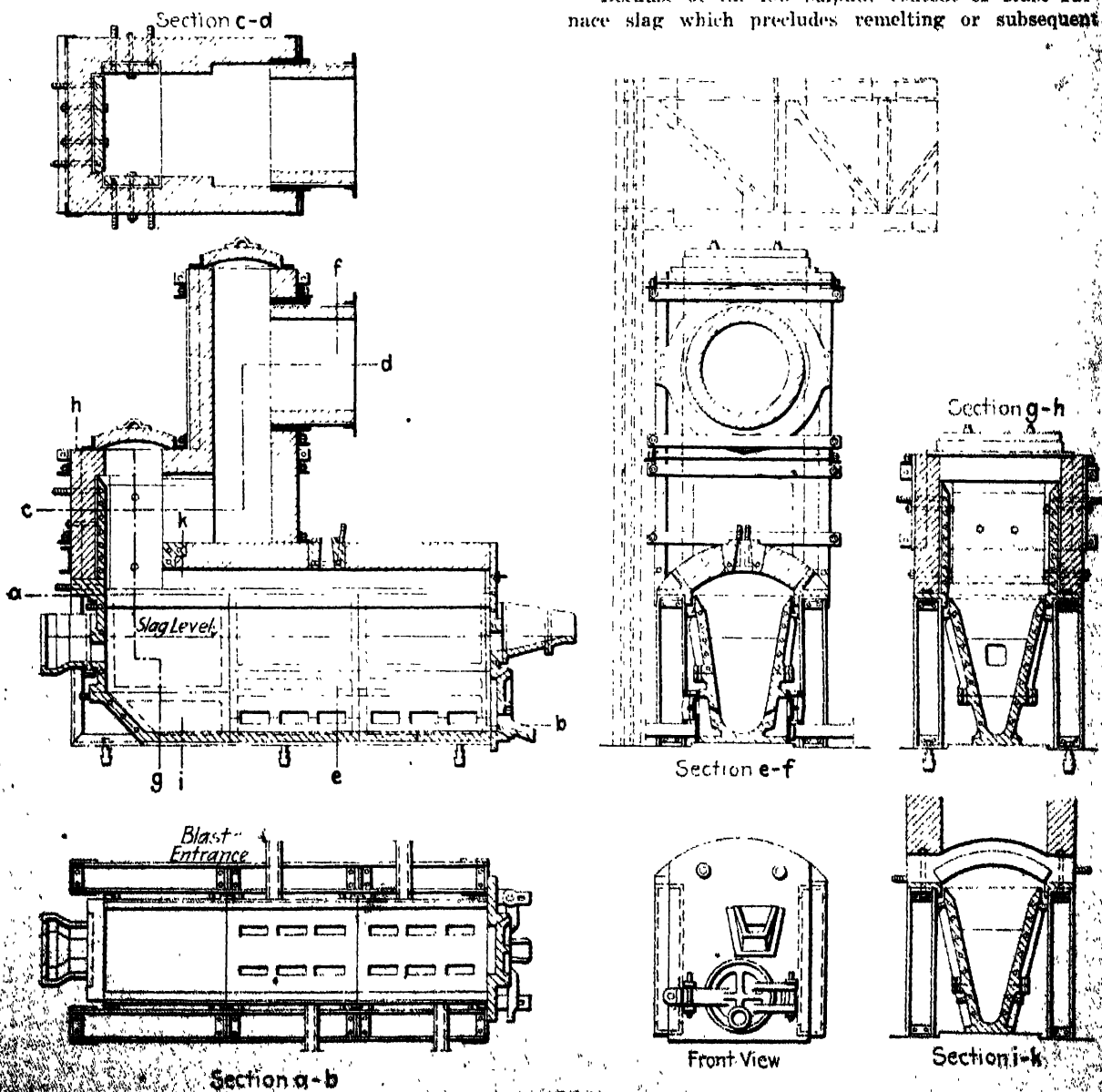


The reaction when calcium sulphate is present is as follows:



It should be mentioned that calcium sulphide and sulphate cannot exist together in a molten silicate slag, as is the case in the solid condition.

Because of the low sulphur content of blast furnace slag which precludes remelting or subsequent



treatment, all the work was done on the molten slag as it came from the furnace by blowing air through it. Preliminary tests carried out with molten slag and oxygen gave a gas containing 23.1 per cent SO, by volume. Further experiments showed that a slot-shaped tuyere gave a richer gas than a round one. Following these tests an apparatus was designed that has been used successfully for several months at Gutehoffnungshütte. Its construction is shown in the illustration, which gives sectional and front views. The body consists of a gray iron casting with pipes for water cooling in the casting. In the bottom at each side are openings in which tuyeres can be placed. According to the kind of cast iron plates placed in these openings two, three or four slots can be used, one over the other. Blast boxes are arranged along the sides. When the apparatus is warm and the slag hot and fluid, the pressure uses from about 2 to 3½ lb. per sq. in. and often it rises to about 4½ lb. if the slag is colder, due to the formation of a spongy solid slag above the tuyeres.

At the end of a run of slag, the tapping hole is opened and the slag drained off. Then the working door is opened and the crusts and scales around the tuyeres broken and removed. The slag coating on the apparatus itself is allowed to remain unless it breaks off automatically, as it protects the metal against sudden changes of temperature, and also serves as an insulator for the slag, preventing unnecessary cooling.

In regard to the action of the different slags the following may be said: The sulphur output is higher as the slag is hotter and higher in sulphur. Acid slags give off sulphur more easily and more thoroughly than strongly basic slags. However, the latter are usually hotter and higher in sulphur, so that good results are obtained.

The change in appearance of the slags after treatment is interesting. It is known that slags with large amounts of calcium sulphide are milky because of numerous needles of sulphide. Such slags after treatment become completely clear and glassy, a proof that the sulphide is decomposed and the lime dissolved in the body of the slag. In some cases, with high sulphur slags and insufficient air, free sulphur is produced. This cannot be used as a method for obtaining free sulphur, but it explains the tremendous flame seen when air is blown through hot liquid slag rich in sulphur, the sulphur vapor burning in a long flame. This flame is intensively white with a violet tinge, due to lime vapor being present as a white mist.

If the gases produced in the process are conducted through iron pipes, an incrustation of white salts is produced, consisting almost entirely of potassium bisulphate. The temperature of the gases is about 930 to 950 deg. C., measured away from the range of radiation from the fluid slag.

The apparatus shown, measuring 3.5 meters (11 ft. 5½ in.) long, 0.6 meter (1 ft. 11½ in.) wide and 1.4 meters (4 ft. 7 in.) high, was sufficient to treat all the slag from a large blast furnace making 180 to 240 tons of pig iron each 24 hr. It is compact, and stands up well in practice. Average results obtained over several months on slag when making iron for open-hearth furnaces are given in Table I.

TABLE I

Air Treated Blast Furnace Slag from Steel-Making Iron		
Original Slag, Sulphur, Per Cent	Treated Slag, Sulphur, Per Cent	Sulphur Removal, Sulphur, Per Cent
2.35	0.97	1.38
2.21	1.15	1.06
2.35	1.34	1.01
2.44	1.26	1.18
2.44	1.19	1.25
2.45	1.20	1.25
2.40	1.15	1.25

These slags throughout were hot and fluid. A test on slag while making low phosphorus gray iron showed 1.55 per cent S, in the slag entering and 1.03 per cent

S, in the slag leaving the apparatus. The gas gave 10.37 per cent SO, 1.2 per cent CO, 2.3 per cent O, and 84.63 per cent N, all by volume.

Table II gives the results on basic Bessemer slags both with and without the addition of anhydrite, CaSO. These tests ran for over a month. The oxygen content of the gases was in all cases sufficient for the change of the SO, to SO, whether the chamber or contact process was employed. The percentage varied from 9.5 to 10.5 per cent by volume.

TABLE II

Composition of the Obtained Gases, showing Percentage of SO ₂			
Without Addition of CaSO ₄	With Addition of CaSO ₄	Without Addition of CaSO ₄	With Addition of CaSO ₄
5.70	7.27	3.60	8.46
4.93	6.34	3.19	10.34
5.11	5.63	5.77	7.76
4.50	7.57	6.11	7.66
5.63	10.85	6.51	6.87
8.09	9.95	7.10	7.17
7.58	6.81	8.39	6.37
5.03	8.19	8.96	6.86
6.20	7.78	9.85	6.97
5.92	8.88	5.57	14.11

The gases obtained by the Diehl process contain on the average 6 to 7 per cent SO, small amounts of CO, from 1 to 1.2 per cent, and about 10 per cent oxygen, while the rest is nitrogen. There is entire freedom from arsenic, chlorine, fluorine, carbon monoxide, sulphur and dust or similar impurities, except for small amounts of potassium bisulphate which can be easily removed. The gas is therefore remarkably suitable for the production of specially pure sulphur products such as liquid sulphur dioxide, sulphites such as sodium sulphite or sodium bisulphite, sulphuric acid or fuming sulphuric acid. A very rich gas can be obtained if a sulphate such as calcium sulphate is added to the slag while air is blown in. In this way the heat of the slag is used for decomposition. After treatment the slag can be used exactly as before and for granulating, slag wool, building purposes, etc., it is better because of the lower sulphur content.—G. B. W.

Report on Waterways Improvements

WASHINGTON, Jan. 30.—Of particular importance to iron and steel shippers is the report of the joint commission which studied the proposed improvement of the St. Louis River as an outlet of the Middle Western States and the Atlantic Coast. In a statement issued yesterday Congressman Nelson of Wisconsin stated that the analysis of testimony showed sentiment in Canada and this country favoring the proposed improvements. He insisted that the inquiry showed the need of opening this waterway to the resources of the Middle West, which is particularly rich in raw materials of the basic industries, such as iron ore, coal and copper. The commission reported that "no consideration of the economic practicability of the proposed St. Lawrence waterway can afford to ignore the important group of problems involving the relationship between rail and water transportation. In this group are included such questions as car and locomotive shortage, the terminal congestion, terminal and trans-shipment charges, rail rates and water rates, marine insurance and refrigeration." The expenditures recommended amount to \$252,000,000.

The commission believes that while it is physically practicable to bring both railroads and terminals up to the point where they could handle the traffic of the United States without serious congestion, the expense involved would be enormous, amounting in the opinion of experienced railroad executives, to two billion dollars per annum over a series of years, and it is perhaps questionable if in the end the relief afforded would be comparable to that promised by the creation of an all-water route from the interior of the continent to the Atlantic seaboard.

The commission is of the opinion that it would be desirable to make further study of the alternative plans before taking any definite action.

Silico-Thermy and Its Practical Application

German Iron-Silicon Castings of "Thermisilid" Made by Thermal Reactions—The Silicides Which Are Formed—Properties of the New Alloy

BY C. A. HEISE

AT a meeting held by the German Metallurgical Society, several months ago, Richard Walter, Düsseldorf, read a paper on a novel process of producing silicon alloys of a pre-determinable chemical constitution developed by the author. A synopsis of the paper follows:

Positive heat changes, due to reactions, are a feature of the smelting of iron and silicon which has not been subjected to detailed scientific research thus far, though they have been observed by other scientists devoted to the study of this particular field. The only possible explanation of these heat changes must be sought in the formation of silicides. If soft iron and silicon are simultaneously heated in a crucible, a spontaneous heat reaction will set in at about 1200 deg.

by the enormous heat as, for instance, cement or calcium carbide. Such is the heat generated by the formation of ferrosilicides that 80 per cent of the iron of the FeSi silicide and 67 per cent of that of the FeSi silicide are not only liquefied but even considerably superheated.

When it is considered that the liquefaction is solely due to the liberated heat of the reaction, it is obvious that the melting process, aside from its interesting thermo chemical features, has also economic bearings which are worth studying. A certain analogy with aluminothermy—which, if silicon is used as a reducing agent, may be classed under silico-thermy—is apparent, a common feature of both being chemical transformation and positive heat changes with the differ-

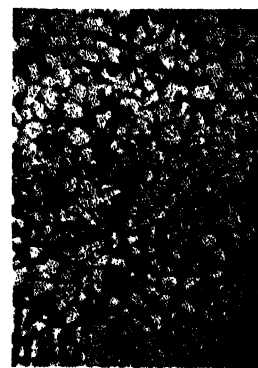
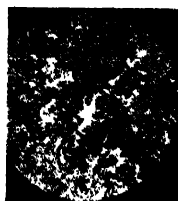


Fig. 1 (Left) Is a Photomicrograph of a Silicon-Iron Alloy Formerly Produced in a German Foundry, While the Small Photomicrograph, Fig. 2, Represents the Structure of Tantalum. The third photomicrograph, Fig. 3, is one of Ironac, and Fig. 4 (right) is a reproduction of the structure of the new iron-silicon alloy, Thermisilid

Celsius or considerably below the melting points of the two components, which will liquefy the charge within a few seconds, leaving behind a highly superheated metal.

The Silicides Formed

The silicides thus formed are either FeSi or Fe₂Si or their more or less saturated solutions in iron, according to the stoichiometric proportion of the quantities of the two components. The silicide, FeSi, for instance, is obtained by proportioning the solid charge in a ratio of 80 per cent iron and 20 per cent silicon. The temperature of the bath immediately upon termination of the reaction was ascertained by test observations to be 1800 deg. Celsius and above. Both micrographic and chemical analyses confirm the fact that the molten metal crystallizes as a homogeneous body. An exact chemical transformation is thus taking place and it is interesting to note that the components react in a solid state already several hundred degrees below their melting points under simultaneous liquefaction. Owing to the swiftness of the reaction, a precise measuring of the temperatures is difficult and largely restricted to the measuring of the temperature at the termination of the reaction by an optical pyrometer when, however, a notable drop in temperature has doubtless already taken place.

An empirical method of obtaining some temperature data consists in adding such bodies to the charge which, while not participating in the reaction, are yet liquefied

ence, however, that a reduction is taking place in the aluminothermic process.

Silicides of Other Metals

Similar heat changes have been observed in the formation of silicides of other metals of the iron groups, such as manganese, nickel and cobalt, as well as with the metals of the chromium groups, chromium, tungsten and molybdenum.

The carbon content of the silicides plays a decisive rôle in the silico-thermic reaction, the exothermic process being hindered by carbon and, with certain percentages of carbon, no heat changes being noticed at all. The most violent reaction is observed with non-carboniferous iron, especially electrolytic iron, but the intensity of reaction decreases with an increasing carbon content. With cast iron no visible heat changes were noticeable at all, the silicon being mechanically separated from the iron under a simultaneous elimination of elementary carbon. Another result of the high temperature incident to silico-thermic reaction is the formation of a further carbon combination, silicon carbide (SiC).

Silicon Alloys in Industry

Silicon alloys are of importance to the chemical and associated industries on account of their resistance to acids and other aggressive matter. One of the oldest representatives of the silicon alloys is the

so-called neutral iron, (7 to 8 per cent Si). Some 15 years ago, British foundrymen began to increase the silicon percentage up to about 15 to 17 per cent, the new alloy being marketed under the name of Tantiron.

Fig. 1 is a photomicrograph of the structure of an alloy formerly produced at a German foundry. The honeycombed surface, the result of a separation of graphite when cooling down, illustrates better than any text the unserviceableness of the alloy for products required in the chemical industry. The instability of the structure of the Tantiron, shown in Fig. 2, is clearly revealed. The darker parts represent a carboniferous iron-silicon solution with an average Si content of 15 to 17 per cent, the lighter spots sprinkled in between are iron silicide, FeSi , of 33 per cent Si. The simultaneous occurrence of the two bodies having different silicon contents is, of course, bound to cause instability. Fig. 3 shows the American metal Ironac, characterized by the dendritic constitution of crystals. This material is known for its extraordinary hardness but is hardly suitable for castings.

Unstability Due to Different Silicides

It is mainly due to this unstable character that these alloys have on the whole met with little favor in the chemical industry. Castings made of such alloys will easily develop cracks, the casting stresses being partly due to the tendency of the structure to change over into a state of balance, but even more so to the difference in contraction of the various silicides. The primary aim of the author, therefore, was to avoid an agglomeration of bodies of different constitutions, in other words: To produce a metal composed of one uniform silicide only. Such an alloy would consist of a chemically uniform body and therefore be in a state of balance.

Now, the ordinary melting methods heretofore followed were mainly in the nature of physical processes, though occasionally accompanied by synthetic formations of silicides. The only reliable way of effecting a chemical combination, however, is by way of reaction or transformation. Such a transformation is taking place in silico-thermic reactions. The photomicrograph of an alloy produced by this process is shown in Fig. 4. The arrangement of the polygonal crystals distinctly reveals a lawful orientation, the bright spots being the silicide, FeSi , while the darker mass represents a carboniferous solution of silicon in iron. The photomicrograph furthermore characterizes the homogenous and equalized alloy which is free of interior stresses.

This metal lends itself to castings the production of which has met with insurmountable difficulties so far

and is claimed to answer requirements by the chemical industry in a far higher degree than all its predecessors. In order to obtain satisfactory results, several other factors have to be considered in the practical application of the process which are primarily calculated to control the behavior of the carbon. Further details in this respect were not disclosed by the author on the plea of safeguarding the interests of the German industry. The alloy produced in this novel process has been given the name "Thermisilid" by the inventor and is being produced by the Friedrich Krupp Aktien Gesellschaft and the Esslingen Engineering Works. A range of samples of thermisilid products is shown in Fig. 5.

An Inexpensive Process

The silico-thermic reaction, which has been shown to be a simple and cheap melting process, may also be advantageously applied in other fields of metallurgy, particularly where a certain silicon content is required in the product, as is the case with dynamo and motor sheets. Another possibility of applying the process is the production of solid reactionary bodies consisting of ferrosilicon and small iron scrap which are formed into briquettes with cement as a bond. These briquettes will liquefy immediately upon reaching the temperature of reaction and will be serviceable wherever silicon is to be added to the charge, as for instance in foundries.

In conclusion it may be mentioned that while the thermisilid is highly acid-proof, it does not enter into corrosion where a rust-proof material is required. Regrading the workability of thermisilid, machining operations are still confined to grinding on account of the hardness of the alloy. It is hoped to improve upon this drawback so as to render "chip producing" machining operations possible. The strength of thermisilid is below that of cast iron.

The Millville Iron Works, Inc., Millville, N. J., has begun operations in its new plant. It will manufacture tanks and stacks, structural iron work mainly for bridge purposes, also repair boilers and do oxy-acetylene cutting and welding. The company has completed its purchases of equipment. Samuel Campbell is president; Daniel Campbell, vice-president, and Lester Fleetwood, secretary-treasurer.

W. B. Storey, president the Atchison, Topeka & Santa Fe Railroad, has announced that an extension 58 miles long will be built in Kansas to tap a rich wheat growing district in Stanton and Grant counties. This is the largest new construction project to be undertaken by a railroad since the pre-war period.

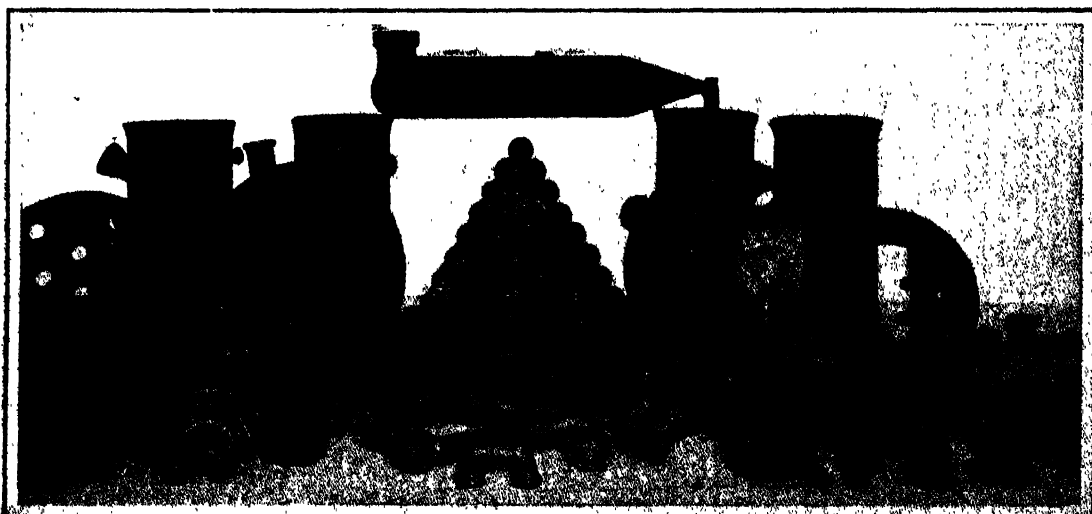


Fig. 5—Various Castings Which Have Been Made of the New German Iron-Silicon Alloy "Thermisilid" Produced by the Heat of the Chemical Reaction

February Meeting of the Mining Engineers

The 125th meeting of the American Institute of Mining and Metallurgical Engineers will be held at the Engineering Societies Building, New York, Feb. 20 to 23. The program for the two sessions on iron and steel on Wednesday, Feb. 22, follows:

10 a.m.—Room 1.

"Application in Rolling of Effects of Carbon, Phosphorus and Manganese on Mechanical Properties of Steel," by W. R. Webster.

"Acid Open-hearth Process for Manufacture of Gun Steels and Fine Steels," by W. P. Barba and Henry M. Howe.

"Effect of Sulphur and Oxides in Ordnance Steels," by W. J. Priestley.

"Electrolytic Deposition of Iron as Applied to Building Up Worn or Undersized Parts," by D. R. Kellogg.

2 p.m.—Room 2.

"Effect of Time in Reheating Quenched Medium-carbon Steel Below the Critical Range," by C. R. Hayward, D. M. MacNeill and R. L. Presbrey.

"Effect of Quality of Steel on Case-carburizing Results," by H. W. McQuaid and E. W. Fehn.

"Malleablizing White Cast Iron," by Arthur Phillips and E. S. Davenport.

The first of these sessions is in memory of Prof. J. W. Richards.

On Monday morning, Feb. 20, there will be a meeting of the committee on breakage and heat treatment of drill steel at which B. F. Tillson will preside. The regular smoker will be held in the evening.

Two sessions of the Institute of Metals Division are scheduled, one for Monday afternoon, Feb. 20, and one for Tuesday afternoon, Feb. 21. Symposiums on oil, gas, mining and on industrial relations fill the programs for other sessions.

The annual banquet will be held at the Hotel Pennsylvania on Wednesday evening, Feb. 22.

Several excursions are planned for Thursday, Feb. 23. The Crucible Steel Co. of America's plant at Harrison, N. J.; the Bayway plant of the Standard Oil Co. of New Jersey and the chrome plant of the U. S. Metals Refining Co. are to be selected from by those interested.

Drop Forge Association Activities

The recent organization of the American Drop Forging Institute, to serve the interests of drop forging makers in extending the field of use of such forgings, has apparently resulted in the suspension of the American Drop Forge Association. The latter association was made up of the heads of the drop forging departments of the various manufacturing plants like automobile plants, and also of the commercial and technical executives of the independent drop forging companies.

There is now a plan for the new association to carry on the practical matters formerly handled by the American Drop Forge Association. Four or five groups of the technical and shop men will be formed to meet at intervals to discuss shop practice and annually to review activities. It is the expectation that the institute, combining all the subjects of interest to the industry, will cover a wide field and be more useful and valuable than was the association. A uniform cost system is actively being studied under the supervision of the Cleveland office of Scovell, Wellington & Co., in the Hanna Building, that city.

Buffalo Engineering Society in New Quarters

The Engineering Society of Buffalo, with a membership of 600, now has permanent quarters in the Iroquois Hotel, Buffalo. These quarters are fitted up as a club and have, after two months, resulted in a marked increase in interest in the activities of the society.

At the January meeting of the Society, Jan. 10, there were two speakers. E. B. Neil, Pierce Arrow company, spoke on "Progress in Worm Gear Designing." Capt. George H. Norton, representing the city planning commission of Buffalo, outlined the activities of the commission.

On Jan. 24 the first of a series of luncheon meetings

was held. Arthur C. Pound, under the subject "Men, Mills and Minds," covered the psychological effect of automatic machinery on industrial workers.

The regular monthly meeting, Feb. 14, will be addressed by Ralph H. McKee, Ph.D., professor of chemical engineering, Columbia University, on the subject of "Gasoline from Oil Shale."

Steel Manufacturers Join Standards Committee

Beginning with 1922, the American Railway Association (Engineering Division) and the Association of American Steel Manufacturers became member-bodies of the American Engineering Standards Committee.

The Association of American Steel Manufacturers is an organization of forty iron and steel manufacturing companies. Its activities are limited to the standardization of rolling mill practices and to the standardization and inspection of iron and steel products. The association was organized in 1895. Its official representative on the American Engineering Standards Committee has not yet been designated.

The American Railway Association, which speaks for practically all the steam railroads of the country, has four technical branches, each having its own secretary, the engineering and the mechanical divisions, and the signal and the telephone and telegraph sections. The engineering division, which is intimately connected with the American Railway Engineering Association, the two organizations having the same officers, covers broadly the civil engineering activities of the railways.

These two new member-bodies bring the total number of national organizations represented upon the American Engineering Standards Committee up to 28, and of representatives to 52.

Estimates of the extent to which the 1919 coal strike in the bituminous field affected output, now made by the United States Geological Survey, are of interest in view of the approaching "show down" on miners' wages, scheduled for March 31. Of the total capacity, 71.6 per cent was involved in the 1919 strike.

COMING MEETINGS

February

American Boiler Manufacturers' Association. Feb. 13. One-day winter meeting. Fort Pitt Hotel, Pittsburgh. Secretary, H. N. Covell, 191 Dikeman Street, Brooklyn, N. Y.

American Institute of Mining and Metallurgical Engineers. Feb. 20-23. Spring meeting. Engineering Societies Building, New York. Secretary, Frederick E. Sharpless, 29 West Thirty-ninth Street, New York.

American Association of Engineers. Feb. 22. Congress Hotel, Chicago. Secretary, C. E. Drayer, 63 West Adams Street, Chicago.

March

American Society for Steel Treating. March 3. Sectional meeting. Engineering Societies Building, New York. Secretary, W. H. Eisenman, 4600 Prospect Avenue, Cleveland.

Refractories Manufacturers' Association. March 15, 16 and 17. Annual meeting. Chicago. Secretary, F. W. Tordahon.

April

National Metal Trades Association. April 19 and 20. Annual meeting. Hotel Astor, New York. Secretary, Louis W. Fischer, Peoples Gas Building, Chicago.

American Supply and Machinery Manufacturers' Association and Southern Supply & Machinery Dealers' Association. Joint Meeting. April 24 to 26. Birmingham. F. D. Mitchell, 233 Broadway, New York, is secretary of the American association and A. M. Smith, Smith-Courtney Co., Richmond, Va., is secretary of the Southern association.

Society of Industrial Engineers. April 26 to 28. Spring meeting. Hotel Statler, Detroit. George C. Dent, business manager, 327 S. La Salle Street, Chicago.

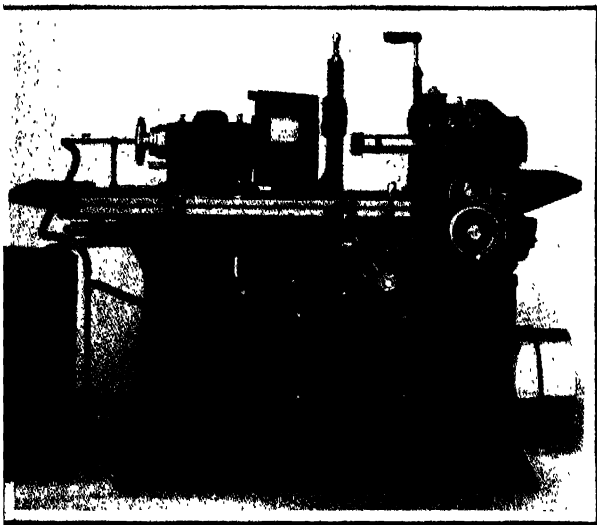
American Electrochemical Society. April 27 to 29. Spring meeting. Baltimore. Acting secretary, Dr. Collin G. Flak, 110 Park Avenue, New York.

Internal Grinder for Production Work

An internal grinding machine known as the Hydroll, designed primarily for production work and based upon the principle of high traverse speeds, has been placed on market by the Greenfield Tap & Die Corporation, Greenfield, Mass.

The superiority of the machine, it is claimed, is in its ability to remove stock rapidly in roughing operations, for holes of 3 in. bore diameter or greater. It is said to remove at least one cubic inch of hardened steel per minute, floor to floor, assuming a reasonably fast holding fixture. Where exceptional finish is desired, production rates are sacrificed to some extent, although the high operating speeds are said to show to advantage in this class of work as compared with conventional machines of the slower type.

The machine is shown in the accompanying illustration. The wheel spindle is carried on a wheel slide



The Design is Based on the Principle of High Traverse Speeds. Flexibility of table control is a feature

controlled by a feed screw calibrated for feed increments of 1/4000 in. on the bore diameter of the work. The work table reciprocates upon ways at right angles to the wheel-slide ways and carries a work head for holding and rotating the work piece.

The table traverse speed is controlled by the regulation of a sensitive throttle valve which admits oil under low pressure to a distributing valve, controlled by the table-limit stops, and thence into either end of a double-acting cylinder and piston mechanism attached to a crosshead on the under side of the table. It is claimed that by a careful application of hydraulic principles a flexibility of table control has been obtained which is practically impossible to get by mechanical means. Table speeds from 2 to 36 ft. per min. are employed in the usual range of operation, while maximum speeds of 50 ft. per min. are possible in the present design. Special designs can provide for faster operation.

There are no definite stations of speed setting and minute shading of speed is possible. Valve and piston design provides for shockless reversal. The time to accomplish a reversal is said to be so small that on 1/2-in. stroke the table will reverse 320 times per min. without shock. A pressure relief valve is provided to stop the table when overloaded, this feature also permitting accurate positioning of the table for grinding against a shoulder. A screw-adjusted stop locates the table, which is held in place under oil pressure. By a combined use of reversing and locating stops, the table can be held to within 0.0005 in. limit on reversal, without sacrifice in operating speed.

The work is revolved toward the operator at the top, while the wheel turns away from the operator at the top. The diamond contacts on the back of the wheel throw the dust down instead of up. Spindle bearing pressures are in the same direction whether the wheel is grinding or running free, a feature intended

to eliminate "burning" in the bearings and overcome one source of bell-mouth grinding. Ball bearings are employed throughout and the standard spindles provided are mounted upon ball bearings installed so that the thrust adjustment eliminates shake in either axial or radial pressure action. A good commercial finish free from chatter is said to be obtainable with the standard spindles. Where exceptional mirror finish is desired special types of spindles are used.

For large bearing races having straight holes a special type of work head is provided which chucks several races end to end, holding them endwise between a plunger operated by oil pressure and an iris plate mechanism fashioned after a camera shutter. The plunger ejects the load at the end of the operation, when the iris is opened. By the use of loading pots this fixture also grinds piston rings, etc. Machines thus equipped are said to be consistently showing floor to floor time of from half to one-third that of the conventional machine commonly used for this work. A single machine, it is claimed, has ground 25,000 piston rings per 10 hr. day with a helper to load the pots.

The following are among the features emphasized by the makers as underlying the high production of this machine: High table traverse allows the rapid exposure of work surface to the wheel face for depths of wheel feed well within the capacity of standard abrasive wheels. The wheel, therefore, actually cuts more material in a given time without friction and heat losses attendant upon slow traverse operation. Rapid sizing is obtained because the rapid application of relatively light cuts minimizes spring away or gouging action of the wheel and draws out the surface uniformly. A single lever controls all table motions. A foot pedal stops and starts the work. Heavy construction minimizes distortion and vibration, and allows accurate positioning in spindle feeding. The feed index mechanism is located by "feel" as well as by sight, permitting the operator to watch his work. The diamond-holder fixture swings out of the way, but can be located instantly at the previous position on the table by a single motion. A water supply is provided for cooling the diamond. Spindles are of the unit type and are exchanged as fast as a man can slide one out and put in another.

The machine is the design of R. L. Morgan, formerly principal owner of Churchill-Morgan-Crittlinger, Worcester, which concern was purchased recently by the Greenfield Tap and Die Corporation and forms a part of the machine tool division with which Mr. Morgan is connected. W. H. Chapman, formerly assistant to C. H. Norton, Norton Co., Worcester, is assisting Mr. Morgan in giving engineering service.

David J. Joseph was re-elected president of the David J. Joseph Co., waste material dealers, at the annual meeting held in Cincinnati Jan. 21. All of the other officers of the company were re-elected. Reports submitted at the meeting showed that the company had had a fair year and that the prospects were much brighter. The company during the year had branched out to a considerable extent, opening offices in Pittsburgh and yards at Chicago and St. Louis. A feature of the meeting was the presentation of a silver loving cup to Mr. Joseph from the officers and employees of the various offices of the company.

The Polytechnic Institute, 99 Livingston Street, Brooklyn, has inaugurated an evening course in metallography. Instruction is given by lectures and laboratory practice in a well-equipped metallographic laboratory. The course covers a study of the microstructure of iron and steel and the fundamental physical chemical principles. The course consists of 16 lectures given on Friday evenings at 8.30 and 15 2-hr. laboratory exercises on Friday or Monday evenings from 7.30 to 9.30 commencing Feb. 3. The class is limited to 30 and the fee is \$25.

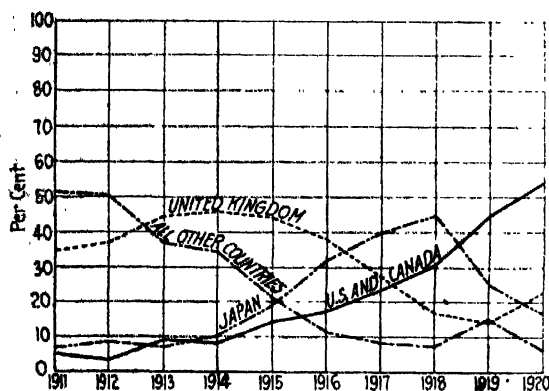
The Chapman Valve Mfg. Co., Indian Orchard, Mass., announces the completion of its new steel foundry, electrically operated throughout. The plant is 275 x 90 ft., the height to the crown of roof 22 ft.

CHINESE MACHINERY TRADE

Recent Changes in Commerce Between That Country and the United States

BY W. H. RASTALL*

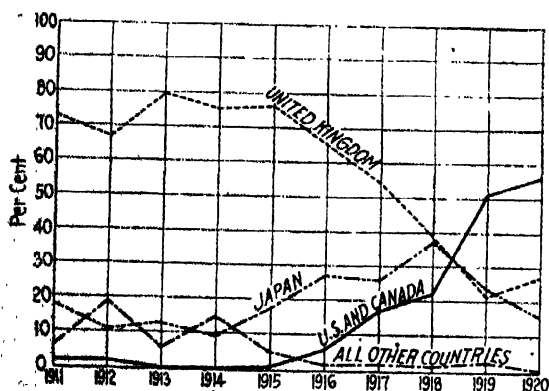
THE progress made by American machinery manufacturers in developing export business and the superior position of American engineering equipment in the markets of the world are shown very plainly by the experience in China since 1911, as is illustrated very forcibly by the charts published herewith. It should be noted that these data are from Chinese,



Division of Imports of Industrial Machinery into China, According to Countries of Origin

not American sources, being developed from the returns of the Chinese Maritime Customs.

Conditions in China have differed radically from those in the other markets of the world because business there has been influenced very strongly by political forces, as has been called to public notice in connection with the armament conference. It has been customary to specify in loan agreements that the machinery required shall be purchased in the country furnishing the money, with the result that the United States supplied China only about 30 per cent of the machinery she imported in 1918, as compared with 80 per cent supplied in the same year to Japan, which is and has long been an openly competitive market. Consequently it should be recognized that the progress indicated below has



Division of Imports of Textile Machinery into China, According to Countries of Origin

been made in spite of the difficulties encountered by those who sell machinery in China without financial assistance.

The customs authorities in China always credit consignments to the last port of shipment, so that machinery built in the United States and shipped to China via Vancouver would be credited as from Canada. In recent years very important amounts of machinery have been shipped in that way, and for this reason the

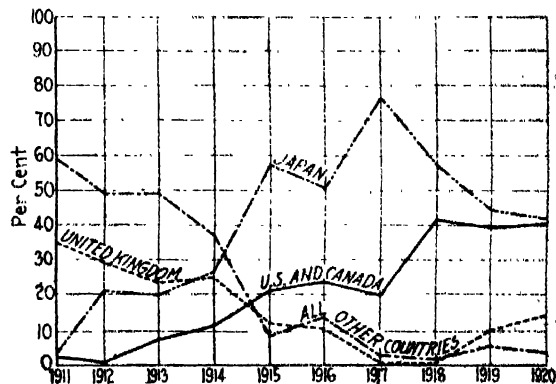
charts show the total of the shipments from the United States and Canada, as it is felt that practically all of the machinery leaving Canada originated south of the boundary. Similarly it should be remembered that the shipments from "other countries" include not only machinery from Germany but important shipment from Holland, Belgium, Sweden and other sources although in the period prior to 1914 Germany was the most important of these sources of supply.

The progress made has been shown as a percentage in order to demonstrate clearly the comparative position of American exports in the China machinery trade but this is a rather inadequate expression of the true situation, as there has also been a most astonishing increase in the volume of this business, making it worthwhile to submit the following figures showing the value of the shipments of the leading countries. These values are given in Haekwan taels, the exchange value of which fluctuates very seriously, being worth about 65c in 1911, \$1.03 in 1917, etc.

Value in Haekwan Taels of Machinery Imports into China (Excluding agricultural, embroidering, knitting and sewing machinery)

Year	U S A and Canada	United Kingdom	Japan	Total From All Sources
1911	382,054	2,330,209	465,122	6,561,020
1912	179,803	1,762,916	388,476	4,704,485
1913	673,227	3,241,590	548,622	7,187,048
1914	681,170	3,749,149	852,934	8,157,270
1915	669,722	3,994,518	851,185	4,485,807
1916	1,078,530	2,350,903	1,991,031	6,131,268
1917	1,411,141	1,648,869	2,419,813	6,982,715
1918	2,390,332	1,313,604	3,569,909	7,860,290
1919	6,407,727	2,073,968	3,604,906	14,828,243
1920	12,181,382	5,229,026	3,727,604	22,536,254

From this table and also Chart I it is evident that American machinery exports to China have increased



Division of Imports of Machine Tools into China, According to Countries of Origin

3100 per cent since 1911 and the American share of this business has increased from 5.8 per cent, the lowest of the countries here mentioned, in 1911 to 54.1 per cent, or more than all others combined, in 1920.

Even this statement does not adequately describe the situation, because American machinery transhipped in Japan, especially for points in North China and Manchuria, is credited to Japan in the above returns. Unfortunately, it is not possible to submit figures to show the volume of this trans-shipment business but there is reason to believe it is very large and during the war was strongly influenced by the demand in Siberia for war equipment.

The above refers to the experience covering all classes of machinery. If one wishes to be more specific it is possible to submit corresponding charts regarding particular classes of machinery and in Chart II is a corresponding record of Chinese imports of textile machinery. In this diagram the line representing Japan is also deceptive, as a considerable amount of the textile machinery exported from Japan is of a type employed in cottage industries, as distinguished from the factory machinery shipped from Europe and America. For Americans the interesting part of the diagram is the comparison between the experience of the United States and the United Kingdom in this trade. The superiority of American engineering as represented by cotton mill design and cotton mill equipment has been clearly rec-

ognized in China as also certain other countries, and it is anticipated that European designs will soon incorporate certain American features. The values involved in this trade are as follows:

Value in Hackwan Taels of Textile Machinery Imports into China

Year	U.S.A. and Canada	United Kingdom	Japan	Total From All Countries
1911.....	7,161	241,234	80,159	331,582
1912.....	9,885	307,283	50,229	458,616
1913.....	2,613	672,150	112,500	830,724
1914.....	2,536	1,540,100	187,661	2,038,460
1915.....	15,416	1,076,229	253,490	1,419,511
1916.....	115,431	1,257,901	531,437	1,934,141
1917.....	218,928	668,619	302,507	1,235,806
1918.....	279,867	669,402	612,948	1,714,994
1919.....	1,911,350	813,294	897,760	3,767,406
1920.....	3,897,204	1,925,696	1,071,201	6,927,728

It is thus clear that the textile industry in China is growing rapidly, and that the American interest in the trade is making even more rapid progress.

Correspondingly, Chart III illustrates the experience in connection with machine tools. This class of machinery is of a type that is strongly influenced by the loan and concession agreements, being used very largely in connection with railroads, mines, arsenals, dock-yards, etc., and it is this that explains, to a large ex-

tent, the situation in 1919 and 1920. Experience in this regard is largely self-explanatory, but the above comments regarding the trans-shipment of machinery from Japan should be remembered. It is true that Japan is trying to develop a machinery building industry and has paid especial attention to the production of machine tools, having more than 26 shops engaged in this business in 1918. It should also be remembered that Chart III is plotted in percentages, so that the high value shown on the Japanese curve for 1917 is deceptive. In that year European and American manufacturers shipped very little of this class of machinery because of the war embargoes. The volume of this machine tool business is shown in the following table:

Value in Hackwan Taels of Machine Tool Imports into China

Year	U.S.A. and Canada	United Kingdom	Japan	Total From All Countries
1911.....	615	9,699	1,067	27,726
1912.....	132	5,726	4,112	19,629
1913.....	3,773	12,112	10,234	51,288
1914.....	11,601	24,040	25,771	96,912
1915.....	15,494	9,052	42,094	72,811
1916.....	23,403	10,772	49,740	97,778
1917.....	40,982	1,254	180,475	208,394
1918.....	145,547	2,598	198,954	349,108
1919.....	197,859	50,477	221,896	499,853
1920.....	305,780	111,038	316,636	761,073

Gas Burning Equipment Installed on Large Core Oven

Details of Construction—Data on Performance
—Temperature Regulation—
Operating Cost

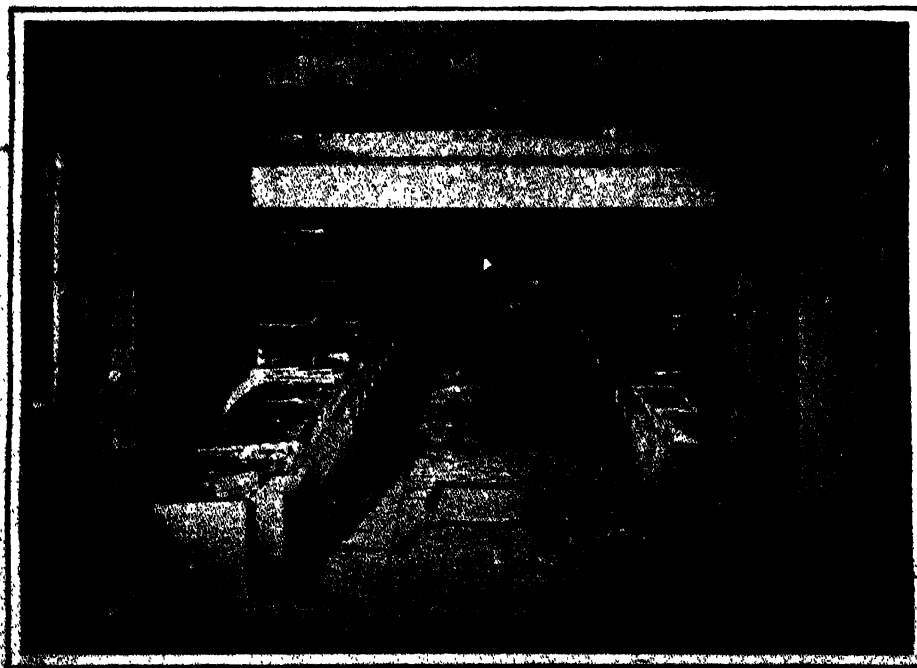
BY W. M. HEPBURN*

A SUCCESSFUL installation of gas burning equipment was recently made on a large core oven of the Gardner General Foundry, Gardner, Mass. The apparatus used was furnished by the Surface Combustion Co., New York, and was designed to burn the gas with the proper amount of air for complete combustion, gas-air proportions being maintained constant automatically. The issuing products of combustion entrain as they enter the oven either fresh air, oven atmosphere or any desired combination of the two. By this means the gas is burned at its greatest efficiency, the dilution taking place only after the combustion has been completed. Products of combustion issue from a special type of burner at a high velocity, and this energy

is utilized to entrain the quantity of air required to maintain the desired oven atmosphere, at the same time transforming the small quantity of high temperature products to a larger quantity of comparatively low temperature drying gases.

The oven was of the coke-fired car type, constructed of red brick, and measured internally 9 ft. wide, 25 ft. long and 6 ft. high. It accommodated three steel cars each having a loading space 8 ft. long by 5½ ft. wide upon which the large cores were loaded. The oven was formerly fired with coke and had two fire boxes, one at the left-hand rear corner on one side; the other at the right-hand front corner on the other side. One flue runs from the bottom of the oven and two from the top to a stack approximately 30 ft. high.

*Engineering department, Surface Combustion Co.



Two Fire-Brick Ducts Extend Down Either Side, as Shown. A circular tile at the entrance of each duct forms a throat into which the burner fires. The approach to the throat has two openings, one leading into the oven and the other through the front to introduce fresh air.

In constructing the oven the fire boxes were bricked up, and a special type of burner together with an inspirator supplying it were installed. These were placed at the front firebox, on either side of the car approximately 9 in. above the floor level, as indicated in the accompanying illustrations. Two fire-brick ducts 18 x 18 in. were built at the floor level and extended down either side, as shown, openings being provided at short intervals along the sides of each duct. These openings were placed at the sides in order to prevent sand from falling inside the duct and also to enable the top of the duct to be used as shelves for drying the smaller cores.

A circular tile was placed at the entrance of each duct, forming a throat into which the burners fired.

cores, reveal a close relationship between cubic feet of gas used and pounds of cores baked, 1.04 of 550-B.t.u. gas per lb. of cores being a representative figure. This would tend to indicate that with a substantial red brick construction, the heat losses of the oven are small compared to the heat absorbed by the work treated. This in turn means that it is of prime importance to accurately control the atmosphere within the oven.

The advantages of this type of firing lie in the complete utilization of the inherent advantages of gas fuel. With this method the B.t.u. in the gas was utilized to generate heat energy, its velocity to condition the atmosphere, its distribution to maintain a rapid circulation. No other fuel contains so many inherent

Gas-Fired Core Oven - General Data for First Three Runs

Run No.	Temperature		Hours	Deg. Rise Per Hr.	Gas Rate Coming to Temp., Average Cu. Ft. Per Hr.	Hrs. Held at Temp.	Gas Rate Holding at Temp., Average Cu. Ft. Per Hr.	Total Amount Cores Baked, Lb.	Total Gas Used, Cu. Ft.	Cu. Ft. of Gas Per Lb. of Cores Baked	Approx. Rate of Change of Air
	From, Deg.	To, Deg.									
1	260	500	3	86	1,543	2	1,084	5,350	6,800	1.32	20
2	100	550	5 1/2	82	2,040	5	957	11,256	11,500	1.29	21.6
3	100	450	2	100	2,040	5 5	980	7,200	7,500	1.01	19

The approach to the throat was located just inside the front wall or door and provided with two openings; one at the top leading directly into the oven through which the oven gases could be drawn to cause a recirculation; the other through the front of the oven through which fresh air could be drawn from the atmosphere. Dampers for each opening were provided so that the respective quantities of fresh air or oven atmosphere could be controlled as desired.

Burners of special design were lined with refractory capable of withstanding the highest temperatures and these in turn were connected to automatic inspirators

advantages regardless of the cost. The ability to utilize the core oven as a humidity dryer is of great importance, especially with larger size cores. In the ceramic industry the effects of skin drying are well known. Little attention has been paid to this phase in drying cores, however, although its effects are most serious.

Another advantage was found in the versatility of the oven under the close control of the temperature distribution. Temperature readings, taken at the front, center and rear of the oven, could be regulated to within 5 deg. at all three places. On the other hand it was sometimes necessary to bake an unusually large core together with a load of smaller cores. It was desirable in such cases to give the larger core extra heat and the temperatures were easily regulated to provide the additional heat at the particular location of the larger core, thereby enabling the uneven load to be uniformly baked.

The cost of a charge for this oven even in the simplest shape represents a value of \$75. Bad castings resulting from improperly baked cores run into losses which far exceed any possible difference in the fuel cost. The number of core ovens on high priced fuels already indicates that the progressive managers have found the fuel cost per hour a small percentage of the cost of baking cores.

The noteworthy features of this installation may be summarized as follows: Ability to maintain any desired atmosphere within the oven; uniformity of temperature; no regulation of the flues required; and the elimination of labor charges involved in firing, cleaning fires, regulating dampers and repairs. Ability to duplicate desired conditions is also a feature. After the best conditions are once determined these can be reproduced as frequently and easily as desired.

Positive control of the draft, eliminating the necessity of stack or stack drafts is also an advantage.

Details of Run No. 3

Gas Pressure, Lb.	Time, P. M.	Temperature, Deg. Fahr.		
		Rear	Center	Front
12	2:30	100	...	...
11	3:00	320	...	330
	3:30	380	...	380
11 5	4:00	...	440	415
	4:30	450	...	450
	5:00	420	...	430
	5:30	...	430	430
21 1/2	6:00	...	450	445
	6:45	...	...	455
	7:00	...	...	460
	7:30	445	...	470
Shut down	8:00	445	480	480

Load: 9 large cores, 3 per truck, 3 small cores on floor near door.

Weight of cores: 800 lb. each.

Total weight: 7200 lb.

Total gas used: 3990 measured at 13 lb.

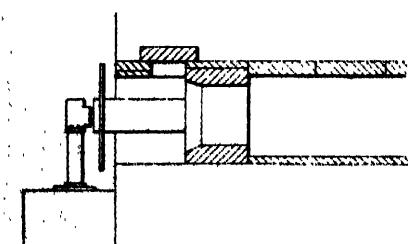
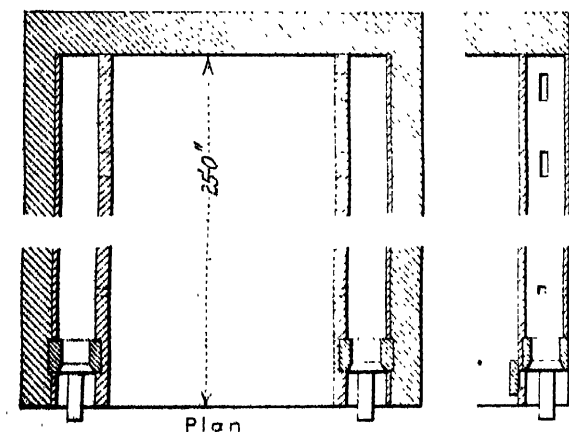
Corrected to 3 in. of H₂O: 3990 × (14.7 + 13) ÷ (14.7 + 0.1) = 7500 cu. ft.

Gas per lb. of cores baked: 7500 ÷ 7200 = 1.04 cu. ft.

550 B.t.u. gas.

Gas per cu. ft. oven content: 7500 ÷ 1350 = 5.55 cu. ft.

With gas at \$1.25 per 1000 cu. ft., cost per 100 lb. of cores baked: 7500 × 1.25 ÷ 7200 = \$0.13.



The Arrangement of the Burners and Ducts Is Shown in the Plan Above, Together with a Vertical Section, at the Right, of One of the Ducts. Below the plan, details of the burner connection are shown

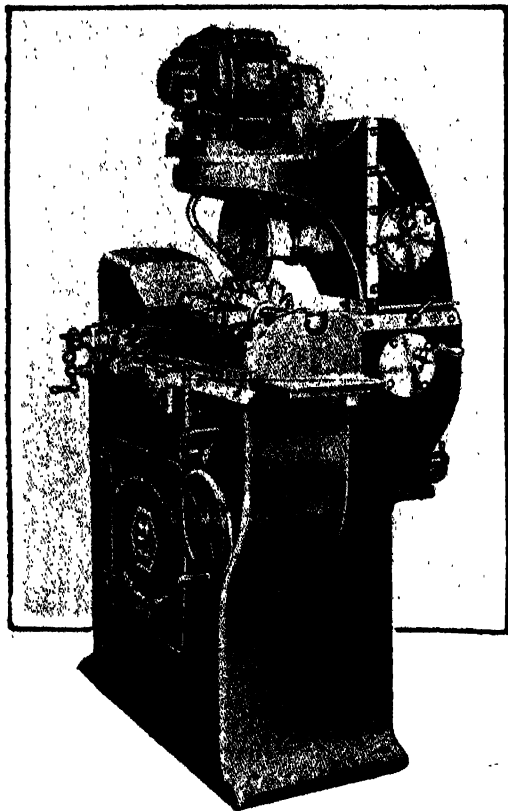
which were designed so that gas under pressure up to 10 lb. per sq. in. drew in from the atmosphere the proper quantity of air for complete combustion. These proportions of air and gas remained constant through all rates of burning, and the rate of burning was controlled through a single valve.

The accompanying figures relate to typical runs made in this oven. Data obtained from a number of runs with charges weighing from 6800 to 14,500 lb. of

Improved Motor-Driven Hob Grinder

An improved motor-driven, universal, full-automatic machine for sharpening hobs with right or left hand spiral flutes or straight flutes has been placed on the market by the H. E. Harris Engineering Co., Bridgeport. It will also grind formed cutters, Curvex cutters or ordinary gear cutters, either singly or in gangs.

In the new machine two motors are used, one a 1 hp. motor belted directly to the wheel spindle as shown in the illustration, and the other a ½ hp. motor mounted on a bracket at the back of the machine and integral with it. Carrying all the intermittent or reciprocating actions on a separate drive is intended to provide uniform and smooth action in the wheel drive, as none of the shocks from the various operating mechanisms are transmitted through the motor to the wheel spindle to



One Motor Drives the Wheel, As Shown. Another motor mounted on a bracket at rear drives the intermittent and reciprocating mechanisms.

cause irregular action to the wheel. This arrangement is also said to result in less horsepower required and less current consumed.

The machine will index from 2 to 26 divisions and take hobs up to 8 in. in diameter and 10 in. long. The maximum angle of spiral possible at 8 in. diameter is 47 deg., either right or left. It grinds on both strokes of the table and indexes without stopping or dwell at the end of each return stroke. Indexing is by two plates, a working index plate and a master index plate, these being integral with each other and easily changed. Provision is made to adjust the front face of the teeth of the hob against the grinding wheel after all flutes have been ground. This is accomplished by rotating the hob toward the grinding face of the wheel, varying in amounts from 0.0002 in. to 0.005 in., as desired. This is done automatically and requires no attention when changing to a hob with a different number of gashes or flutes. The indexing is set in motion by a fixed trip dog on the machine frame operating directly on the index itself at the end of each return stroke, allowing the indexing mechanism to turn the index on the work spindle to the next index notch. No part of the table stroke is used to operate the indexing mechanism. The work-carrying or index head is rigidly built and excepting for the heaviest hobs, it is

not necessary to support the outer end of the work arbor with the tail center, a feature intended to save time in changing hobs.

The wheel is closely mounted to the overhead circular support, which is of large diameter and carried in a column of heavy construction. The support can be swiveled about the vertical center of the wheel for spiral hobs, and is graduated in degrees. The wheel spindle is carried in large bronze bearings having oil-well type lubrication and having provision for taking up thrust and wear. These replace the ball-bearings formerly used.

The machine is equipped completely for wet grinding, flooded lubrication of both the wheel and the work being provided. The machine may not only be set for radial grinding of the faces of hob teeth, but may be set also to compensate for the wear of the wheel. An adjustment is provided so that hobs may be ground undercut or with "hook" or "top rake" to the teeth. The work table is driven by a clutch reverse-gear mechanism operating a pinion in a rack, and stops on the front edge of the table permit adjustment to any length of hob within the capacity of the machine. All adjustments can be made conveniently by the operator from the front of the machine and many adjustments made while the machine is running.

Right or left hand spirals are generated without the use of change gears and may be adjusted to any lead angle by merely turning the ball crank handle at the left. This is done when the machine is either in motion or at rest. Graduations that give the lead angle in degrees and minutes are provided.

Expect to Limit Expenditures for Repairs

WASHINGTON, Jan. 31.—Failure marked the attempt of Representative Graham of Illinois to have the House incorporate an amendment in the independent offices appropriation bill last week to limit to \$1,000,000 the amount which the Shipping Board could expend for repairs on any one of its vessels without authority from Congress. The amendment was designed to prevent the board from proceeding with the work of reconditioning the Leviathan in the absence of an appropriation from Congress. The cost of doing this work, it is estimated, will be approximately \$8,000,000. Efforts are being made by the Massachusetts delegation in Congress to have the vessel reconditioned at the Boston Navy Yard and with this end in view Representative Dallinger of that State was successful in having an amendment incorporated in the appropriation measure which would give navy yards the right to submit estimates to the board for repair of its vessels. The navy yard figures can be only estimates and not specific bids such as are required of private interests and even if the Dallinger amendment passes the Senate, it is not considered likely that it will result in the work being done at a navy yard.

December Exports of Iron and Steel

Japan takes by far the leading place in American exports of iron and steel in December, according to the following table, prepared by the Department of Commerce. The total shipments amounted to 129,921 gross tons. The leading items sent to Japan comprised: Steel sheets, 29,812 tons; rails, 9650 tons; tin plate, 5974 tons; wrought pipe, 4272 tons; steel bars, 3185 tons; plain wire, 3157 tons; wire rods, 2209 tons, and wire nails, 1918 tons.

	Gross Tons	Per Cent of Total
Japan	62,182	47.86
Canada	26,147	20.05
Mexico	6,807	5.01
British India	6,056	4.66
China	5,539	4.26
United Kingdom	3,872	2.98
Argentina	3,141	2.42
Cuba	2,142	1.65
Brazil	1,822	1.41
Philippine Islands	1,714	1.32
Hongkong	1,618	1.25
Kwantung (leased territory)	1,518	1.17
Switzerland	1,418	1.09

GERMAN IRON AND STEEL EXPORTS

Part of 1921 Shows Sharp Expansion—Comparisons with Other Years—Imports
(Special Correspondence)

BERLIN, GERMANY, Jan. 6.—As far as it is possible to judge from available data (the returns for the period Jan.-April, 1921, not having been published as yet), October will probably figure as the most noteworthy month last year in German iron and steel exports so far as absolute figures are concerned. Exports of iron and steel and products thereof, not including machinery, amounted to 246,115 metric tons valued at 1,267,789,000 m., as compared with 225,331 tons valued at 1,233,039,000 m. in September, and 234,249 tons valued at 1,764,373,000 m. in November.

STILL IN DOUBT

Attitude of Attorney General As to Trade Associations Not Determined

WASHINGTON, Jan. 31.—Announcement by the Government outlining its policy with regard to trade associations continues to be an indeterminate matter. Attorney General Daugherty this afternoon said that a new draft of a statement had been prepared which he and Secretary of Commerce Hoover might put out jointly, but added that this had not been agreed upon by any means. He further stated that he does not know that anything will come from the Department of Justice except a statement to aid the Department of Commerce. It is the position of the Attorney General that the decision of the Supreme Court in the Hardwood

Iron and Steel

Product	Exports		Countries	Imports	
	Oct.	Nov.		Oct.	Nov.
Pig iron, including ferroalloys, scrap, etc.	50,381	38,976	Great Britain	56,619	43,512
Piping and pipe shapes of non-malleable material	3,304	1,947	Holland	3,313	1,816
Hardware and other non-malleable iron ware	6,421	6,076	Holland	132	134
Semi-finished materials, rails, crucible steel, blooms, etc.	3,767	2,513	Great Britain	25,992	11,746
Bar iron, section iron	52,022	51,583	Holland	35,617	18,889
Sheets and plates of all kinds, including tin plate	25,831	27,395	Holland	5,005	2,169
Wire, rolled and drawn, rough and finished	15,730	13,491	Eastern Asia	6,083	3,129
Tubing and piping, rolled and drawn, rough and finished	8,014	9,845	Holland	351	423
Rails, ties, fishplates and other track supplies	26,329	29,825	Holland	3,300	4,307
Railroad axles, car wheels, buffers, springs, etc.	4,422	4,316	Holland		
Malleable iron ware, rough and machined, including boilers, tanks, containers, machine parts, steam fittings, etc.	14,416	14,856	Northern Russia	30	19
Bridges and parts thereof, other structural material	4,613	4,625	Holland	1,244	591
Bolts, nuts and rivets of all kinds	2,726	2,486	Holland	108	70
Wire nails, etc.	6,494	6,310	Holland	645	462
			Eastern Asia	18	18
Machinery					
Locomotives	3,753	4,542	Balkans, Spain	23	..
Steam engines and other prime movers, tractors	2,833	2,857	Sweden	90	53
Machine tools	4,331	4,891	Holland		
Agricultural machinery	2,071	2,201	France	135	31
Textile machinery	2,826	3,075	Belgium	197	32
Automobiles, including chassis; also motor trucks	1,415	1,790	Holland	287	61
Automobiles, number of cars and trucks	670	1,000	Holland	116	90
Motorbicycles, number of engines	300	211	Holland	81	70
			Denmark	10	6

The import figures are 146,695 tons for October, 106,519 tons for September, and 94,222 tons for November.

Striking features of the November returns are the decrease in shipments of pig iron, semi-finished products, bar iron and wire and the increase in sheets, plates, rails, tubing and machinery. Broadly speaking, most of the November figures are lower than the October figures, but still higher than those for September. The notable increase in exports of rails and track supplies to southeastern Asia; British India; Malacca; Ceylon, French, Dutch, and Portuguese Indies; Philippines and Siam deserves mention. Of the totals, 2042 tons, or 5 per cent, was shipped in September, against 3953 tons, or 11 per cent, in October, and 5482 tons, or 18 per cent, in November. As in September, Northern Russia again heads the list in this department.

The swelling of import figures for October and, to a lesser extent, November, is mainly attributable to heavy shipments of pig iron, scrap, old materials, semi-finished products, and a few other commodities by Luxembourg and Alsace-Lorraine.

A tabulation of most of the exports and imports, showing principal importing countries, is given below for October and November. The quantities are metric tons.

Further details of German steel exports and imports for 1921 by months, as compared with other periods, follow:

German Iron and Steel Exports and Imports in Metric Tons		
1921	Exports	Imports
May	129,847	43,850
June	162,297	47,013
July	177,773	55,104
August	249,035	70,008
September	225,331	106,519
October	246,115	146,695
November	234,249	94,222
Total 7 months, 1921	1,416,647	563,441
Average per month	202,365	80,491
1920 average per month	145,983	34,950
1919 average per month	10,500	35,600
1918 average per month	479,500	33,700

case was explicit as to its meaning, and the department cannot discuss a subject that would make courts think it necessary for the Department of Justice to supplement a decision of the Supreme Court.

It was made clear by the Attorney General that the Department of Justice will not undertake to explain away any decision that might be interpreted as trying to modify a decision or that would "muddy the water" of cases now being prosecuted. It was pointed out that the question is how far trade associations can go in distributing information among their members exclusively as to prices and as to whether the information should be made public and in what manner. The Department of Justice apparently is determined to guard itself against allowing any efforts at violation of the law that might be attempted by use of a statement issued by the department. However, the department still hopes that it will be able to work out a plan to serve as a guide to trade associations, but with the distinct purpose that nothing will be done that might stand in the way of the Hardwood decision.

It is understood that one plan in mind is to have trade associations make information public so as to overcome that feature of the Hardwood decision which condemned the practice of limiting the information to members of the Hardwood association only. This information, it is said, would take on the nature of averages as to production, stock and prices and would not deal with such statistics for individual members of trade associations. It is a question as to how the information would be distributed. Use of the Department of Commerce as the agency for this purpose, it was pointed out, might not be satisfactory on account of the delay incident in preparing the reports and forwarding them to Washington and also by reason of the time this would require, it is contended that the value of the information would be either greatly lessened or entirely destroyed.

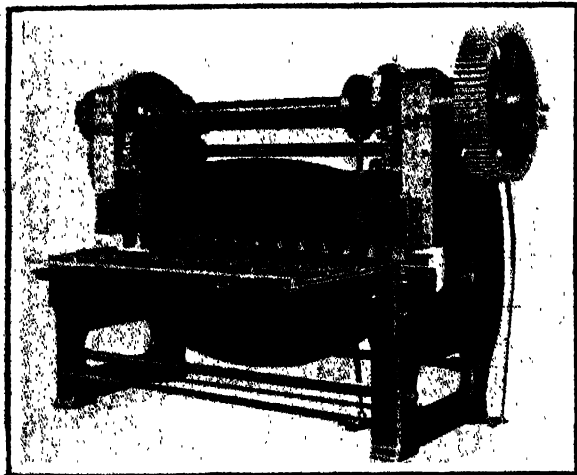
The most logical solution of this problem, according to some officials, would be to use the trade papers as a means for distribution of trade information.

Improved Gap Shear

A gap shear for cutting $\frac{3}{4}$ in. and lighter annealed steel, and incorporating features of improved design, has been added to the line of shearing machinery offered by the Streine Tool & Mfg. Co., New Bremen, Ohio.

An outstanding feature is the new design of the cutter bar or cross head, which is of double-ribbed and cross-ribbed box-type construction, as shown in the illustration, and provided with long cross-head bearings fitted into the slides of the housings by means of adjustable hand-scraped taper gibs. This construction is intended to eliminate the use of truss rod or hog chain to keep the cutter bar from springing under strain. The long cross-head bearings with adjustable taper gibs are to prevent the cutter bar from tilting while cutting and thus to permit cutting a clean smooth edge.

The cutter bar is connected to the eccentrics by ad-



The Shear Bed Is Deeply Ribbed and Is Adjustable to Suit the Work. The cutter bar is of double-ribbed and cross-ribbed construction, as shown in view to right

justable links, thus allowing the shear knives to be set by raising or lowering the cutter bar, either to split long stock or do plain shearing to the full length of the knives. The hold down or clamp is automatically operated and equipped with compensating springs to take care of unevenness in the thickness of the metal to be sheared.

A full set of front, side and back gages is provided, the back gage being of the parallel-screw and miter-gear operated type. It is operated with a crank handle and the miter shaft is made of two pieces, joined by a sleeve, which can be loosened and the gage set parallel with blades or otherwise without loss of time.

The shear bed is deeply ribbed and can be adjusted to suit the requirements of the work. Parallel graduations in sixteenths of an inch are marked from the edge of the shear blades to the ends of the front gage supports thus permitting quick and accurate setting of the gages. The eccentrics are double keyed and shrunk on the eccentric shaft, the bearings of which are split and can be readily adjusted or replaced. All shafts are of large diameter and gears machine cut, the gears being made of semi-steel castings and the pinions of steel forgings. The clutch is of forged steel and is fitted with tool steel clutch pin and finger.

This shear can also be arranged for motor drive or equipped with a long squaring arm. The machine illustrated is the 6 ft. shear, but other lengths can be supplied. The specifications give length of shear blades as 74 in. and approximate weight of the machine as 18,500 lb. The flywheel pulley is 42 in. by 7 in., weighs 1260 lb. and runs at 280 r.p.m. The strokes of the cutter bar are 18 per min., and the ratio of gearing 16 to 1. The floor space required is 84 by 104 in. A 15-hp. motor, 900 to 1800 r.p.m., is recommended.

Thermal Stresses in Steel Car Wheels

On Dec. 10 a conference was held at the Bureau of Standards, Washington, to discuss the accumulated data obtained in thermal tests of steel car wheels. Representatives of various manufacturers and purchasers of steel wheels were present. The results obtained in the tests of 16 wheels completed to date were discussed, the interesting features of which may be summarized as follows:

None of the steel wheels failed.

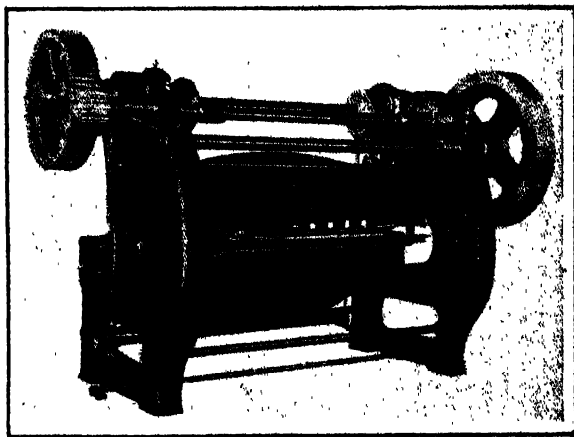
Because of the movement of the hub with respect to the rim, on account of the heating of the rim, a beam effect is produced in the plate which induces tensional stresses near the hub and stresses in compression near the rim on the face of the plate, while on the back of the plate the stresses are approximately equal in magnitude but reverse in nature.

These effects were observed in new wheels, while in the case of old wheels the stresses on the face of the plate were in tension near the hub and at the rim they decrease to practically nothing, this difference from the new wheel probably being due to the quantity of metal worn away.

The magnitude of the maximum stresses developed approximated the yield point of the material as determined in tensile tests.

After the first "run" on the new wheels, an apparent set was obtained which was not the case in succeeding runs nor in runs on old wheels. The maximum stresses were in the surface of the plates and beyond the yield point of the material.

It was suggested by one representative that tests on wheels with thinner plates be made in order to



determine the effect of plate thickness on induced stresses. One of the steel companies expressed a willingness to furnish wheels for this test, and the matter is now being considered.

Further work on single plate chilled iron wheels seems justified in view of the fact that a survey of the stresses on the back of the plate of this type of wheel was not made. From experience with the steel wheels, it is believed that the stresses will be quite different from those on the face.

The stockholders of the Bridge & Beach Mfg. Co., St. Louis, have re-elected the following directors: Hudson E. Bridge, L. H. Booch, Henry C. Hoener, John F. Shepley, Louis H. Riecke, Laurence D. Bridge and George Leighton Bridge. The board elected the following officers: Hudson E. Bridge, president and treasurer; L. H. Booch, vice-president and manager; Henry C. Hoener, vice-president; Louis H. Riecke, secretary; George Leighton Bridge, assistant secretary; A. F. Gammeter, assistant treasurer; Laurence D. Bridge, assistant treasurer.

The Laconia Car Co., Laconia, N. H., is delivering cars on repair contracts at the rate of 32 per week, but shortly expects to increase this to 40 cars. The company has sufficient car repair work on its books to keep its plant operating at its present capacity until May, 1911. The company's foundry is located at Laconia.

Obsolete Naval Vessels Sold

Washington, Jan. 31.—The Henry A. Hitler's Sons Co., Philadelphia, has been awarded eight of the nine obsolete naval vessels recently offered for sale by the Navy Department. This salvaging company's aggregate bid for the eight vessels was \$235,000, which was submitted on the basis of "all or none." The vessels going to the Hitler company include the battleships Maine, Missouri and Wisconsin; the cruiser Columbia, and the monitors Puritan, Ozark, Tonopah and Miantonomah. The ninth ship, the old cruiser Memphis, was awarded to the A. H. Radetsky Mine & Metal Co., Denver, for \$3,000. The Memphis is a wreck on the shores of Santo Domingo.

The salvaging of these obsolete ships will occasion the greatest undertaking of this kind ever engaged upon in the United States, and is regarded as a possible forerunner of the establishing of a regular ship salvaging industry on a broad scale, provided terms of the conference on the limitation of armaments are finally agreed upon and a permanent and adequate American merchant marine is created.

Proposed Reduction of Miners' Wages

PITTSBURGH, Jan. 30.—An echo of the recent refusal of operators in the different fields of the so-called central competitive district to enter into preliminary conferences with representatives of the United Mine Workers of America, to discuss a new wage scale to become effective with the expiration of the present one on March 31 next, is found in an announcement late last week by the Pittsburgh Coal Producers' Association and the Southern Ohio Coal Operators' Association setting up new scales to become effective April 1 next, which reduce wages roughly from 30 to 40 per cent. The check-off system, whereby the operators collected and paid over to the union the dues of workmen, is eliminated, and when the United Mine Workers of America meet in Indianapolis on Feb. 14, for the annual wage scale convention, they will also have to consider dealing with the operators in the several districts individually, instead of for the entire so-called central competitive district as has been the case heretofore. As was to be expected, the action of the Pittsburgh and southern Ohio district operators find disapproval among union leaders and already there are suggestions of a strike, as of April 1.

Roofing Shingles of Copper

The Anaconda Copper Mining Co. has secured a contract to cover with copper shingles the roof of the new Holy Innocents Church in Brooklyn. This shingle comes in three sizes—6 x 18 in., 8 x 18 in. and 8 x 60 in., and weighs approximately 84 lb. a square of 100 ft., a light material for roofing purposes. This weight compares with 200 lb. for the wooden shingle, 400 to 600 lb. for asbestos, 750 to 1200 lb. for slate and 1000 to 2000 lb. for tile of the same area. Anaconda's shingle is made of a specially developed grade of copper 99.95 per cent pure. The present plant at Perth Amboy, N. J., which will start operations Feb. 1, can turn out more than 500 squares daily. Its capacity will be increased to meet demand.

Electrical Properties of Titanium Alloys

The electrical properties of titanium alloys have been investigated at the Rensselaer Polytechnic Institute, Troy, N. Y., and the investigation is the subject of No. 12 of the Engineering and Science Series of that institution, published by the authors, M. A. Hunter and J. W. Bacon. A summary of the results of the investigation is as follows:

The addition of titanium to iron improves the magnetic quality of the iron. The magnetization curves are invariably higher and the hysteresis losses lower than in an untreated specimen.

The action is attributed to a cleansing of the material by the addition of titanium. If additions are made in such amounts that titanium is left in the iron, the material improvement is no longer apparent. The samples will under

these conditions be lower in magnetic quality than the original iron.

Good results were obtained by treating silicon-iron with titanium. These alloys gave an exceedingly high permeability and low hysteresis loss.

The aging of the titanium-treated specimens was of the order of that of iron, though somewhat less in degree.

Alloys of titanium with nickel, copper, nickel-iron and nickel-copper were made. The specific resistance of these materials are only moderately high for additions of titanium up to 5 per cent. Beyond this point the alloys are exceedingly hard to draw. Such wires as were made can be run continuously only at low temperatures by reason of their tendency to oxidation when run at a red heat.

Sheet Metal Contractors' Association

At the annual convention of the Sheet Metal Contractors' Association of Pennsylvania, held in Reading, Pa., Jan. 26 and 27, the following officers were elected: President, Louis Luckhardt, J. D. McIlroy & Sons, Pittsburgh; first vice-president, Charles A. Bachman, Easton, Pa.; second vice-president, Joseph Urban, Reading, Pa.; secretary, W. F. Angermeyer, W. F. Angermeyer & Co., Pittsburgh; treasurer, G. C. Krack, Gus. A. Krack & Sons, Erie, Pa.; directors, W. H. Tinney, Philadelphia, and N. F. Bantham, Wilkes-Barre, Pa. Announcement was made of the organization of the salesman's auxiliary affiliated with the association. Officers of the auxiliary follow: President, Thomas R. Cook, Philadelphia; first vice-president, Warren Carter, Philadelphia; second vice-president, C. J. Deshore, Philadelphia; secretary, Oliver C. Brooks, Philadelphia; treasurer, William Gowan, Pittsburgh. Directors, George J. Claudice, Baltimore; Thomas Quinn, Philadelphia; George Gock, Philadelphia; John Follansbee, Pittsburgh, and George Johnson, Pittsburgh.

Anaconda's Acquisition of American Brass Co.

The acquisition recently of the American Brass Co., Waterbury, Conn., by the Anaconda Copper Mining Co., has been referred to by officials of the latter company as a step that will place the company's business on a sound foundation. The Anaconda company, in the five plants east of the Mississippi River which it has acquired, has a capacity equal to approximately 40 per cent of the total copper and brass manufacturing business of the country. The acquisition of the brass company will mean the absorption of practically the entire copper output of the Anaconda Copper Mining Co. by the new subsidiary. In June, 1918, the Anaconda company opened a wire mill at Great Falls, Mont., which up to the end of last year had rolled into rods and drawn into wire 166,000,000 lb. of copper.

The Anaconda company has been a producer of copper, zinc, lead, gold, silver, ferromanganese, sulphuric acid, copper rods and wire, copper and zinc shingles white lead, etc.

Corrosion of Steels

Laboratory work relating to the determination of the relative resistance of certain alloy steels to corrosion when submitted to combined weathering and immersion in distilled water was completed recently by the Bureau of Standards. Based on exposure of 19 days, the polished samples of steel showed the best resistance to corrosion in the order given below:

Annealed stainless steel (carbon, 0.15; chromium, 13 per cent).

Annealed high chromium and high nickel steels.

Forged stainless steel.

Cast iron chromium alloy (carbon, 0.01, chromium, 6.5 per cent).

Annealed chromium steel (carbon, 0.20, chromium, 8.6 per cent).

Annealed chromium steel (carbon, 0.30; chromium, 5.72 per cent).

Annealed chromium steel (carbon, 0.28; chromium, 8.90 per cent).

Pure iron.

Iron carbon alloy (carbon, 0.45 per cent).

List Prices and Discounts on Steel Castings

American Steel Foundries Makes Public New Method of Quoting Its Products—Important Departures from the War Committee Schedules

THE American Steel Foundries, Chicago, manufacturer of steel castings, with plants distributed throughout the country, has announced list prices and discounts on its products, effective Feb. 1. The new prices cover 30 different classes of castings under which 195 separate discounts are listed. The classifications, the prices and the discounts were worked out after two years of exhaustive study by the company, and are believed to be on the lowest possible basis compatible with the costs of any producer in the industry.

The idea of preparing quotations of general application is not a new one in the steel castings field; neither is it an innovation to make a careful study of the costs of different classes of casting work with the view of arriving at proper spreads in prices. For some years prior to the war, the steel foundry industry carried on an investigation of costs, and during the war, at the instance of the Committee on Steel and Steel Products of the American Iron and Steel Institute, maximum prices were established which prevailed throughout 1918. This schedule, it is to be noted, remained in effect notwithstanding uninterrupted increases in labor costs. With the coming of the armistice and the subsequent efforts of the Government to stabilize prices on a lower level through the medium of the Industrial Board of the Department of Commerce, the same committee which represented the steel castings industry in establishing the war schedule prepared new prices which were $12\frac{1}{2}$ per cent below those previously in force. While these prices were never submitted to the Industrial Board, they were generally used by the industry for the remainder of 1919. In 1920 advances in the cost of labor and raw materials made two increases necessary—one in the first quarter and the other in the second quarter. Since the beginning of 1921, prices have declined steadily, and here and there in the industry business is known to have been taken at a loss.

The new prices and discounts announced by the American Steel Foundries will tend to discourage the taking of business at a loss in lean times and likewise restrain the naming of excessive prices in brisk periods. Prices, of course, should have a proper relation to costs, and in this respect it is felt that the new list will prove an education to the buying public.

The schedule of the American Steel Foundries differs in a number of important particulars from the maximum war prices of 1918. In the latter, separate prices were fixed for each class and subdivision of that class. The new schedule carries only 17 list prices graduated according to weight, and 12 extras for carbon, nickel, chrome content, etc. It is felt that this method of quoting is far simpler than that followed during the war and therefore more intelligible to the trade. In the war schedule there was no uniformity in the gradations of prices per weight. For example, under "Propeller Wheels" separate prices were quoted for weights 101 to 300 lb. inclusive, 301 to 600 lb. inclusive, 601 to 1000 lb. inclusive, etc., while under "Crane Castings" separate quotations were named for weights 1 to 10 lb. inclusive, 11 to 25 lb., 26 to 50 lb., etc. Under the American Steel Foundries schedule, the same weight classification applies to all castings. The list prices fixed for each division of weight will remain unchanged, but the discounts will vary from

time to time according to market conditions. A similar method of quoting has long been the rule on steel pipe, bolts and nuts, and valves and fittings.

The new schedule is also more specific than that of the war period. Whereas the general classifications are similar to those used for war prices, many more component items are included. Where a single price was quoted for a class under the war schedule, the American Steel Foundries names separate discounts for all of the important kinds of castings composing that class. Thus due allowance is made for differences in design and size of product.

Under the appended list prices and discounts, freight is allowed to customers whose plants are located within the area demarcated by a line drawn from Boston through Schenectady, Rochester, Niagara Falls, Detroit, Duluth, St. Louis, Cincinnati, Washington, Cape May, N. J., and other Atlantic ocean terminal points between Cape May and Boston. Customers located outside of this territory will pay the freight from the boundary line. This is the same practice which was employed under the war-time prices, and is explained by the fact that most of the steel foundry capacity of the United States lies within the territory above defined.

List Price of Steel Castings per 100 lb., According to Unit Weight

These prices cover steel castings produced in accordance with the requirements of the American Society for Testing Materials' standard specifications for steel castings

Over 1 to 10 lb. each	\$32.60
Over 10 to 25 lb. each	22.40
Over 25 to 50 lb. each	17.95
Over 50 to 75 lb. each	15.55
Over 75 to 100 lb. each	14.45
Over 100 to 150 lb. each	13.45
Over 150 to 200 lb. each	12.85
Over 200 to 300 lb. each	11.90
Over 300 to 500 lb. each	11.80
Over 500 to 750 lb. each	10.60
Over 750 to 1,000 lb. each	10.30
Over 1,000 to 2,000 lb. each	9.80
Over 2,000 to 3,000 lb. each	9.35
Over 3,000 to 5,000 lb. each	9.20
Over 5,000 to 10,000 lb. each	8.95
Over 10,000 to 50,000 lb. each	8.50
Over 50,000 lb. each	9.95

Extras to Be Added to Net Prices

For carbon, 0.30 to 0.70 per cent	Add \$0.25 per 100 lb.
For carbon, 0.70 to 1.00 per cent	Add 0.50 per 100 lb.
For carbon, 1.00 to 1.25 per cent	Add 0.75 per 100 lb.
For carbon, 1.25 to 1.50 per cent	Add 1.00 per 100 lb.
For carbon, 1.50 and over	Add 1.75 per 100 lb.
For $2\frac{1}{4}$ to $3\frac{1}{4}$ per cent nickel	Add 3.00 per 100 lb.
For 0.18 per cent vanadium	Add 3.40 per 100 lb.
For 1 per cent chromium	Add 1.50 per 100 lb.
For 1 per cent chromium and 2 per cent nickel	Add 3.25 per 100 lb.
For 1 per cent chromium and 0.18 per cent vanadium	Add 4.90 per 100 lb.
For any portion of titanium	Add 1.00 per 100 lb.
For steam test on any castings	Add 0.50 per 100 lb.

Freight Allowance

The prices obtained after applying the discounts cover the castings in the rough, f.o.b. our works, with published rate of freight allowed to the freight station of the purchaser, rather than railroads, located within a line drawn from Boston through Schenectady, Rochester and Niagara Falls, N. Y., Detroit, Duluth, St. Louis, Cincinnati, Washington, Cape May, N. J., and other Atlantic Ocean terminal points between Cape May and Boston. Prices to railroads are f.o.b. our works with published rate of freight allowed to the nearest point on the line of their road located in the territory mentioned above. For deliveries outside of the territory mentioned on shipments to all purchasers freight will be added only to the boundary line; the same to be paid by the purchaser.

Classification as of Feb. 1, 1922, According to Class of Castings

Block Castings	
In lots of 100 to 249 pieces.....	50 per cent
In lots of 250 to 499 pieces.....	55 per cent
In lots of 500 and over.....	60 per cent

Steel Furnace Castings	
Gears, pinions, segments and racks.....	•
Worms, worm wheels, sprockets, sheaves and pulleys.....	•
All other castings used in the construction or repair of blast furnaces.....	25 per cent

Boiler Castings, Flanges and Fittings	
Ammonia fittings.....	10 per cent
Ball and socket joints for dredges.....	25 per cent
Boiler saddles.....	25 per cent
Cross boxes.....	25 per cent
Crossovers.....	10 per cent
Dredge piping.....	25 per cent
Flanges, in lots of 1 to 49 pieces.....	35 per cent
Flanges, in lots of 50 to 99 pieces.....	40 per cent
Flanges, in lots of 100 and over.....	45 per cent
Handhole frames and covers.....	25 per cent
Headers.....	10 per cent
High-pressure flange fittings.....	25 per cent
Hydraulic fittings.....	25 per cent
Low-pressure flange fittings.....	10 per cent
Manhole frames and covers.....	25 per cent
Manifolds.....	10 per cent
Nozzles.....	25 per cent
Steam piping of heavy section.....	25 per cent
Steam piping of light section.....	10 per cent
Steam separators.....	10 per cent
Steam traps.....	10 per cent
Valve bodies.....	25 per cent
Valve parts.....	25 per cent

Bridge Castings	
Bridge blocks, column bases and shoes:	
In lots of 1 to 49 pieces.....	55 per cent
In lots of 50 and over.....	60 per cent
Gears, pinions, segments and racks.....	•
Worms, worm wheels, sprockets, sheaves and pulleys.....	•

Car Castings	
Booster center fillers and rear draft lugs combined:	
Booster center fillers and backstops combined:	
Center plates and booster center fillers combined:	
Striking castings and center sill connections combined:	
Striking castings and front draft lugs combined:	
In lots of 1 to 49 pieces.....	35 per cent
In lots of 50 to 99 pieces.....	40 per cent
In lots of 100 to 249 pieces.....	45 per cent
In lots of 250 to 499 pieces.....	50 per cent
In lots of 500 to 999 pieces.....	55 per cent
In lots of 1,000 and over.....	60 per cent
Booster center fillers, plain:	
Roping and jacking castings:	
Truck columns—box section:	
In lots of 1 to 49 pieces.....	40 per cent
In lots of 50 to 99 pieces.....	45 per cent
In lots of 100 to 249 pieces.....	50 per cent
In lots of 250 to 499 pieces.....	55 per cent
In lots of 500 to 999 pieces.....	60 per cent
In lots of 1,000 and over.....	65 per cent

Journal box wedges, cored type:	
Push pole pockets:	
Striking castings, plain:	
Truck columns, U section:	
Miscellaneous freight car castings:	
In lots of 1 to 49 pieces.....	45 per cent
In lots of 50 to 99 pieces.....	50 per cent
In lots of 100 to 249 pieces.....	55 per cent
In lots of 250 to 499 pieces.....	60 per cent
In lots of 500 to 999 pieces.....	65 per cent
In lots of 1,000 and over.....	70 per cent
Center plates, plain:	
Coupler carriers, plain:	
Draft lugs, short:	
Side bearings, plain:	
In lots of 1 to 49 pieces.....	50 per cent
In lots of 50 to 99 pieces.....	55 per cent
In lots of 100 to 249 pieces.....	60 per cent
In lots of 250 to 499 pieces.....	65 per cent
In lots of 500 to 999 pieces.....	70 per cent
In lots of 1,000 and over.....	75 per cent
Journal box wedges, solid type:	
In lots of 1 to 49 pieces.....	55 per cent
In lots of 50 to 99 pieces.....	60 per cent
In lots of 100 to 249 pieces.....	65 per cent
In lots of 250 to 499 pieces.....	70 per cent
In lots of 500 to 999 pieces.....	75 per cent
In lots of 1,000 and over.....	80 per cent
Journal boxes, all types.....	†
Passenger car castings, all types.....	†

Cement Mill Castings	
Gears, pinions, segments and racks.....	•
Riding rings.....	35 per cent
Rollers.....	45 per cent
Tires.....	35 per cent
Worms, worm wheels, sprockets, sheaves and pulleys.....	•
Miscellaneous castings for cement mills.....	35 per cent
Centrifugal Pump Castings	
Castings.....	†
Impellers.....	†
Miscellaneous castings.....	†

Copper Mine and Smelting Plant Castings	
Copper ladles.....	80 per cent
Copper molds.....	45 per cent
Copper bars.....	45 per cent
Copper castings.....	80 per cent
Copper rods.....	45 per cent
Copper wire.....	45 per cent
Copper castings.....	40 per cent

Truck Castings	
Brake wheels.....	10 per cent
Bumper hoods.....	10 per cent
Center stem castings.....	10 per cent
Charging bar supports.....	10 per cent
End carriages.....	20 per cent
Gear covers.....	10 per cent
Gears, pinions, segments and racks.....	10 per cent
Guide brackets.....	10 per cent
Hollow shafts and stems.....	10 per cent
Long hollow rack castings.....	net
Motor supports.....	10 per cent
Peels and peel heads.....	10 per cent
Ram frames.....	10 per cent
Sheave guards.....	10 per cent
Stripper rams and sleeves.....	10 per cent
Trolley frames.....	10 per cent
Truck castings.....	20 per cent
Worms, worm wheels, sprockets, sheaves and pulleys.....	•
Miscellaneous castings.....	30 per cent

Die Blocks	50 per cent
-------------------	-------------

Dredge Castings	
Ball and socket joints.....	25 per cent
Cutter heads.....	†
Dredge piping.....	25 per cent
Gears, pinions, segments and racks.....	•
Worms, worm wheels, sprockets, sheaves and pulleys.....	•
Miscellaneous dredge castings.....	†

Engine Castings	
Chambered pistons.....	10 per cent
Counter balancers.....	45 per cent
Crank disks.....	45 per cent
Crank webs.....	45 per cent
Cylinder heads.....	10 per cent
Gas engine cylinders in one piece.....	†
Gas engine cylinders in two pieces.....	†
Flywheels.....	45 per cent
Flywheel hubs.....	45 per cent
Flywheel segments.....	45 per cent
Miscellaneous engine castings.....	30 per cent

Gears, Pinions, Segments, Racks, Etc.	
Gears, pinions, segments and racks:	
In lots of 1 to 49 pieces.....	40 per cent
In lots of 50 to 99 pieces.....	45 per cent
In lots of 100 and over.....	50 per cent
Machine molded gears.....	†
Railway motor gears.....	†
Worms, worm wheels, sprockets, sheaves and pulleys:	
In lots of 1 to 49 pieces.....	25 per cent
In lots of 50 to 99 pieces.....	30 per cent
In lots of 100 and over.....	35 per cent

Hammer Heads	50 per cent
---------------------	-------------

Hammer Rams	50 per cent
--------------------	-------------

Hydraulic Machinery Castings	
Accumulator cylinders:	
With walls over 1½ in. thick and simple flange on one end.....	20 per cent
With walls 1½ in. thick or less, and with simple flange on one end.....	10 per cent
All other types of accumulator cylinders.....	net
Hydraulic press cylinders:	
Of plain surface with standard rectangular flange.....	35 per cent
Of irregular contour, with wings or special cored openings, and flanges.....	25 per cent
Head castings.....	50 per cent
Nut castings.....	55 per cent
Platen castings.....	50 per cent
Miscellaneous castings.....	40 per cent

Jaw and Gyratory Crusher Castings	
Gears, pinions, segments and racks.....	•
Gyratory crusher housings.....	25 per cent
Jaw crusher frames.....	25 per cent
Worms, worm wheels, sprockets, sheaves and pulleys.....	•
Miscellaneous castings.....	40 per cent

Locomotive Castings	
Driving wheel centers.....	50 per cent
Engine frames, weighing less than 1000 lb. each.....	15 per cent
Engine frames, weighing 1000-5000 lb. each.....	25 per cent
Engine frames, weighing 5000 lb. each and over.....	40 per cent
Miscellaneous locomotive castings.....	40 per cent

Marine Castings	
Propeller blades.....	10 per cent
Propeller hubs.....	45 per cent
Propeller wheels.....	net
Stern frames for merchant ships:	
In one piece.....	5 per cent
In two pieces.....	20 per cent
In over two pieces.....	25 per cent
All other marine castings.....	†

Mine and Industrial Car Castings	
Column guides, cradles, rockers and pedestals:	
In lots of 1 to 49 pieces.....	30 per cent
In lots of 50 to 99 pieces.....	35 per cent
In lots of 100 to 249 pieces.....	40 per cent
In lots of 250 to 499 pieces.....	45 per cent
In lots of 500 and over.....	50 per cent
Bumpers and link and pin drawheads:	
In lots of 1 to 49 pieces.....	40 per cent
In lots of 50 to 99 pieces.....	45 per cent
In lots of 100 to 249 pieces.....	50 per cent
In lots of 250 to 499 pieces.....	55 per cent
In lots of 500 and over.....	60 per cent

Miscellaneous castings:	
In lots of 1 to 49 pieces.....	35 per cent
In lots of 50 to 99 pieces.....	40 per cent
In lots of 100 to 249 pieces.....	45 per cent
In lots of 250 to 499 pieces.....	50 per cent
In lots of 500 and over.....	55 per cent

Wine and Industrial Car Wheels

Irregular designs, including self-offers, special flanged wheels, special hubs and special treads:

In lots of 1 to 49 pieces	30 per cent
In lots of 50 to 99 pieces	35 per cent
In lots of 100 to 249 pieces	40 per cent
In lots of 250 to 499 pieces	45 per cent
In lots of 500 and over	50 per cent

Single flange, web plate wheels, with plain hub:

In lots of 1 to 49 pieces	40 per cent
In lots of 50 to 99 pieces	45 per cent
In lots of 100 to 249 pieces	50 per cent
In lots of 250 to 499 pieces	55 per cent
In lots of 500 and over	60 per cent

Single flange, spoke center wheels with plain hub:

In lots of 1 to 49 pieces	35 per cent
In lots of 50 to 99 pieces	40 per cent
In lots of 100 to 249 pieces	45 per cent
In lots of 250 to 499 pieces	50 per cent
In lots of 500 and over	55 per cent

Refractory and Brick Yard Castings

Bottom plates	40 per cent
Inside circle plates	50 per cent
Outside circle plates	50 per cent
Pan rims	25 per cent
Roller tires	35 per cent
Scraper plates	45 per cent
Toggle plates	45 per cent
Miscellaneous castings	30 per cent

Riveter Castings

Arms for boiler riveters	20 per cent
Riveter frames	50 per cent
Riveter stakes	50 per cent
Miscellaneous castings	40 per cent

Road and Mining Machinery Castings

Miscellaneous castings	40 per cent
------------------------	-------------

Rolling Mill Castings

Annealing bottoms	55 per cent
Annealing boxes and pots	35 per cent
Anvil blocks	50 per cent
Blast furnace castings	**
Charging boxes	50 per cent
Charging box heads and ends	50 per cent
Coupling boxes	55 per cent
Cylinders	30 per cent
Gears, pinions, segments and racks	*
Housings, roll and pinion	50 per cent
Mill pinions, unfinished, less than 1000 lb each	20 per cent
Mill pinions, unfinished, 1000-5000 lb each	30 per cent
Mill pinions, unfinished, 5000 lb. each and over	40 per cent
Rolls, unfinished, less than 1000 lb. each	30 per cent
Rolls, unfinished, 1000-5000 lb. each	40 per cent
Rolls, unfinished, 5000 lb. each and over	50 per cent
Spindles, solid	50 per cent
Spindles, hollow	45 per cent
Table rollers, hollow and disk	30 per cent
Worms, worm wheels, sprockets, sheaves and pulleys	*
Miscellaneous rolling mill castings	40 per cent
Machine work prices	†

Snow Plow Castings

Miscellaneous castings for snow plows	†
---------------------------------------	---

Steam Shovel Castings

Miscellaneous castings for steam shovels	†
--	---

Sugar Mill Castings

Couplings	55 per cent
Crown wheels	55 per cent
Crusher rolls	20 per cent
Gears, pinions, segments and racks	*
Housings	50 per cent
Worms, worm wheels, sprockets, sheaves and pulleys	*
Miscellaneous sugar mill castings	40 per cent

All Other Classes

Other steel castings not covered above	†
--	---

*For discounts on this class of work see "Gears, Pinions, Segments and Racks."

**For discounts on this class of work see "Blast Furnace Castings."

†Discounts on this class of work will be furnished on receipt of inquiry and drawings showing the castings desired

‡Net prices on machine work will be quoted on application

Production of Bauxite in 1921

The production of bauxite in the United States for 1921 is estimated by the U. S. Geological Survey at approximately 130,000 gross tons as compared with 521,308 tons in 1920, a decrease of 391,308 tons. This great decrease is largely the result of the curtailed demand for aluminum, particularly aluminum used in the automobile industry, though the curtailed consumption of chemicals containing alumina lessened the output of some of the mines, particularly in the Georgia-Alabama field.

After a period of inactivity extending over a month or so, the New Haven Clock Co., New Haven, Conn., has resumed operations with approximately 1500 employees. The present schedule calls for about 65 per cent of capacity. Indications are, however, the schedule will shortly be increased.

QUALITY OF THERMOCOUPLES

Effect of Small Percentage of Impurities in Platinum-Rhodium Wires

Tests made by the pyrometry laboratory of the Bureau of Standards early in 1921 revealed the fact that many of the platinum-rhodium thermocouples found on the American market were subject to large changes in indication after long continued exposure to very high temperatures.

The wires from which these thermocouples were made were obtained from two sources, one American and one British. The tests showed that the former were of satisfactory purity for the use to which such couples are applied. They satisfactorily met all industrial requirements as to constancy and reliability if properly protected by well-known methods of insulation.

The British refined metals and alloys were found to be subject to large changes in their indications after their exposure to high temperatures. Chemical and spectroscopic tests revealed the fact that the trouble was due to the presence of several tenths per cent of iron in the platinum-rhodium alloy wire. The platinum wires, on the other hand, were found to be of high and satisfactory degree of purity.

The facts developed by these tests were immediately communicated to the firms engaged in refining the metals used for thermocouples, as well as to manufacturers of pyrometers who were employing them in their pyrometric installations. As a result of these tests, the British firm determined to improve its product and immediately took up the problem of producing new platinum-rhodium alloys free from the presence of iron or other impurities. Samples of their improved wire were submitted to the Bureau for tests a few months ago, and the results show the new couples to be eminently satisfactory. Therefore, at the present time purchasers have a choice of two makes of wire, either of which will prove to be satisfactory.

This work has resulted in a marked advance in reliability of high temperature measurements, since it has brought about the general use of materials of sufficiently high purity to remove an important cause of variations in thermocouple indications.

Cobalt Magnet Steel

A new formula for making magnet steel is coming into use, the principal change from the ordinary practice being the employment in its composition of cobalt instead of tungsten, says the London *Ironmonger*. Hitherto such steel has contained about 5½ per cent of tungsten, and the substitution of about 15 per cent of cobalt raises the coercive force of the material from 60 to 250, making it possible to use smaller magnets. The use of the new steel necessitates a new form of magnet, consisting merely of two small flat plates of steel placed on the sides of the armature, hence if it should come into general use the familiar horseshoe-shaped magnet will disappear. As yet, however, cobalt magnet steel is only in the experimental stage. Cobalt magnet steel costs three or four times as much as tungsten steel, but a much smaller magnet is required to do a given amount of work.

Large Portland Cement Output in 1921

Except for 1920, the 1921 production of portland cement in the United States, according to the Geological Survey, was greater than for any other year in its history. The total, reaching 98,293,000 bbl., compares with approximately 100,000,000 bbl. in 1920, and smaller quantities in preceding years. Production during the year showed a steady growth from 4,093,300 bbl. in January to more than 10,000,000 bbl. in August, September and October, falling, from seasonal causes, to 6,559,000 bbl. in December. Shipments followed a similar but much more pronounced trend, having peaked at the end of the year amounting to 11,947,000 bbl.

Center-Drive Lathe for Mine Car Axles

The center-drive lathe with short head, shown in the accompanying illustration, is being offered by the Reed-Prentice Co., Worcester, for turning mine-car axles and similar work. It was originally designed for turning the rear axles of small automobiles, but is said to have proved of equal value in other fields, its only limitation being that the work cannot be turned in the middle portion, as this is where it is gripped in the machine.

The head stock carries two chucks, one at each end of the spindle. These are generally of the floating type, so that they will position themselves relative to the outside diameter of the work when the jaws are tightened, at which point they are securely clamped against the shoulder on the main spindle. By this means the work is positively driven and, being held

The carriages have their bridges set off center, permitting a close-up position to the head stock. The blocks are arranged to receive special magazine tool holders. Each carriage is provided with an eccentric link motion, which by a slight effort of the operator feeds the tools into a predetermined diameter, at which point they automatically lock. The longitudinal feed of the carriages is then engaged and after turning the desired length, a tripping mechanism automatically releases the link and cam actions, which immediately allows the tools to recede from the finished work so that they will not score the work when they are returned to their starting position. Each carriage has an individual automatic feed trip, although both are driven by a single set of feed gearing at the extreme left of the machine. Both carriages feed simultaneously toward the head stock.

In the machine illustrated a back-arm attachment



Center Drive Lathe for Turning Both Ends of Mine-Car Axles and Similar Work For long or short work, either tailstock may be unclamped and moved to proper position. The carriages have their bridges off-center, permitting a close-up position to headstock.

rigid, maintains the natural position of the shaft without deflection. The spindle is of cast iron and has a large hole through it. It rotates in cast iron journals, having a driving gear mounted directly on the spindle. In cases where the shafts are particularly short, one of the chucks is omitted, to permit the carriages to come closer to the head stock. The drive to the head stock spindle is from a 7½-hp. motor mounted at the rear of the bed and driving direct to the sprocket gear on the head spindle through silent chain. The motor is controlled by a foot treadle at the front of the machine which actuates a clutch, releasing the gearing in the head without stopping and starting the motor.

The left-hand tail stock has an extra large spindle with two holes running through its entire length, one of which carries a standard center, the other acting as a clearance hole through which the work is telescoped in loading and unloading the machine. By withdrawing the index plunger, which is shown at the front of the left tail stock, the spindle may be revolved, bringing the clearance hole into proper alignment with the hole in the head-stock spindle, at which position the work may be entered or withdrawn from the head stock. After the work has been passed into the head, the index plunger is released and the spindle rotated 180 deg., this bringing the center into proper position for guiding the work. The withdrawal of the index plunger is automatically actuated by the rotation of a large hand wheel, due to a certain angle of free rotation in which the cam surface on the hub of the hand wheel withdraws the plunger. By continuing to rotate the hand wheel the spindle picks up the motion and finally brings the center or clearance hole into the desired position.

There is no endwise adjustment to the left hand spindle, this being taken care of by the longitudinal action of the spindle in the right-hand tail stock, which is similar to the standard engine-lathe type. Either tail stock may be unclamped from the bed and moved to the proper position to accommodate long and short work.

has been incorporated for each carriage so that the squaring of shoulders, as well as grooving at the end of the shafts, can be performed simultaneously with the turning operation. It is not essential, however, that the machine be equipped with this arrangement. Various set-ups are possible, permitting a wide range of operations. The machine may be arranged with front blocks for diameter turning and rear blocks for shouldering and taper turning, the rear block to come into operation by hand after the diameter turning has been accomplished; or the front blocks may be used for diameter turning and the back arm for shouldering, necking, chamfering or grooving simultaneously with the turning of the front tools. In another arrangement the auxiliary blocks can be introduced at the rear, hand operated, for shaving the radius at the end of the cylindrical turning or chamfering of corners.

On a machine for turning shafts up to 2¾ in. in diameter and having a 9-ft. bed, the distance between centers is 72 in., and the overall dimensions 10 ft. by 40½ in.

The theory of rolling mills, with recent developments in the industry, was discussed by Prof. W. Trinks of the Carnegie Institute of Technology, Pittsburgh, at a meeting of the Buffalo section of the American Society of Mechanical Engineers on the evening of Feb. 1 at the Iroquois Hotel, Buffalo.

J. D. Martin, chief engineer, Hillman Coal & Coke Co., Pittsburgh, and retiring chairman of the mining section, Engineers' Society of Western Pennsylvania, spoke on "Standardization of Mine Turnouts," at the annual meeting of the section at the William Penn Hotel, Pittsburgh, Tuesday evening, Jan. 31.

George Berry, chief chemist Halcumb Steel Co., Syracuse, N. Y., addressed the Rochester Chapter of the American Society for Steel Treating on "From Ore to Steel" at the regular January meeting, on the evening of Jan. 11.

New Heavy Engraving Machine

A heavy engraving machine, designated the No. 1-S, for cutting dies, steel stamps, large-size letters and similar work in steel, brass and cast iron, has been added to the line of the George Gorton Machine Co., Racine, Wis. The new machine is heavier and of greater capacity than the company's previous machines.

As an example of the capacity in cutting heavy lettering, a sunk letter $1\frac{1}{2}$ in. high, $\frac{1}{4}$, $\frac{5}{16}$ or $\frac{3}{8}$ in. depth of cut can be made in cast iron in 2 min. with a single cut. In cold-rolled steel a letter 2 in. high, $\frac{9}{64}$ in. depth, is cut in relief in 15 min., with two cuts and in bronze a 2-in. letter, $\frac{5}{16}$ in. depth, is done in 2 min. with one cut.

The pantograph is adjustable and has a range of 1 to 1 down to 6 to 1 in reductions. The pivot bearings are ball bearing, both radial and thrust, all other pantograph bearings being formed by hardened, ground and

and is adjustable to compensate for change in reduction of the pantograph.

The longitudinal feed of the table is $17\frac{1}{2}$ in. and the cross feed $8\frac{1}{4}$ in. The minimum distance from end of spindle to top of table is $\frac{3}{4}$ in., the maximum being 18 in. The belt-driven machine weighs approximately 1800 lb. and the motor driven, 1950 lb.

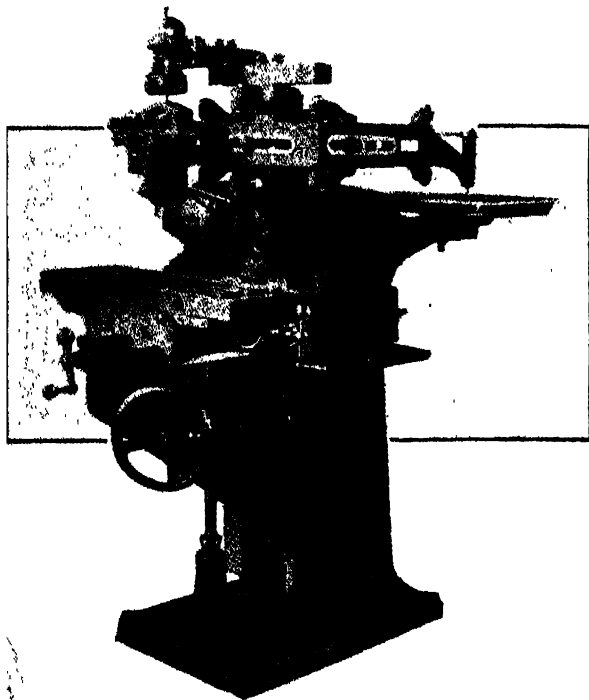
Cast Iron Carwheels Made Centrifugally

The casting of iron car wheels by the centrifugal process is reported as under way by a large British pig iron maker, which is negotiating with a British foundry for the purpose of organizing a company to develop this process, says *Foundry*. The wheels are to be made in a machine with a vertical axis and will be cast with chilled iron on the rim and a softer, more ductile metal for the center. This is regarded as likely to awaken considerable interest, as it is stated that the cast iron car wheel is practically unknown in England. The new organization is reported to have the benefit of considerable experience in centrifugal casting and it expects to produce large castings centrifugally in other lines in addition to its work in the railroad field.

New Spark Plug Gages

A new set of spark plug thread gages made to S.A.E. standard limits has been placed on the market by the Pratt & Whitney Co., Hartford. The set consists of a double-end limit plug gage of the Trilock reversible-end type, a "go" and "no go" templet in one unit and a setting plug for the templet, consisting of two threaded members and one cylindrical plug for checking root diameter.

The pitch diameters of the plugs are 0.841 in. and 0.843 in., the tolerance for tapped holes being 0.002 in.

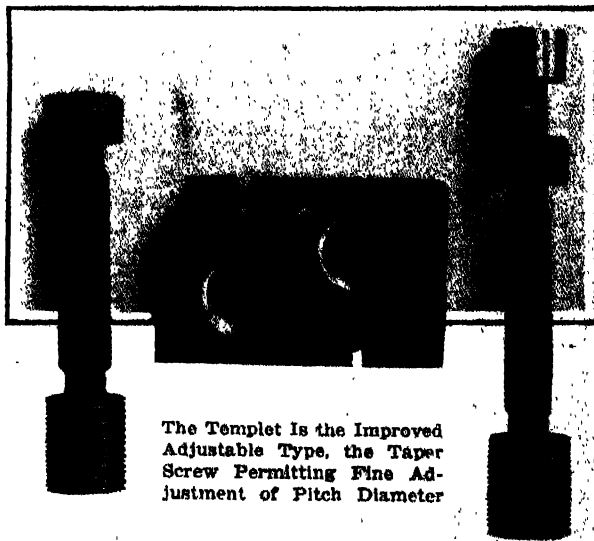


When Engraving Work of Curved or Irregular Contour, a Forming Attachment Having Six Adjustments Is Used

lapped cone point centers, male and female. The tracing style is held in a $\frac{1}{2}$ -in. collet and the adjustable scales are mounted on top surfaces of bars. The scales have engraved figures, giving the settings for various reductions, and are graduated full length, 20 graduations to the inch, so that any intermediate reduction can easily be obtained. For larger work, the same machine can be equipped with a larger pantograph having reductions 2 to 1 down to 8 to 1.

The cutterhead is an integral part of the heavier of the pantograph bars. The spindle is $\frac{13}{16}$ in. diameter, is mounted on ball bearings and has a range of 1800 to 8000 r.p.m., enabling very small cutters to be used for fine work and finishing up corners. Spindle speeds down to 600 r.p.m. are obtainable by using special drive pulleys. The spindle nose has a straight hole $\frac{1}{8}$ in. in diameter with a collet nut for holding the cutters. Extra bushings to take drill rod cutters from $\frac{1}{4}$ in. diameter down can be obtained and a heavy spindle running in bronze bearings and at slower speeds can be furnished.

When engraving work of curved or irregular contour, the forming attachment having six different adjustments is used. This can be set quickly and accurately in relation to the work to be engraved. The lower member of the attachment is directly over the center of the spindle, and carries the former block, which is a hardened piece of steel of the same shape as the engraved surface, except in reverse. This controls vertical movement of spindle. The copy holder is mounted on a bracket at right-hand side of machine



The Templet Is the Improved Adjustable Type, the Taper Screw Permitting Fine Adjustment of Pitch Diameter

The templet pitch diameters are 0.836 in. and 0.839 in., giving 0.003 in. tolerance on spark-plug body threads, and a neutral zone of 0.002 in. between maximum plug and minimum hole.

The templet is shown in the accompanying illustration and is of the improved adjustable type, the taper screw permitting fine adjustment of pitch diameter. When both locking and adjusting screws are tight the threads of the adjusting screw are said to form a perfect dowel in both planes. The go and no go ends are placed close together, for convenience in spinning onto work. The go side of the templet is cut away for quick identification when using the gage for rapid inspection. The reversible plug ends are intended to provide double the usual wearing surface.

An additional open hearth furnace of the Sharon, Pa., plant of the Bethlehem Steel Co. is being fired preparatory to the early resumption of operations. Five of the nine furnaces of the plant will then be in use.

INCORPORATION OF UNIONS

Two Reports of Private Investigators -- Senator Kenyon Does Not Agree with Colleagues

WASHINGTON, Jan. 31.—Legislation making it compulsory for labor unions to incorporate is recommended in one report, and a Federal agency for regulation of the coal industry is recommended in another, made to the Senate last Friday by the Committee on Education and Labor in connection with its investigation of disorders in the West Virginia-Kentucky coal fields.

The recommendation for incorporation of unions, which frequently has been made in the past, and always vigorously combatted by the American Federation of Labor, was made in a report signed by Senators Phipps, of Colorado; Warren, of Wyoming; and Sterling, of South Dakota, all of whom are Republicans. The setting up of a code to regulate the coal industry was recommended by Senator Kenyon, of Iowa, Progressive Republican and chairman of the committee. His proposal was supported by the other three senators, but they maintained that such a code would be impracticable unless incorporation of labor unions were required so that they would be legally responsible in their dealings with the coal operators.

In his report, Senator Kenyon said that mutual concessions must be made by both operators and miners to any conflict, but the other Senators hold that the law should provide that when agreements were reached, through arbitration or otherwise, the promises made must be respected.

In their report, the three Senators said that "As a matter of fact when conditions made it safe to do so, when wages soared and when men were highly needed, these contracts were broken by the employees and there was no redress. At the same time the operators were liable for the full performance of their contracts to deliver specified quantities of coal at prices at which they had been sold."

The position of Senators Phipps, Warren and Sterling, who also differed with Senator Kenyon as to the responsibility for conditions in the West Virginia mining district, is that it should not be necessary to compel incorporation of labor organizations. Their report declared that no valid reason existed for their failure to incorporate and pointed out that such action would benefit the labor unions themselves because it would compel an accounting of funds through annual reports to all members of the organization.

It was declared, that under the present methods of handling funds of labor organizations, the great body of union men never know what becomes of the dues which they pay into the general treasury. The three Senators also said that paid organizers had gone into the West Virginia district from other States and had resorted to intimidation and violence in an effort to force unionizing the miners as a body. On the other hand, Senator Kenyon charged that both miners and operators were "measurably responsible."

Further, it was the opinion of the three Senators that "too much stress has been laid upon the point where operators were to blame and not enough is said about the crimes, including murder, of which the employees were guilty."

The proposed code to regulate the coal industry, for which Senator Kenyon announced he would introduce a bill, would create a Government coal board similar to the Railroad Labor Board. It would consist of three representatives each of the employees, employers, and the public, appointed by the President. The industrial code principles would be interpreted by the board. The proposed code is largely similar to one that has been previously outlined in a bill introduced by Senator Kenyon. Some of the high lights of the proposed bill of Senator Kenyon are: "Right of operators and miners to organize is recognized and is not to be interfered with in any manner; the right of collective bargaining through representatives of operators and miners of their own choosing is recognized; non-union miners have the right to work without being harassed by fellow workmen who may belong to unions; and union

miners have the right to work without being harassed by operators who do not believe in unionism; common laborers have the right to earn an adequate living wage; six days of eight hours each would be the recognized working standard; punitive overtime would be paid for hours worked each day in excess of the standard working day; when a dispute or controversy arises, there should be no strike or lockout, pending a conference or a hearing and determination of the facts and principles involved.

Senator Kenyon maintains that the Kansas Industrial Court idea involving compulsory arbitration, has proved futile. He considers that the topic of regulation of the coal industry and the setting up of a labor code is both timely and pressing at this period, because of the threatened strike of bituminous coal miners on April 1.

To Reduce Eye Hazard

HARRISBURG, Pa., Jan. 30. Of interest to the iron and steel trade generally are the plans of the Pennsylvania Department of Labor and Industry to remove, or decrease, the eye hazard in industry in the State. Definite steps of the year's program were announced this week by Commissioner Clifford B. Connelley, who asserted that there has been an alarming increase in the hazard in Pennsylvania and throughout the nation generally.

The Industrial Board of the department, after more than two years' study of conditions causing eye loss, has completed a revision of safety standards governing head and eye protection in Pennsylvania. This head and eye code was recently completed and adopted by the board after one year of public hearings and revision, and is now printed for distribution. The Division of Hygiene and Engineering performed an exhaustive investigation and prepared recommendations which it submitted to the board in July 1920, on the eye hazard.

Seven separate occupations, wherein protectors are required, are enumerated in the new code. They are:

1. Oxy-acetylene and other compressed gas welding and burning
2. Chipping
3. Electric arc welding
4. Grinding—wheel dressing and rough emery.
5. Iron tapping at cupola
6. Sand and shot blasting
7. Thermit welding.

Goggles, mask, helmets, hoods, and shields are recommended as protectors for certain lines of work. In every one of the mandatory occupations, with the exception of sand and shot blasting, goggles are required. In sand and shot blasting a hood is required.

Recognition of the element of negligence in the enforcement of this code has resulted in the injection of strong language for the purpose of bringing home to the workers and employers the danger in eye accidents. The fact that eye cases number more than all other permanent injuries combined, for which compensation is paid, brings home a lesson to the responsible parties, Commissioner Connelley emphasized. Another lesson which confronts the workers particularly is found in the fact that eye losses are permanent in the sense that such cases almost preclude rehabilitation in any form.

Safety Movement at Youngstown

The Youngstown Sheet & Tube Co., Youngstown, Ohio, is instituting a safety drive at its various plants in order to reduce the number of accidents in 1922. A special appeal has been issued to the newly elected representatives of employees in the Representation Plan to aid the movement, that the record for 1922 will be the best ever.

Pointing out the cost of accidents to the company, James M. Woltz, general safety director, states that "when an employee is injured and required to be off work, the company loses an experienced workman. A man with less experience takes that job and we have a reduction in production on this particular machine. The quality of the work is not as good; the slowing

down of initial production may, and oftentimes does, cause a slowing down all along the line to the finished product, and sometimes even to the shipping.

"The work of the medical department, compensation department, safety department and other correlated departments or bureaus is increased, and this means spending additional money.

"A new man is taken into our organization to replace the man who was injured. It costs money (from \$35 to \$500 is the estimate, depending upon the work, etc.) to hire, examine, instruct and supervise this new man, and there is a lot of his product at first that is only good for scrap, and this is a heavy loss. His output is limited and not up to the standard."

Labor Conditions at St. Louis

ST. LOUIS, Jan. 31.—The labor situation in the Eighth Federal Reserve District is reflected in a statement compiled by the Federal Reserve Bank of the district from reports received from 210 leading employers in 21 of the largest cities of the district showing that the number of employees of the reporting interests decreased 8887 or 5.1 per cent (men decreased 8.3 per cent while women increased 35.4 per cent) between Dec. 31, 1920, and Dec. 31, 1921. On Dec. 31, 1920, the number was 10.9 per cent under normal and on Nov. 30, 1920, the total was 11.8 per cent under normal. Wages, figured on a semi-monthly basis, decreased \$3,025,452.32 or 20.7 per cent between Dec. 31, 1920, and Dec. 31, 1921.

On July 1, 1921, the total wage earners was 27.4 per cent under normal, on Aug. 1, 1921, 23.1 per cent under normal, on Sept. 1, 1921, 16.4 per cent under normal, on Oct. 1, 1921, 17.7 per cent under normal, and on Nov. 1, 1921, 17.1 per cent under normal.

Newport Rolling Mill Co. Reincorporates

The Newport Rolling Mill Co., Newport, Ky., has decided to surrender its Kentucky charter and to reincorporate under the laws of the State of Delaware. This move is being made for the purpose of making the company an interstate corporation, giving it an opportunity to seek redress in United States courts if any person or persons interfere with the conduct of its affairs. The decision of the company was made as a result of the strike now in progress at its plant, and the difficulty encountered by the company in securing adequate protection for its employees. The Kentucky State troops which have been stationed at the plant for the past five weeks, were moved away on Jan. 28, and Newport city officials were commissioned to maintain order at the plant. There have been several instances of employees being attacked even when the troops were on guard, and fears are entertained that civic officials may not be able to control the situation.

Working Rules Rejected

CHICAGO, Jan. 28.—Rejection of the new rules covering working conditions in railroad shops recently announced by the United States Railroad Labor Board, has been ordered by a committee of 100 acting for the six railroad shop crafts. In a circular issued to the shop men in this country, the committee has ordered new disputes instituted with the railroad management immediately to the end that the rules again be amended and, failing to reach an agreement, the disputes are ordered taken to the Labor Board for hearing. The circular is signed by the international presidents of the six shop crafts unions.

The General Electric Co., West Lynn, Mass., is employing 7500 to 8000, as against a normal personnel of 11,000 to 12,000. Incoming business shows a slight improvement, and the outlook is brighter than it has been before in some time.

Eight hundred employees of the Readville car shops, New York, New Haven & Hartford Railroad, Readville, Mass., laid off a month ago, have been called back to work without change in wages. Returning employees include machinists and blacksmiths.

REFRACTORIES LITTLE CHANGED

Demand Comes From Many Industries But Is Limited in Volume

PITTSBURGH, Jan. 30.—The situation in refractories does not change much. Demand is anything but brisk, and yet there is some buying by practically all consuming industries, and to be doing some business at a time when the iron and steel industry, the chief outlet for refractories, is running at such a moderate rate as at present, is an occasion for some satisfaction. This feeling, however, does not extend beyond the fairly diversified character of the buying, for prices generally either show a loss or mean only a new dollar for an old one. An effort is being made to maintain present prices, chiefly on the argument that they are as low as they should be on the basis of current costs. This plea, however, does not carry much weight with the iron and steel producers, whose experience for some time has been that what buyers are willing to pay rather than producing costs determines the selling prices.

Large makers of fireclay brick are holding high duty grade at \$32 per 1000 as a minimum, but instances still are heard of business being accepted by smaller producers at \$30 in all districts, except possibly Kentucky. There does not seem to be any shading of the recently established minimum of \$30 per 1000 for Pennsylvania silica brick, but there is scarcely enough business to provide a real test of that figure, and in the Chicago district the going price is not more than \$35.

An interesting development in connection with magnesite brick prices is that since Eastern makers now are entirely on Austrian magnesite, the prices of the larger producing interests are f.o.b. Baltimore, that port having been set up as a basing point. The freight from Baltimore to Pittsburgh common freight points is \$4.70 per net ton and to Youngstown district points \$5.60. Chrome brick still is weak, with most sales at or near \$41 per net ton, f.o.b. works.

We quote per 1000 f.o.b. works:

Fire Clay:	High Duty	Moderate Duty
Pennsylvania	\$32.00 to \$35.00	\$20.00 to \$32.00
Ohio	30.00 to 35.00	25.00 to 30.00
Kentucky	32.00 to 35.00	30.00 to 32.00
Illinois	32.00 to 35.00	30.00 to 32.00
Missouri	32.00 to 35.00	25.00 to 32.00
Silica Brick:		
Pennsylvania		30.00
Chicago		35.00 to 37.00
Birmingham		40.00
Magnesite Brick:		
Standard size, per net ton (f.o.b. Baltimore)		53.00
Chrome Brick:		
Standard size, per net ton		41.00 to 43.00

Building 2 1/4 Years Behind Demand

Col. Leonard P. Ayres, vice-president Cleveland Trust Co. and formerly chief statistical officer of the A. E. F., speaking at the annual convention of the Associated General Contractors of America, in Cleveland, last week, expressed the belief that prices will continue to fall, intermittently, for ten or twenty years more, but conveyed assurance that the construction industry will be immune to many of the embarrassments of the coming period, because it supplies a market in which there is a latent demand equal to 2 1/4 years of normal production of buildings.

"In other words," said Col. Ayres, "construction can go along for nine years at 25 per cent above normal, and only fill the normal demand by the end of that time."

The Ajax Electrothermic Corporation, Trenton, N. J., has sold to the U. S. Molybdenum Metals, Ltd., Los Angeles, Cal., a high-frequency converter of 25 k.v.a. capacity, together with three Ajax-Northrup high-frequency induction furnaces. They are to be used for the reduction of molybdeniferous, tantaliferous and tungstic ores at the mines. The company has also sold to the Walsbach Co., Gloucester, N. J., a 25-k.v.a. Ajax-Northrup high-frequency converter and a special furnace for attaining a temperature of about 1600 deg. C. (2915 deg. Fahr.).

CONTENTS

February 2, 1922

Swedish Steel Belt Conveyors	321
Adapted to Hot and Sticky Materials Which Cannot Be Carried on Rubber or Fabric Belts	
Managerial Understanding of Welding	323
Conditions Necessary to Secure Best Results—Checking Welders' Ability—Test for Correct Welding	
Preparing and Distributing Powdered Coal	326
Plant in Seamless Steel Tube Works—Used for Both Furnaces and Boilers	
New Blast Furnace Replaces Pioneer	331
Equipment Provided for Warwick Furnace Plant—Pre-Revolution Activities of First Warwick Stack	
Sulphur from Blast Furnace Slag	335
Diehl Process and Apparatus Developed in Germany—Yields from Slags from Steel Making, Foundry and Bessemer Irons	
Silico-Thermy and Its Practical Application	337
German Iron-Silicon Castings of Thermisilid Made by Thermal Reactions—Silicides Which Are Formed	
Gas Burning Equipment for Large Core Oven	342
Data on Performance with Surface Combustion System—Temperature Regulation and Operating Cost	
List Prices and Discounts on Steel Castings	348
American Steel Foundries Makes Public New Method of Quoting Its Products—Departures from War Schedules	
Hearing on Basing Point Case Begins	361
Examiner of Federal Trade Commission Takes Testimony at Milwaukee—Admit Temporary Improvement of Conditions	
American Valuation Has Strong Support	363
Tariff Conference of National Association of Manufacturers Meets at Washington—Letter from Charles M. Schwab	
Luxemburg's Recovery in Iron.....	324
New 7-ton Heroult Furnace.....	325
Building Construction in 1921.....	329
Washington Agricultural Conference.....	330
Government Building at Rio Janeiro....	330
Shipbuilding in 1921	334
Coal and Coke Production.....	334
Waterways Improvements	336
Mining Engineers' Meeting.....	339
Drop Forge Association Activities.....	339
Buffalo Engineering Society	339
Steel Makers Join Standards Committee..	339
Coming Meetings	339
Internal Grinder for Production Work....	340
Chinese Machinery Trade.....	341
Improved Hob Grinder.....	344
To Control Government Ship Repairs....	344
December Exports of Iron and Steel.....	344
German Iron and Steel Exports.....	345
Status of Trade Associations.....	345
Improved Gap Shear	346
Thermal Stresses in Steel Wheels.....	346
Roofing Shingles of Copper.....	347
Electrical Properties of Titanium Alloys..	347
Sheet Metal Contractors	347
Corrosion of Steels	347
Production of Bauxite in 1921.....	350
Quality of Thermocouples	350
Cobalt Magnet Steel	350
Portland Cement Output in 1921.....	350
Center Drive Lathe for Axles.....	351
Heavy Engraving Machine	352
Iron Carwheels Made Centrifugally....	352
Spark Plug Gages	352
Incorporations of Unions	353
To Reduce Eye Hazards.....	353
Safety Movement at Youngstown.....	353
Labor Notes	347, 354
Refractories Market	354
Building Deficiencies	354
Editorials	356
Heaping Up Labor Antagonism—More Steel in 1922 than in 1921—Volume of Steel Using Business—Trade Information for All—Contrast in Steel Exports.	
Correspondence	359
Tests of Rotary Drill Pipe.	
Steel Corporation Earnings	359
Taper Pin Reamer.....	360
Spiral Fluted Reamer.....	360
Economic Situation	379
Foreign Trade Conditions.....	364, 365, 384
Book Reviews	385
New Trade Publications.....	385
Industrial Finance	386
Trade Changes	387
Iron and Steel Markets	366
Comparison of Prices	367
Non-Ferrous Metal Market	380
Prices Finished Iron and Steel f. o. b. Pittsburgh	381
Personal Notes	382
Obituary Notes	383
Machinery Markets and News of the Works	388
New York Jobbers' Prices	396

ESTABLISHED 1855

THE IRON AGE

EDITORS:

A. I. FINDLEY

WILLIAM W. MACON

GEORGE SMART

CHARLES S. BAUR, Advertising Manager

Member of the Audit Bureau of Circulations and of
Associated Business Papers, Inc.

Published every Thursday by the IRON AGE PUBLISHING CO., 239 West 39th Street, New York

F. J. Frank, President

PRINTED IN U. S. A.

George H. Griffiths, Secretary

Owned by the United Publishers Corporation, 243 West 39th Street, New York, H. M. Swinstead, Pres., Charles G. Phillips, Vice Pres., A. C. Benson, Treas., F. J. Frank, Secy.

BRANCH OFFICES: Chicago: 618 S. Building, Pittsburgh: Park Building, Boston: 110 Paddy Building, Philadelphia: 1429 1432 Widener Building, Cleveland: Guardian Building.

Detroit: 317 West Fort St., Cincinnati: Mercantile Library Bldg., Washington: 810 Fifteenth St., N. W., San Francisco: 320 Market St., London, Eng.: 11 Haymarket, S.W. 1. Subscription Price: United States and Possessions, Mexico, Cuba, Shanghai, \$6.00; Canada, \$8.50; Foreign, \$12.00 per year. Single copy 50 cents.

Entered as second class matter June 18, 1879, at the Post Office at New York, New York, under the Act of March 3, 1879.

Heaping Up Labor Antagonism

At Washington the other day Samuel Gompers warned the members of the Agricultural conference that those of them who favored the repeal of the Adamson law were playing into the hands of the bankers, implement manufacturers and their like. He said that he had "faced the same stereotyped antagonism to labor" in the Unemployment conference last fall. While the Agricultural conference did not vote for the repeal of the Adamson law, it did call for participation by railroad labor and railroad corporations in the general price deflation now under way. Mr. Gompers was not pleased with this position respecting railroad labor. His attitude on all proposals for wage reductions is what it was just after the war, when he served notice that organized labor was going to hold everything that it had gained in war time. Of course, organized labor has not been able to hold wages up to the war level, and all the king's horses and all the king's men could not avert the deflation that has been under way. It is not the advocates of necessary wage reductions who are working against labor, but those leaders who insist on keeping wages so high that factories cannot run, since the market will not pay their price.

As has been said over and over, it is not the holding of a high wage rate the worker wants, so much as the maintenance of his purchasing power at the highest possible point. What will it profit a man in the common labor category to have a \$5 daily wage rate and get but one or two days' work a week? It is the amount in the pay envelope that counts, and what it will buy. The coal miners, who share Mr. Gompers's unwisdom, think the remedy for their small weekly earnings is to raise the rate still higher. It is perfectly plain to the average intelligence that excessive wage rates are responsible for very much of the inactivity at industrial plants in the United States, high railroad labor being responsible more than anything else. The farmers have had deflation in excess. High transportation rates have done them more hurt than any other one thing. Naturally they ask to have transportation rates reduced and they recognize that this must come about through a reduction of railroad wages.

Mr. Gompers's sulphurous language is familiar, but we can only wonder that he goes on year after year discussing labor and economic questions as though all who disagreed with him were enemies. He never gets over the language of militarism. To the farmers at Washington he said that if they adopted the report of the committee which recommended the repeal of the Adamson law, "we cannot help but feel you are aligning yourselves with our enemies." We could understand such language if it came from an advocate of the abolition of the "capitalistic system" root and branch. But Mr. Gompers has been a stout opponent of the soviet and all that ilk. Yet he has steadily urged the essential antagonism of employer and employee and opposed any plan that would bring about direct contacts between employers and their employees in friendly conference. Nothing has been more heartening to the friends of better industrial relations than the progress made in recent years with plans of employee representation that have aimed at the settlement of disputes on a basis of fairness and justice rather than by the argument of superior force. In all these the aim has been to bring into industrial relations the spirit of the international conference that is now so successfully ending its labors at Washington.

To the carrying over into industry of any such program of peace and conciliation the American Federation of Labor is opposed with all its might. The greatest military machine in the labor world was built for war and its perpetuation requires a continuing state of war and the constant preaching of enmity and antagonism.

The low rate of American blast furnace operation in 1921 naturally has been reflected in the iron ore imports. To Dec. 1, 1921, these had fallen to the lowest figure in many years, or 28,510 gross tons per month against 216,231 tons per month in 1913. A feature of last year's imports was the large proportion from Sweden. To Dec. 1, 42 per cent of the total imports, or 11,894 tons per month, came from Sweden, as against only about 14 per cent in 1913, when the volume both from Sweden and other countries was much larger.

Spain's proportion fell to very small figures last year. There is no doubt, however, that imports from Sweden and other countries will expand rapidly as blast furnace operations increase, because foreign ore can be laid down along the seaboard at a lower cost than Lake Superior ores, and compete in quality as well.

More Steel in 1922 Than in 1921

It is a common expectation that steel production in 1922 will exceed that of 1921. The history of reactions in the industry is one of rebound in the year following a low dip. If one takes for study the half century 1864 to 1913 inclusive he cuts out the recent war but takes into the reckoning the Civil War boom in production, with the recession that would follow if war necessarily involves a recession afterward. In those 50 years there were 31 which made new high records in pig iron production and only 19 that failed to do so. Thus the proportion of record-breakers was better than six in ten. The longest spell without a new record was five years, 1874 to 1878, the next longest being the four years 1891 to 1894, next coming the three years 1883 to 1885.

The greatest recessions in pig iron production were in 1876 and in 1894, when output was 27 per cent below the previous high mark for a year, and in 1908, when there was a recession of 38 per cent. In 1921, on the other hand, the recession was 58 per cent from the record of 1916. In the year after 1876 there was a gain of 11 per cent, while after 1894 there was a gain of 42 per cent and the making of a new record and after 1908 there was a gain of 55 per cent and a new record.

This is speaking merely by the statistics. The years 1876 and 1894 had practically nothing in common with 1908 from the economic viewpoint. They were years of industrial depression in which demand for iron and steel increased despite the depression, while 1908 was simply a year in which the country liquidated its stocks and made a fresh start, for 1909 broke the previous production record by a small margin, and then 1910 beat 1909 by 6 per cent.

One can argue that there should be a much greater demand upon the iron and steel industry this year than last without contending that history must repeat itself in full, without refusing to admit that the war must exert an important influence. Pig iron could gain 54 per cent over 1921 and still have 54 per cent to go above that tonnage to equal the previous record, while steel ingots could gain one-half and still have to gain one-half of that to equal the war-time record of output.

Merely a duplication in 1922 of the actual ultimate consumption of 1921 would require an increased production at mills and furnaces, for there is no denying that stocks of steel in the hands of buyers and stocks of manufactured goods in the hands of various holders were much smaller at the end of 1921 than at the beginning. That is not because stocks at the beginning of 1921 were phenomenally large, but because stocks at the end of the year were practically nothing. The same consumption this year as last would mean

larger production, restoration of normal stocks would mean still larger production, and a moderate increase in consumption would mean additional production on top of that.

So great was the slump in steel production in 1921 that one can throw out of the reckoning the war production and take it that a steel production in 1922 of 25 per cent less than production in 1912 and 1913 would still be 16 per cent more than production in 1921, thus allowing for a recession of 25 per cent in consumption in ten years instead of counting upon any increase at all. Thus the most moderate—even pessimistic—appraisal of prospects must show that the iron and steel industry has left its worst year behind.

Volume of Steel-Using Business

The great difference between the volume of general business in the United States and the character of the business, from the standpoint of steel manufacturers, needs always to be borne in mind. What the steel industry is actually thinking of, when it speaks of the volume of general business, is not really general business at all, but rather the particular kind of business that makes for steel demand, the kind of business that represents construction, expansion and improvement.

As to the actual amount of business done, the business that involves a money turnover, there is no better index than the "bank debits" reported by the Federal Reserve Board. These represent the total of debits to individual accounts at banks in about 150 leading clearing house centers. The figures are better than statistics of clearing house operations for various reasons, one being that they include checks deposited at the banks on which they are drawn. These bank debits are reported weekly, and are now available in monthly totals for the past three years, as follows:

Bank Debits, Millions of Dollars

	1919	1920	1921
January	34,138	44,727	37,560
February	27,883	35,281	29,358
March	31,725	42,835	33,487
April	32,270	41,036	31,812
May	36,555	38,695	32,110
June	38,676	39,778	33,172
July	40,190	39,299	31,088
August	37,458	35,783	29,179
September	38,080	36,862	31,225
October	43,880	40,207	38,853
November	41,960	39,265	32,997
December	45,916	42,400	37,512
Year	449,349	476,188	393,923

There are represented in these bank debits nearly all business, commercial and industrial transactions, including sales of real estate, sales of commodities at wholesale and retail, services rendered for salary or wages, bond and stock transfers, interest and dividends paid, etc.

Comparing the year totals, 1920 is only 6 per cent above 1919 and only 21 per cent above 1921. In some minds the reaction to this showing may be simply that here are some statistics that need to be explained away, but it is more practical to recognize the value of these statistics and form a viewpoint in accordance with them.

The Bureau of Labor's index number of com-

modity prices at wholesale was higher for 1920 than for 1919 by 15 per cent, and higher for 1920 than for 1921 by 57 per cent. Wages and salaries were higher in 1920 than in 1919 and much higher than in 1921. Payments to and by the railroads were higher in 1920. Dividend disbursements were much higher. Practically all the important things that can be reckoned in dollars in proportion to the physical volume of business done or service rendered were higher in 1920 than in 1919 or 1921 by greater margins than are shown by the bank debits. The conclusion is that the physical volume of business was less in 1920 than in 1919 and probably less than in 1921.

This fact is not something to be explained away but something to be used to enable one to obtain a clearer viewpoint. From the steel maker's standpoint it is not so much a question of how much money is changing hands, how much "business" of a sort is being done, but whether the business or activity is of the nature to produce steel demand. The activity of 1920 produced a large steel demand, yet there must have been involved a relatively light turnover of some commodities that were very high priced and were assumed, merely on that account, to be in large demand. Some of these commodities were held at high prices in 1920 and did not sell, while in 1921 they were offered at lower prices and did sell. The country did not stand still in 1921, but transacted a great deal of business, of a sort, and while it called for little steel during the year it probably wore out a great deal of steel in its activity, and it has been going at an ever increasing pace since last August, auguring an eventual increase in the demand for steel.

Trade Information for All

At a recent meeting of members of the National Conference of Business Paper Editors and representatives of the Chamber of Commerce of the United States in Washington, the decision of the Supreme Court in the so-called Hardwood Lumber case was discussed at length. The prevailing opinion was in harmony with that expressed in these columns shortly after the decision was handed down, especially as to the ability of trade organizations to carry on statistical work, when it is not in any way intended to use it to boost prices, and also in the opinion that it will now be necessary to depend, to a greater extent than ever, upon trade paper publications.

In the case of the Hardwood Manufacturers' Association, the statistics as to prices and production, in the opinion of the court, were used to establish higher prices and to monopolize the market. The statistics were not sent to buyers and sellers but only to members of the association. If, however, the information as to prices and production is made open to all, as in the case of publication in trade papers, it is difficult to see how there could be any more objection to it than to the market reports already published.

There has been some disappointment because the much-talked-of statement in regard to the situation created by the Supreme Court decision has not been issued by the Department of Justice. It

has been an open secret, however, that Cabinet officials were not unanimous in their views as to the decision. Moreover, the Attorney-General, perhaps naturally, hesitated about issuing an explanation of the Supreme Court decision. Pronouncements of the highest court in the land are supposed to speak for themselves, and the Attorney-General is not expected, ordinarily, to attempt to clarify the language. If, however, agreement could be reached and a statement issued removing some of the uncertainty that now troubles many associations which do not know whether they are acting legally or not, it would be well for all concerned.

A Contrast in Steel Exports

The recent changes in the positions of the leading countries in respect to steel exports are worth noting. Data for the last half of 1921 show that countries which were in the front rank in 1920 have been passed by others from which not so much was expected. The following table compares the last half of 1921 with other years, the figures representing monthly averages in tons:

	Last Half of 1921	1920	1919	1913
Germany	225,584*	145,883	10,300	479,800
Great Britain	144,192*	271,000	186,100	414,100
France	127,100†	74,600	19,400	48,200
United States	103,467	392,400	362,100	241,000

*December estimated.

†Third quarter only.

From a position of leadership in 1920, the United States has dropped to the foot of the list, with only 27 per cent of its 1920 exports and less than 45 per cent of the 1913 movement. Germany has advanced to first place, showing a striking recovery in two years. In the last two or three months of 1921 Germany's exports were about 50 per cent of those for 1913. Great Britain is rapidly regaining her overseas trade, while France has taken a position by no means insignificant.

The export position of the United States may not be better than third in the list in 1922. High transportation and high fuel costs are retarding factors at home, and adverse exchange will be a continuing influence. In Great Britain liquidation in prices and labor has been more rapid recently. France and Germany are hard at work and labor and materials are cheap. Germany's disarmament will work steadily in her favor, as will every step toward stability in eastern Europe, where much German steel at length will come into use. The Orient, South America, South Africa and Australia will be the chief outlets for American steel, apart from the steady stream flowing in upon our neighbor on the north.

In a plant of the Detroit Edison Co. has just been completed the largest boiler in the world. It is rated at 2982 hp., and can convert each hour 24,000 gal. of water into 200,000 lb. of steam. The boiler was made by the D. Connelly Co., Cleveland. The four upper drums are 44 in. diameter and the two mud drums 48 in.; there are 2184 tubes. The combustion chamber volume, from the tubes to the top of the stoker towers, is 11,440 cu. ft. The stoker, of the Taylor three-plunger type, with 14 retorts on each side of the boiler, has a total fuel-burning capacity of 33,000 to 35,000 lb. of coal per hour.

CORRESPONDENCE

Tests of Rotary Drill Pipe

To the Editor: In THE IRON AGE of Sept. 29, 1921, there was an article on "Tests of Rotary Drill Pipe" which I had written with the object of calling attention to the fact that nearly all of the specimens failed in tension by jumping out of the coupling rather than by breaking the pipe. For the sake of brevity, a full description of the tests was omitted and emphasis was placed on the manner of failure. It seems, however, that the apparent lack of uniformity of the maximum load in these published results for iron pipe has led to considerable adverse criticism of iron pipe for oil well use. The purpose of these tests of casings was to determine the strength or efficiency of the joint under particular threading conditions or with predetermined looseness of the joint in screwing up. In order that no injustice be done this industry, I am asking that you publish the following more detailed table of the results of these tests:

Results of Tensile Tests of Oil Well Casings
(First eight items are iron pipe; last item, steel.)

Diam., In.	Weight Per Ft. Lb.	Threads Per In.	Thread Bearing in Coupling, In.	Tightness of Joint	Max. Load, Lb.
6 1/2	17	11 1/2	2	Mill tight	168,400*
5 1/2	17	11 1/2	1 1/2	Mill tight	153,400*
5 1/2	17	11 1/2	2	2 thds. loose	137,760*
5 1/2	17	11 1/2	2	4 thds. loose	126,600*
10	40	10	2 1/2	Mill tight	314,000*
10	40	10	2 1/2	2 thds. loose	217,300*
10	40	10	2 1/2	3 1/2 thds. loose	194,000*
10	40	10	3	Mill tight	266,860*
10	40	10	2	Mill tight	387,800†

*Coupling pulled off the pipe.

†Pipe broke just within the lower coupling.

A. H. STANG,

Associate physicist, Bureau of Standards,
Pittsburgh Branch, Department of Commerce.

Steel Corporation New Construction

The statement has been published recently in various quarters that the National Tube Co. would build an extensive plant at Gary, Ind. This is not a new project. The United States Steel Corporation announced some years ago that its tube subsidiary would build a complete plant, including blast furnaces, at Gary. From 1917 to 1920, at the beginning of each year, in connection with the Steel Corporation's program of new construction, the following item appeared: "Gary Tube Plant—Self-contained tube plant, including four blast furnaces." The statement of Jan. 1, 1920, was the last in which this item had a place. It has been the understanding, however, that the Steel Corporation has not given up the project. The announcement that it has again become active would not be surprising, as there has been no record of the abandonment of any new construction project the Corporation has once announced.

The Steel Corporation's statement of new construction under way at the beginning of 1922 included a reference to the rod and wire mills and town site extensions, with additional dwellings for employees, at the Duluth works of the Minnesota Steel Co. Work on the rod and wire mills has been actively carried on for some time, and it is probable that these will be put in operation in May.

The Maryland Steel Rolling Co., 1410 Fidelity Building, Baltimore, will commence work immediately on a new plant at Chesapeake and Cleveland Avenues, St. Helena, near Baltimore, manufacturer of steel reinforcing bars and kindred products. The initial building will be 66 x 228 ft., and will be supplemented by other one-story work buildings. The machinery installation will include a traveling crane, and different equipment contracts are being let. R. S. Baldwin is general manager.

STEEL CORPORATION EARNINGS

Deficit Again Recorded — Very Poor Showing Made in December

The net earnings of the United States Steel Corporation for the last quarter of 1921 were \$19,612,032 compared with \$18,918,058 in the third quarter. The corporation earned the preferred dividend, but not the common, and it was necessary to take \$5,280,901 from the surplus. The poor record for the past two quarters is still considerably better than that for the last quarter of 1914 when the earnings were only \$10,933,174, the lowest on record. The usual dividend of 1% on preferred and 1 1/4 on common were declared. For the year the total net earnings were only \$92,708,827. The deficit for the year is \$14,001,178 after paying dividends. The earnings for the past four years were as follows:

Quarters	1921	1920	1919	1918
First	\$32,286,722	\$12,089,019	\$33,513,384	\$56,961,424
Second	21,892,016	43,155,705	34,331,801	62,557,391
Third	18,918,058	18,051,540	40,177,232	42,961,589
Fourth	19,612,032	43,877,862	35,791,302	36,354,165

Net earnings
Each year \$92,708,827 \$177,174,126 \$143,813,219 \$198,834,569

Earnings

The statement for the quarter ending Dec. 31 shows steady decrease in earnings from October to December. It is as follows:

	Earnings Before Charging Interest on the Subsidiary Companies'	Less: Interest on the Subsidiary Companies'	Balance of Bonds Outstanding	Earnings
October, 1921	\$8,864,873	\$660,515		\$8,204,358
November, 1921	7,100,727	660,289		6,440,438
December, 1921	5,633,521	666,284		4,967,237

	\$21,599,121	\$1,987,088	
Net earnings			\$19,612,032
Less charges and allowances for depreciation and sinking funds on U. S. Steel Corporation bonds			8,290,021
Net income			\$11,322,012
Deduct: Interest for the quarter on U. S. Steel Corporation bonds outstanding	\$4,878,304		
Premium on bonds redeemed	147,462		
			5,025,766
Balance			\$6,296,246
Add, net balance of sundry charges and receipts			1,081,555
Total			\$7,377,801
Dividends on stocks of the United States Steel Corporation, viz.:			
Preferred, 1% per cent.	\$6,304,920		
Common, 1 1/4 per cent.	6,353,782		
			12,658,702
Deficit			\$5,280,901

C. A. Orr Appointed Receiver of Cromwell Steel Co.

The Cromwell Steel Co., Cleveland, with a plant at Lorain, Ohio, has been placed in the hands of a receiver on the petition of the Guardian Savings & Trust Co., Cleveland. C. A. Orr, vice-president and general manager of the steel company, was named as the receiver. His office is at 1539 Guardian Building. The obligations of the Cromwell company include \$2,000,000 in bonds on which interest has been defaulted and approximately \$1,000,000 in notes and accounts. About \$1,250,000 in bonds, stocks and other claims have been deposited with the Guardian Bank under the terms of a recent adjustment agreement.

The plants of the New London Ship & Engine Co., at New London, Conn., are starting up again, having received a good sized order recently which will keep a part of the plant in work for over a year. Additional men are added to the force each week.

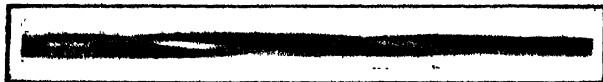
Work has been started on the Ford electric plant at Flat Rock, Mich., below Detroit. The contractors have started blasting out a spillway 5 ft. deep and one-half mile long at the bottom of the Huron River bed.

Taper Pin Reamer.

A line of taper pin reamers under the name of Cutwell has been placed on the market by the Bickford-Switzer Co., Greenfield, Mass. The reamer has three right-hand spiral flues, the cutting lands are rugged and the hook or undercut generous.

The reamer is sharpened so that two of the lands are relieved up to the cutting edge. The third land is relieved for only about two-thirds of its width, the balance being a circular section which acts to steady the tool and prevent the right-hand spiral and undercut from drawing the tool into the work.

It is claimed that this reamer will not grab or draw into the work, that it cannot chatter and that it cuts like a drill and works best when used by power. The

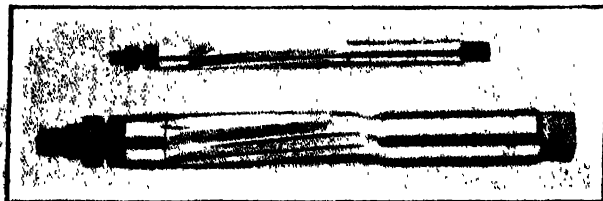


New Taper Pin Reamer

same design has been applied to a chucking or hand reamer for parallel holes. In this case there are three equally spaced and fully relieved cutting lands, and midway between two of these there is a narrow and unrelieved land which acts to steady the tool and prevent its being drawn into the hole or chattering. It also serves, in connection with one of the cutting edges, to furnish a place to measure the diameter of the reamer.

Spiral Fluted Expansion Reamer

The Pratt & Whitney Co., Hartford, has added to its line of small tools the spiral-fluted expansion hand reamer shown in the accompanying illustration. The long life of this type of reamer and the adjustable feature that permits covering a range of sizes with one



The Lock Nut Holds the Size and the Safety Stop Prevents Over Expansion

tool are features emphasized. Oversize and undersize holes can be reamed by simple adjustments.

The reamers are made in all the regular sizes. They are equipped with a lock nut to hold the size and a safety stop to prevent over expansion and indicate positively when the maximum limit has been reached.

Bids on Government Shells

CHICAGO, Jan. 31.—Bids were taken by the Government here to-day on 31,000 tons of shells located at Savanna, Ill.; Columbus, Ohio, and Toledo. Successful bids were as follows: \$11.01 per gross ton f. o. b. Savanna, submitted by the Continental Iron & Steel Co., Chicago and New York; \$13.50 per gross ton f. o. b. Columbus by the Buckeye Steel Castings Co.; \$12.26 per gross ton f. o. b. Toledo, by the Hyman-Michaels Co., Chicago.

The General Electric Co. has developed what is known as an open phase and phase reversal relay designed to prevent polyphase motors from running when a phase of the power circuit opens or reverses, with consequent burnouts or damage to the driven machinery.

A Youngstown district steel interest has purchased upwards of 1,000 tons of heavy melting scrap at \$15.50.

OPPOSE PITTSBURGH BASE

Witnesses Continue Testimony as to Damage But Admit Companies Prosper

MILWAUKEE, Wis., Jan. 31.—Witnesses examined in the basing point case being heard by the Federal Trade Commission Tuesday expressed the opinion that the concerns they represent suffer considerable damage through their inability to compete with rolled steel fabricators in the territory east of Chicago because of the addition of the freight rate from Pittsburgh to Milwaukee on shipments of material, wherever the point of delivery origin. Julius P. Heil, vice-president the Heil Co., testified that frequently he purchased bars from the Bay View mill of the Illinois Steel Co. at Milwaukee, and called for the material with his own trucks, but was charged freight rate from Pittsburgh to Milwaukee. Mr. Heil said with one exception every quotation made him by the Steel Corporation member companies was based on Pittsburgh plus. On May 18, 1920, he said there was an exception to the rule when the Illinois Steel Co. quoted prices on 405 tons of bars and structurals, f.o.b. Milwaukee. Within the week, he said, all concerns save Inland Steel Co. quoted f.o.b. Pittsburgh, Inland quoting for Indiana Harbor. These affected blue annealed sheets, plates, bars and angles.

On Jan. 25, Mr. Heil said, the Wisconsin Steel Co., Chicago, quoted bars and angles at \$1.60, f.o.b. Milwaukee, while the Illinois Steel Co. quoted \$1.50, f.o.b. Pittsburgh, or practically 31.5c. per hundred more than the Wisconsin Steel Co.

J. B. Wheeler, purchasing agent Federal Bridge & Structural Co., Waukesha, was the first witness Tuesday morning, giving testimony involving purchase orders and invoices referred to Monday by President C. J. McIntosh. Henry F. Millmann, purchasing agent Geuder, Paeschke & Frey Co., galvanized utensils, testified it was necessary to absorb freight in selling in Eastern as well as far Western territory in order to compete with Eastern competitors, because of Pittsburgh plus. He said a competitor in Wheeling could sell anywhere in the United States in competition with the Milwaukee company on a cost parity or even an advantage over that, excepting only in Milwaukee, and here the advantage to Geuder, Paeschke & Frey Co. amounts to only 2c. per 100 lb.

On cross examination by the Steel Corporation counsel, witnesses invariably admitted that their concerns had flourished and prospered despite the handicap of Pittsburgh plus, but insisted this system hampered them in expanding trade in competition with Eastern manufacturers. These statements usually were ruled out as speculative statements, however.

(Report of Monday's proceedings will be found on page 361.)

The National Association of Waste Material Dealers, Inc., Times Building, New York, has inaugurated a membership drive for the month of February. Out of a quota of 65 members to be secured throughout the United States an allotment of 10 has been made for New York and vicinity. The secretary of the association is Charles M. Haskins.

The February meeting of the Pittsburgh Chapter of the American Society for Steel Treating on Tuesday evening, Feb. 7, at the Chatham Hotel is designated as a "shop-kink" meeting, at which several speakers will introduce problems for solution which are expected to result in bringing out valuable information.

A meeting will be held in St. Louis, Feb. 21 to 24, inclusive, of the managers of the 37 Better Business Bureaus now operating in 37 of the larger cities of the country. The meeting will devote itself largely to the truth movement in advertising.

Hearing on Basing Point Case Begins

Examiner of Federal Trade Commission Takes Testimony at Milwaukee—Admitted That Conditions Are Temporarily Improved

MILWAUKEE, Jan. 30.—The Pittsburgh basing point practice and its alleged discriminatory effect on Western rolled steel consumers was discussed in testimony taken by the Federal Trade Commission in a hearing which opened here to-day. J. W. Bennett, examiner of the commission, presided on the first day of the hearing, which is expected to continue in session during the remainder of the week. Houston Thompson, member of the commission, was expected to arrive on the scene by Tuesday. Following adjournment in Milwaukee, hearings will be held at Minneapolis, Chicago, and other cities. The testimony is being taken in connection with the complaint issued by the commission against the United States Steel Corporation and its subsidiaries for alleged unfair methods of competition in interstate commerce and discrimination in price between purchasers of its products. Acting as counsel for the commission is K. E. Steinhauer, assisted by E. W. Burr and J. A. Simpson. Others present interested in the prosecution of the case are H. G. Pickering, attorney Western Association of Rolled Steel Consumers, and C. L. Hilton, Attorney General, State of Minnesota, and Ralph M. Hoyt, Deputy Attorney General of Wisconsin, who appeared as a result of resolutions passed by their respective legislatures condemning the "Pittsburgh Plus" practice. C. A. Severance, president the American Bar Association, and W. W. Corlett, general solicitor United States Steel Corporation, represented the respondents.

The witnesses who were examined and cross-examined on Monday included Charles A. McIntosh, president Federal Bridge & Structural Co., Waukesha, Wis., H. W. Ladish, president Ladish Drop Forge Co., Cudahy, Wis., and H. E. White, traffic expert Western Association of Rolled Steel Consumers.

Chicago and Pittsburgh on Parity

Mr. McIntosh testified that his company was engaged in the business of fabricating steel bridges and buildings, with a normal annual capacity of 10,000 to 12,000 tons of steel. He stated that the chief raw materials he used, namely steel plates, structural shapes, and bars, were bought f.o.b. Waukesha, at prices which, until six or eight months ago, were equivalent to the market prices f.o.b. Pittsburgh plus the freight to Waukesha. Of late, however, his company has been purchasing these products at prices which are equivalent to the market price f.o.b. Chicago plus the freight from that city to his plant. The Chicago base prices, he said, are substantially on a parity with the Pittsburgh base prices quoted by Eastern mills. In normal years, he said, the prices quoted by all mills were substantially the same, and he averred that the present existence of a Chicago base was temporary and due to the depressed condition of the market. Under cross-questioning by Mr. Severance, Mr. McIntosh asserted that he did not regard any of the past three years as normal, a pronounced sellers' market having been succeeded by a sharp drop in demand. He stated that with the appearance of a Chicago base his company had competed for business in territory east of his plant, a territory from which it was shut out when the Pittsburgh plus practice was in vogue. He pointed out that while Pittsburgh base prices restricted the operations of his company to the territory west of its plant, Eastern fabricators had no such handicaps, but could bid for work on even terms with competitors not only in the East but in the Western States. Mr. McIntosh admitted that there are numerous fabricating companies in the territory ordinarily served by the Federal Bridge

& Structural Co. and that all of them had developed their business when the Pittsburgh plus practice was in effect.

Western Fabricators Shut Out

Mr. McIntosh was followed on the stand by Mr. White, whose testimony was offered to show why the Pittsburgh basing point shut Western fabricators out of the markets east of them. The rates on finished steel products such as fabricated steel tanks, machinery, boilers, forgings, etc., he said, were substantially the same as those on the rolled steel. The rate on structural steel, fabricated or unfabricated, from Pittsburgh to Muskegon, Mich., is 39.5c., whereas the rate from Waukesha to that destination is 30.5c. Assuming that both the Waukesha fabricator and his Pittsburgh competitor pay the same price, f.o.b. Pittsburgh, the former is under a handicap of 32.5c. per 100 lb., as he must pay the rate from Pittsburgh of 41.50c. plus the rate of 30.5c. to Muskegon. Mr. White cited numerous other examples of a similar character.

Temporary Conditions

The second steel consumer to be examined was H. W. Ladish, president Ladish Drop Forge Co., Cudahy, Wis., a suburb of Milwaukee. He asserted that his company produced drop forgings principally for the automobile industry, and had a normal annual capacity of 12,000 to 14,000 tons a year, although in a period of abnormal demand in recent years its output was as high as 27,000 tons, running the plant day and night shifts. The principal market for his product, he asserted, was in the State of Michigan, where when the Pittsburgh plus practice was in vogue, he was at a serious disadvantage in competing with Eastern forge shops. When cross-questioned by Mr. Corlett, as to whether this market situation was not the same when his company started business, he replied that the contrary was the case. The original market of his company, he asserted, was in Milwaukee and the West and it was only when the rapid development of the automobile industry leaped ahead of the forging capacity of the country that his company turned its attention to the automobile forging business. He stated that while recently his company had been able to buy carbon steel f.o.b. Chicago it was still the general practice of alloy steel manufacturers to name prices on a Pittsburgh base. He regarded his present ability to buy carbon steel f.o.b. Chicago, as of temporary duration and intimated that a restoration of the Pittsburgh plus practice would seriously endanger the future of his plant. Such a restoration, in his opinion, will come as a result of revived demand from other sources than the automobile industry. Automobile production has over-expanded in recent years and with a continuation of sharp competition the readoption of the Pittsburgh basing point would shut his company out of its market. It is only natural to assume, he averred, that Eastern competitors will be able to produce substantially as satisfactory forgings as his own plant, and with the advantage of the Pittsburgh basing point practice they would be able to take all the business offered. He also pointed out that his plant was not only handicapped through the payment of fictitious freight from Pittsburgh when the Pittsburgh base was in effect, but also through the payment of freight on steel wasted in the process of manufacture. The Pittsburgh forge plant pays only the freight on its finished forgings, while his plant pays not only the freight on the finished product, but also the freight from Pittsburgh on all of the raw

material, of which from 25 to 30 per cent constitutes waste in the form of flash burnt steel, etc.

Contract With Illinois Steel Co.

Mr. Ladish entered as part of his testimony a contract with the Illinois Steel Co. dated May 3, 1920, calling for the delivery of 6000 tons of steel from that time until the close of the year. Mr. Corlett, for the respondents, called attention to the fact that the price quoted was f.o.b. Cudahy, not f.o.b. Pittsburgh, and inquired how the witness arrived at the conclusion that he was buying on a Pittsburgh base.

Mr. Ladish replied that he was able to familiarize himself with the Pittsburgh base market by referring to THE IRON AGE, and other trade papers and also by comparing notes with other steel consumers. In this connection he asserted that the automobile manufacturers had proved of service to him and that on occasion the latter had been able to buy at better advantage because of the quantities they ordered and had permitted his plant to use material they purchased in fashioning their products. Counsel for the commission called attention to the fact that while the price specified in the contract in question was f.o.b. Cudahy, recognition of the Pittsburgh base was given in a clause which protected the mill against advances on freight rates. This clause reads as follows: "The price or prices quoted herein are based upon carload freight rates from Pittsburgh to the place of delivery in effect at the date of this agreement, viz., 29.5c. per 100 lb. In the event of an increase in such freight rates, the amount of such increase shall be added to the price of all materials shipped against this contract during the period in which such increased rate is in effect, and in the event of a decrease in such freight rates, the amount of such decrease shall be deducted from the price of

all material shipped hereunder during the period in which such decreased rate is in effect."

Disadvantage of Cudahy

Mr. White followed Mr. Ladish with a presentation of statistics to show the disadvantage of the Cudahy plant in competing with Eastern forge shops under the Pittsburgh basing practice. Assuming that the Ladish plant and Pittsburgh competitors paid the same price f.o.b. Pittsburgh, Mr. White testified as to the material advantage of the latter in shipping to various Michigan points, notwithstanding that the Ladish company shipped in carload lots and the Pittsburgh plants in less than carload lots, the freight rates on which are higher per mile than on carload shipments. In computing these figures Mr. White assumed that the waste at the Ladish plant averaged 30 per cent of the raw material bought. Assuming that Pittsburgh forge plants also shipped in carload lots, Mr. White presented figures to show that the Ladish plant was at a disadvantage everywhere, ranging from 17.5c. at its own doors to \$1.008 in Pittsburgh. He presented similar statistics to show that Cleveland forge shops would have the advantage at almost as many points of delivery, including Moline, and the Pacific Coast, the only exceptions mentioned being Milwaukee, where the Ladish plant would have an advantage of 11.5c., Minneapolis, where its advantage would be 6.5c., and Duluth, where it would be 3c. In all cases, these figures are based on the assumption that the freight from Pittsburgh to Cudahy is paid regardless of whether the steel actually is shipped from Pittsburgh or from a more western producing point such as Chicago. In this connection it is to be noted that Mr. Ladish testified that 90 per cent of his steel was normally purchased from the Illinois Steel Co.

IMPROVING SLOWLY

Gradual Broadening of Buying at Youngstown—Sheet Prices Firm

YOUNGSTOWN, Jan. 31.—While iron and steel buying shows broadening tendencies, the improvement is below the expectations of Mahoning Valley makers, some of whom do not look for a return to normal conditions in the industry until next fall. In the meanwhile, production schedules are holding at about 40 per cent in finishing lines, varying with different interests. Employment is still substantially below normal and large numbers of men are turned away at the mill gates almost daily. This condition exists despite the fact that the 8-hr. day has been established in the majority of departments of steel plants.

During the first 20 days of January, however, the Erie Railroad moved loaded cars 200 above the average daily movement for the corresponding period in December. Other roads report a proportionate betterment.

The United Engineering & Foundry Co. maintains an average production of but 20 per cent., as compared with an average of 40 per cent. in 1921. "This is painfully low for a virile organization to contemplate," states an official. "It means that only one out of five of our former employees is able to work. But housecleaning has been going on since business fell off; machines have been repaired; costs have been analyzed and cut until, given a reasonable chance, we are in a position to bid successfully for any work offered."

Officials of the Trumbull Steel Co. are somewhat more optimistic over the outlook and say they have two weeks' unfilled tonnage on their books at the current rate of production. Until recently the company operated largely on a week-to-week basis. It has increased its open-hearth operations from four to six furnaces and has enlarged its active tin plate capacity, operating its Liberty plant at Leavittsburg, Trumbull County, in part.

Pig iron is now definitely on an \$18 basis for standard basic. Figures on inquiries for foundry iron continue to be submitted by Valley interests.

Sheet Production Sags

Though production in the sheet division of the in-

dustry again sagged this week, producing interests generally say the situation is representative of a gradual improvement. No large business has come out, which accounts, in a measure, it is claimed, for the stability of current quotations. Several 200-ton and 300-ton orders were placed in the district during the week, while the automobile industry is placing tonnage with somewhat more freedom, though still cautiously. The principal independent maker of full finished automobile stock is booked four to five weeks ahead, its product meeting with general acceptance.

In both sheets and pipe, jobbing and warehouse interests are more active in the market than for some time past. Considerable tonnages of merchant pipe have been placed within the past two weeks by jobbers.

That sheet business is not yet sustained, however, is indicated by the fluctuations in operating schedules. Not more than 35 of 113 sheet mills in the Mahoning Valley are rolling this week, as compared with an average of 43 per cent last week, the best record this year. Suspension of the sheet mill department of the Youngstown Sheet & Tube Co., consisting of 15 mills, is largely responsible for the decline.

There has been an appreciable decline in the volume of new lapweld pipe tonnage, with some current production going into stocks. Ten of the Valley's 17 pipe furnaces are fired.

In plates, the situation is temporarily improved due to the placing of some storage tank tonnage within the past week. Additional business from this source is looked for during February. The base price in the Valley continues at 1.50c.

The strip market is likewise an "in-and-out" affair, with cold rolled moving at 3.50c. base, and hot rolled quoted nominally at 2c. Business in hot strip is being booked at concession prices, however, it is generally admitted. Most of the strip business coming through at present is from the automobile industry.

In a general way, the lighter steel products are holding their own in this territory. Independents are expanding their production of tin plate, but admit that the going quotation of \$4.75 is being shaded in some quarters, especially to large consumers. It is believed this price is a fair appraisal of the market on moderate tonnage. In finished lines, tinplate is making a better showing than any other product.

American Valuation Has Strong Support

**Tariff Conference of National Association of Manufacturers
Meets at Washington—Charles M. Schwab
Sends Vigorous Letter**

WASHINGTON, Jan. 31.—Early passage of an adequately protective tariff act with the American valuation plan incorporated was vigorously urged at the two-day convention of the National Association of Manufacturers, attended by approximately 450 delegates. Assembling yesterday morning, the convention closed late this afternoon. After lively discussion of the principle of the American valuation plan preparations were made to combat the strong influences against it. A memorial to the President and members of Congress was adopted in favor of quick action on the legislation, and it will be presented in person to-morrow to the majority members of the Senate Committee on Finance by a committee selected for that purpose. Among the members are Dr. John A. Mathews, president Crucible Steel Co. of America, and C. A. Moffett, of the Gulf States Steel Co.

Delegates who called upon senators and representatives this morning reported back to the convention this afternoon that sentiment in Congress is strongly in favor of the American valuation plan, and early passage of a protective tariff, but the charge was made by Charles J. Webb of Philadelphia that the measure is being held up in the Committee on Finance by two senators, and it was urged that something be done to see that the bill, carrying the necessary protection and the American valuation plan, is reported to the Senate and passed at an early date.

Throughout the convention speakers strongly pointed out the desirability of letting all interests of the country know the meaning of American valuation and the necessity of having it enacted into law as a source of reviving industrial and commercial activities by preventing a flood of cheaply produced foreign goods.

Letter from Mr. Schwab

Strong indorsement of the American valuation plan was given in a letter from Chairman Charles M. Schwab of the Bethlehem Steel Corporation. He declared that "We have American standards in everything but our tariff. To-day, in my opinion, the hour has come when we should put American standards in our tariff laws. The simple and effective way of doing this is by substituting American standards of value for the present archaic standards of foreign values. This is the essence of American valuation which will do for our industries, for our people, for our business, exactly what the gold standard did for currency. It will prevent cheaper currencies of the world from saddling us with economic stagnation.

Mr. Schwab indorsed the purpose of the convention. He declared that indecision is the greatest handicap to progress and that the whole world is calling for action, and that nothing could be more beneficial than a meeting such as that of the association. He cited in support of the American valuation plan the differences in wages paid in the United States and abroad and what it means to the steel industry, transportation and workers in other lines in the United States to permit business to go to foreign countries. Mr. Schwab said:

An ounce of gold to-day in the United States pays the American worker for 17.22 hours of labor as against 50.16 hours in Great Britain, 35.5 hours in Japan, 117.31 hours in France and 201.55 hours in Germany. Last year Congress passed a bill restricting immigration to protect the American worker from the millions of foreigners who would have flooded our labor markets and caused a panic in wages. But what advantage is there to-day to the American worker to have restricted immigration, if, through defects in our tariff, the products of these millions of men and women abroad are now glutting our markets and forcing millions of workers out of their positions? What better employment assurance could we have than a tariff law which insures the

American worker his job in competition with the workmen of the world?

In 1915 it required the work of 5,000 men for one day to make 1,000 tons of steel rails. Let us suppose that to-day an American railroad placed an order for 50,000 tons of rails in Belgium, Germany or England because these rails might be bought for less money abroad than at home. This would mean that 5,000 men in our own country would be idle for 50 days. It would mean that several thousand employees of our railroads would have less work because the railroads would be deprived of hauling these rails and the raw materials such as coal, coke, iron, etc., which come from the mines and furnaces to the mills. It would mean that thousands of miners would have less work if the product of their labor were not used by the mills. It would mean that the workers of the mines, mills and railroads would have less money to spend for the necessities of life with the baker, the grocer or the retailer. This tendency to buy abroad at the expense of our own country is short-sighted economy.

Quick Passage of Tariff Urged

The convention adopted a resolution, prepared as a memorial and addressed to the President and appropriate members of Congress, urging quick passage of tariff legislation carrying adequate protection based upon the American valuation plan where ad valorem duties apply. The resolution was the subject of about one hour's debate, and all speaking on it were in favor of it, with the exception of H. G. Miles, Racine, Wis., representing the Fair Trade League, who insisted that the American valuation would not cure the remedies it seeks to cure, and it was necessary to incorporate in the tariff act a clause covering depreciated currency or to empower the President to select articles produced under American values and bring them up to the American cost and then add a duty.

John P. Wood, Philadelphia, president of the American Woollen Manufacturers' Association, was chairman of the committee on resolutions. Among other members of the committee was C. A. Moffett of the Gulf States Steel Co.

Discussion by members of the convention during Monday was overwhelmingly in favor of the American valuation. The unprecedented depression in agriculture, industry and commerce, vast unemployment, and the general plight of the country were attributed partly to the lack of a protective tariff, with an American valuation administrative feature, and every speaker during the general discussion went on record strongly in favor of quick passage of a protective tariff act and the American valuation plan. Cutlery interests, with exhibits, particularly emphasized the need of this, showing how hopelessly they are being undersold by foreign producers, especially those in Germany. Speakers represented a wide variety of producing interests of the United States.

One of the interesting talks was that made by James B. Reynolds, former Assistant Secretary of the Treasury in charge of customs, and who now represents the Treasury in connection with an investigation being made regarding the American valuation plan for the Senate Committee on Finance. He said that there is no reason why the American valuation plan cannot be operated in every fair and just way. He told the convention that the report prepared under his supervision now is in the hands of the printers. It naturally does not make any recommendation, but carries selling prices here and abroad, price of production by American manufacturers and related data, taken from the books of American producers and importers.

Interview with the President

President John E. Edgerton of the National Association of Manufacturers, who presided at the conven-

tion, told of the interview that a committee from the convention held at noon Monday with President Harding. He stated that the President did not commit himself one way or the other regarding the American valuation plan, but did approve of the suggestion that tariff legislation should be enacted as quickly as possible.

Former Representative William E. Humphrey of Washington, representing the American Valuation Society, attacked the propaganda against the American valuation plan, and at some length sought to reply to claims that have been urged against it, and said that none of them could appeal to reason and intelligence. Among other things, he pointed out that it is easier to learn the American wholesale selling price than the foreign valuation; that it does not increase rates, because it is only an administrative feature and that it would not mean increase in prices to American consumers. He insisted that it is imperative that it be adopted.

President Mathews Speaks

Dr. John A. Mathews, president of the Crucible Steel Co. of America, who said he spoke for 30 makers of tool steel, pointed out that the normal number of employees ranges from 30,000 to 40,000, but to-day does not exceed 25 per cent of the number. It is not raw

steel, but the products from it, which are coming in from Germany. There is possibly an investment of \$200,000,000, he said, in the fine steel industry here, yet they have not been given as great a protection as is given in the common grades of steel. He said American valuation is needed to protect the American fine steel industry. He spoke of the wide difference in the cost of making steel in the United States and abroad.

George T. Kimball, secretary of the American Hardware Association of Connecticut, maker of locks, produced samples of domestic and foreign products and said that German locks are sold at 36c. per dozen, as against the present American production cost of 98c. per doz.

H. L. Hinry, of the American Valuation Society, presented exhibits of razors of domestic and foreign makes, and showed the widespread difference in costs. One type of imported razor, he said, cost \$1.35 per dozen, landed, while the same kind of American razor costs \$4 each.

M. A. Edgar, McIntyre, Ga., of the Mineral Division of the Southern Tariff Association, and other interests in the South, said the mineral interests of the association are 100 per cent in favor of American valuation, and that the other industries for which he spoke have taken a similar position.

GERMAN MARKET WEAKER

Jobbers Shade Prices—Government Control of Scrap Foreseen—Pig Iron Firm

(Special Correspondence)

BERLIN, GERMANY, Jan. 15.—The forcing up of scrap prices during the past few months when the mark was declining daily caused much demand for protection with maximum prices. The result of this is the draft bill recently submitted to the Federal Council. The bill provides for the introduction of maximum prices on old material and empowers the authorities to expropriate stocks whenever such measures are deemed necessary to enforce the law. The scrap interests are vigorously opposing the law and are predicting the utter ruin of this business, but it seems doubtful, provided the law is passed, that the maximum price regulation will immediately come into operation. Indications are that the authorities merely wish to have a weapon to use whenever the price policy should call for it.

The weak tone of the market continued during the past week. Mills are worrying very little over the softening of prices, but jobbers are more inclined to price concessions, which results in considerable variations in quotations. This condition is particularly evident in the finished material market where there is a wide divergence of mills' and jobbers' quotations on many items.

The tone of the pig iron market is firm, a few large deals being closed in Luxemburg and Lorraine iron at an average of 235 fr. per ton. Business in semi-finished material has been light because of the extreme scarcity of material. Mill quotations have been difficult to obtain and merchants have evidently cleaned out their stocks. Rails have sold below the guiding price and concrete bars, heavy sheets and medium sheets were also weaker. In other lines, however, prices are being fairly well maintained, although no increases are noted. The week closed quiet.

Quotations were as follows, per metric ton:

	Marks
Billets, basic (nominal).....	3,900
Sheet bars, basic (nominal).....	3,950
Bar iron.....	6,600 to 6,800
Flats and squares.....	6,200 to 6,400
Rounds.....	6,300 to 6,400
Beams.....	6,000 to 6,400
Hoop iron, ordinary.....	7,000 to 7,300
Rails.....	5,000 to 5,050
Universal plates.....	8,050 to 8,300
Sheets, heavy.....	5,500 to 5,800
Sheets, medium.....	6,700 to 7,200
Plates, light.....	10,500 to 14,500

At the recent meeting of the inland committee of

the Iron Control Federation, it was decided to have a committee representing employers and employees co-operate in the fixing of guiding prices by the Steel Federation (Deutscher Stahlbund). At the first meeting of this joint committee it was agreed to keep the current guiding prices in operation for the present. In view of the anticipated increase of coal taxes and freight rates by February, a meeting has been called for the end of January to again consider a revision of guiding prices. Complaints were heard at the recent meeting that current prices leave practically no profits, often compelling works to operate at a loss. The prevailing price situation is particularly difficult for works which are completing long-term contracts booked at prices considerably below the present-day quotations. Repeated attempts were made, when the boom in business developed, to back out of old contracts or make contracts on a sliding scale. Consumers, however, had learned by experience and insisted upon fixed prices.

German Export Orders

The Siemens China Electrical Engineering Co. will supply machinery for a colliery being organized by the military governor of the province of Chekiang Lu, in connection with the proposed exploitation of coal deposits at the lower Yangtsee. The Gutehoffnungshütte, at Oberhausen, have an Argentine order for a bridge across the Riachuela, valued at 3,100,000 pesos. The material for a railroad on the Carmen de Patagones-Puerto San Antonio line will be placed in Germany. The Hannoversche Waggonfabrik Aktien Gesellschaft, car works at Hanover, has taken a 30,000,000 m. order for Jugo-Slavia. A Saxon railroad car works, the Waggonfabrik Busch, at Bautzen, will reorganize the Phönix car works, at Riga, Russia, and will take a financial interest in a new Lettish company which is to acquire former Russian plants.

The American Engineering Standards Committee has approved as tentative American standard the specifications of the American Society for Testing Materials for cold-drawn Bessemer and cold-drawn open-hearth automatic screw stock, and methods of chemical analysis of manganese bronze and gun metal. Copies may also be obtained from the committee at 29 West Thirty-ninth Street, New York, at a price of 25 cents each.

Charles L. Smith, formerly editorial representative of THE IRON AGE at Cincinnati, has opened an office at 202 Mills Building, El Paso, Texas, as manufacturers' agent and exporter.

EXPORT TRADE IMPROVES

Peking in Market for Rails and Equipment — Other Inquiries from Japan, Brazil and Argentina

New York, Jan. 31.—While there is no appreciable gain in export trade, there is evident a slight increase in the volume of inquiries appearing from all markets and there are several which will close during the next two months. A number of sizeable tonnages for Japan were decided upon before the first of February, included in these being a large tin plate inquiry, rails for the South Manchuria Railway and several thousand tons of structural steel for two bridges. The Japanese market has apparently been slightly affected by the depreciation of the yen in international exchange to about 46c. Purchases of light gage black sheets continue but only on a very limited scale compared to the heavy buying of last year. In a majority of cases bars, plates and structural material continue to be placed in Continental markets. According to one Japanese export house American sellers will eventually be forced to quote on a basis of \$40 per ton, c.i.f. Japanese port, on steel bars, in order to compete with European markets.

A recent rail tonnage for an electric railroad in Japan, placed through a large Japanese export house, is reported to have gone to the leading interest. It calls for 3500 tons of 100-lb. rails for the Hanshin Electric Railway. A recent order from a large oil company in Japan for 95,000 ft. of wire rope in 2000, 3000, and 3500-ft. lengths for use in drilling probably in northern Japan and on Saghalien, may portend further purchases of oil well supplies and equipment. A Japanese telegraph company bought during the past week 100 tons of No. 8 gage wire. One light black sheet inquiry in the market calls for 150 tons.

One of the largest inquiries that has appeared from Chinese markets for some time is from the Peking Tramways for rails and equipment, bids closing March 20. The specifications, which will probably total about \$1,000,000 include 39,000 meters (about 5500 tons) of trolley rails and 2000 meters of T rails, electric motors, armatures, controllers, wheels, axles, two sprinkling cars complete, an automobile truck with tower for repairing overhead wires and other equipment. Although the Chinese Minister of Communications is chairman of the board of the Peking Tramways, there is a considerable investment of British capital in the enterprise, which is operating at a good profit. As a result credit arrangements will probably be made without difficulty.

With the passing of the Chinese New Year on Jan. 28, exporters dealing with the Chinese markets believe there will be a slight revival of business. During the past few weeks there have been numerous inquiries of varying size from the Far East for wire shorts, steel bar crop ends, plate cuttings and other similar material, largely consumed in this part of the world. It has been with the greatest difficulty that exporters handling these inquiries have filled their orders, particularly on the wire shorts. An inquiry from a reputable company in China, which includes fair tonnages of sheets, plain and galvanized, tin plate and other material is again active after several weeks. If it is placed in the American market it will probably total over \$200,000.

A rail inquiry from Mexico has appeared through the Bureau of Foreign and Domestic Commerce. It calls for 4400 tons of 56-lb. rails and accessories for standard gage track, 15 switches complete and about 150,000 wooden railroad ties. While there are numerous inquiries from Mexico and an evident desire to buy a wide range of material, exporters see but small prospect of transacting business as sales, as a rule, must be made on long term credits.

Tenders for bids on traction, transport and construction material involved in the electrification of certain lines of the Central Railway of Brazil have been issued. A fair-sized inquiry for port equipment has been issued by the Argentine Director General of

Navigation and Ports, to be used in improving and developing the port of Buenos Aires. Tenders include locomotives, two cranes, cargo towers, concrete mixers, electric motors, etc. This inquiry and the Brazilian railroad tender are both in the hands of the Bureau of Foreign and Domestic Commerce.

Numerous commercial fairs are to be held throughout Europe during this year. Of the forty or more fairs to be held, only a few have a bearing on the iron, steel or machinery industries. The third annual business fair will be held at Brussels, Belgium, April 3 to 19; an international fair at Utrecht, Holland, Feb. 21; British Industries Fair, London and Birmingham, Feb. 27 to March 10; Lyons Fair at Lyons, France, March 1 to 15; Leipzig Fair, Leipzig, Germany, in the spring and fall. The fair of Rio de Janeiro, Brazil, begins Sept. 7 and closes Nov. 15.

Ford Cars Produced in 1921

It is announced from Detroit that the Ford Motor Co. produced in 1921 a total of 1,054,740 cars, trucks and tractors, closing the year with unfilled orders for 38,260 more, this being sufficient to keep the plant going 11 days at the 1921 average rate. Sales in 1921 are reported at 1,093,000, an increase of 104,213 over 1920 sales, and the highest figure ever reached.

Prices of all models were reduced, effective Jan. 16, to the following (all f.o.b. Detroit):

Touring car, \$348; runabout, \$319; chassis, \$285; coupe, \$580; sedan, \$645; truck chassis, \$430; tractor, \$625. The starter remains at \$70.

Crane Makers and Government Co-operate

WASHINGTON, Jan. 31.—A delegation representing 75 per cent of the manufacturers of cranes and 98 per cent of the production in the United States held a conference here yesterday with Assistant Secretary Huston and other officials of the Department of Commerce and discussed plans looking to closer co-operation between the crane makers and the department. The discussion is said to have related to several subjects, including standardization, sales promotion, costs and production.

Commissioner's Nomination Held Up

WASHINGTON, Jan. 31.—The nomination of George W. Upton, of Warren, Ohio, to the Federal Trade Commission, has been held up by objection of Senator Pomerene, Democrat, of Ohio. Mr. Upton is the husband of Harriet Taylor Upton, vice-chairman of the Republican National Committee, and Senator Pomerene says the appointment is a reward for Mrs. Upton's services.

Merger Negotiations Still On

Reports that merger negotiations of independent steel manufacturers have fallen through are not founded on facts. Although it is true that several propositions put to the various companies interested have been rejected, negotiations are still proceeding. Conferences will be held in New York on Thursday and Friday of this week by those working on the tri-company consolidation.

The so-called minimum wage ordinance enacted by the common council of Milwaukee on Sept. 8, 1921, to control the wages of municipal employees, has been declared constitutional by the Circuit Court, which denies the petition of Herman A. Wagner, president Wisconsin Bridge & Iron Co. and others, to restrain the city of Milwaukee from enforcing the requirements of the statute.

Smith & Wesson, Springfield, Mass., firearms plant, closed since July last, has resumed operations with about 300 employees, or about one-third the normal force. With the resumption of operations a 20 per cent reduction in wages and salaries went into effect.

Iron and Steel Markets

SOME IMPROVEMENT

Better Outlook in Construction Lines

Steel Corporation's Operations Increase At Chicago—Further Price Concessions

As January ends, the amount and character of new demand for steel products is somewhat better than at any time in the month. The larger amount of new construction work ahead, not omitting a better prospect here and there for shipyards, accounts in the main for the improvement, but there is also a healthy volume of replenishment buying.

Chicago rather than Pittsburgh sees conditions in a more favorable light. Operations in the Chicago district are at a higher rate, bringing the Steel Corporation's average for all districts up to 46 per cent.

Of the Illinois Central rail order 16,000 tons was divided between Chicago district mills, while 20,000 tons went to Ensley, Ala. Car builders have given Western mills some good specifications, and 800 new freight cars and the repair of 500 hopper car bodies are included in the week's new business.

Activity in fabricated steel is still the brightest spot. Besides 20,000 tons placed with the American Bridge Co. for the Chicago Union Station, other awards totaled more than 21,500 tons. The volume of new work appearing was about 13,500 tons.

In concrete reinforcing bars a 2000-ton inquiry for Louisville, Ky., and one of 1700 tons for a Seattle pier are conspicuous.

The outlook for shipyard work is improving, though plate-makers have not built high hopes on 1922 as a vessel year. A number of passenger liners are being figured on at the Eastern seaboard, including two for the Old Dominion Line. Five Erie Canal barges are to be built at Chester, Pa., and four Welland Canal boats at Three Rivers, Quebec. Orders have not yet come from recent inquiries sent to Great Lakes shipyards.

Inquiries from Great Britain for a round tonnage of American sheet bars and for 12,000 tons of re-rolling billets are taken to indicate that German or Belgian mills have been unable to make deliveries on some of their contracts. On a foreign bar inquiry 1.30c., Pittsburgh, has been quoted.

Altogether, the week's developments have been more encouraging as to the impetus to come from the seasonal buying expected in the next two months.

In wire and wire nails the South and Southwest have given the first evidence of activity in preparation for spring work. Wire prices show little variation, but in nails recent reports of slight concessions for \$2.50 per keg are confirmed.

The plate orders placed for the latest oil tank work in the Central West indicate that several mills are willing to go to 1.40c., Pittsburgh, for attractive business.

Sheets have been the chief exception to recent reports of irregular prices. But sheet buyers have been particularly cautious and in the past week 3.90c. on galvanized sheets has been established, or

\$2 per ton under the usual market. In blue annealed sheets the competition of plate mills has been felt and in some cases a 1.50c. plate base has been used, resulting in 1.80c. for No. 10.

In the past week the American Sheet & Tin Plate Co. has added to its active tin plate mills, the industry as a whole being on an 80 per cent basis.

The Steel Corporation's statement for the last quarter of 1921, showing net earnings of \$1,700,000 greater than in the third quarter, reflects the 40 per cent increase in output in the last quarter, with the offset of lower prices than the average for the third quarter.

With price concessions freely made on pig iron at Buffalo, Chicago and other Northern centers, and with Alabama iron outside of the immediate Birmingham district selling at \$15.50, furnace, the market is weak, and, with the exception of about 10,000 tons inquired for by Eastern heater manufacturers, no tonnage of considerable size is pending. There is, however, some evidence of increase in melt at a number of jobbing foundries.

Some falling off in merchant pig iron production is likely in the East, two furnaces being scheduled for blowing out.

The week shows a further recession in the composite prices of THE IRON AGE. That for steel is now 2.048c. per lb. against 2.062c. a month ago, 3.057c. a year ago and 1.684c. averaged for the ten years before the war. The pig iron composite is \$18.31 per gross ton, against \$18.60 a month ago, \$30.35 a year ago and \$15.72 the 10-year pre-war average.

Pittsburgh

PITTSBURGH, Jan. 31.

While the first month of 1922 showed some gain in the number of orders booked as compared with the last month of last year, there is disappointment that the gain has not been more pronounced in view of the almost universal belief that stocks in distributing and consuming hands were pretty low at the end of the year. Conservatism still is the keynote of buying and while few expect a reduction in freight rates to be made in the next few months, this, nevertheless, is the most restrictive influence upon buying. Buyers are taking on only their immediate supplies and refraining from building up stocks of materials "loaded" with to-day's freight charges. Very few big individual tonnages are included in the current inquiries. The largest are in plates in connection with some recent tank orders. Consequently, it is rather difficult to discern prices on sizable tonnages. Since what ordinarily would be regarded as resale lots of plates, shapes and bars can be bought easily at 1.50c., Pittsburgh, it is patent that large tonnages would not be placed that high. The common impression is that the basis of such business is 1.40c., although there is considerable hesitancy on the part of manufacturers in admitting this price, probably because of its effect upon buyers' ideas. It is a buyers' market and even in sheets there are signs this week of deviations from the regular market quotations. A lot of 250 tons of galvanized sheets has been sold at 3.90c., base, Pittsburgh, or its equivalent. Prices of wire products remain indefinite, but there is not much doubt that large buyers of nails are obtaining them at \$2.40, base per keg, Pittsburgh.

Variations in the activities of steel plants of this

A Comparison of Prices

Advances Over the Previous Week in Heavy Type, Declines in Italics

At date, one week, one month, and one year previous

For Early Delivery

Pig Iron, Per Gross Ton.	Jan. 31, 1922	Jan. 24, 1922	Jan. 3, 1922	Feb. 1, 1921
No. 2X, Philadelphia...	\$21.34	\$21.34	\$21.24	\$32.09
No. 2, Valley furnace...	19.00	19.00	19.50	29.00
No. 2, Southern, Cin'ti...	20.50	20.50	21.00	34.50
No. 2, Birmingham, Ala...	16.00	16.00	16.50	30.00
No. 2 foundry, Chicago*	18.50	19.00	19.00	30.00
Basic, del'd. eastern Pa...	18.54	20.25	20.25	31.40
Basic, Valley furnace...	18.00	18.00	18.25	30.00
Bessemer, Pittsburgh...	21.46	21.46	21.96	33.96
Malleable, Chicago*	18.50	19.00	19.00	30.50
Malleable, Valley...	19.50	19.50	19.50	30.00
Gray forge, Pittsburgh...	20.96	20.96	20.96	29.96
L. S. charcoal, Chicago...	30.50	30.50	31.50	40.50
Ferromanganese, seaboard	58.35	60.00	60.00	90.00

Rails, Billets, etc., Per Gross Ton:

O.-h. rails, heavy, at mill.	\$40.00	\$40.00	\$40.00	\$47.00
Bess. billets, Pittsburgh...	28.00	28.00	28.00	43.50
O.-h. billets, Pittsburgh...	28.00	28.00	28.00	43.50
O.-h. sheet bars, 1" gh...	29.00	29.00	29.00	47.00
Forging billets, base, 1" gh	32.00	32.00	32.00	48.50
O.-h. billets, Philadelphia...	33.74	33.74	33.74	49.24
Wire rods, Pittsburgh...	36.00	36.00	36.00	57.00
Skelp, wr. steel, 1" gh, lb...	1.50	1.50	1.50	2.45
Light rails at mill...	1.50	1.50	1.55	2.75

Finished Iron and Steel,

Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Iron bars, Philadelphia...	1.81	1.81	1.85	2.70
Iron bars, Chicago...	1.60	1.60	1.60	2.68
Steel bars, Pittsburgh...	1.50	1.50	1.50	2.35
Steel bars, Chicago...	1.60	1.60	1.60	2.73
Steel bars, New York...	1.83	1.83	1.88	2.73
Tank plates, Pittsburgh...	1.50	1.50	1.50	2.50
Tank plates, Chicago...	1.60	1.60	1.60	2.88
Tank plates, New York...	1.83	1.83	1.83	2.88
Beams, Pittsburgh...	1.50	1.50	1.50	2.45
Beams, Chicago...	1.60	1.60	1.60	2.83
Beams, New York...	1.83	1.83	1.88	2.83
Steel hoops, Pittsburgh...	1.90	1.90	2.00	3.05

*The average switching charge for delivery to foundries in the Chicago district is 10c per ton.
†Silicon, 1.75 to 2.25. ‡Silicon, 2.25 to 2.75.

The prices in the above table are for domestic delivery and do not necessarily apply to export business.

Sheets, Nails and Wire,	Jan. 31, 1922	Jan. 24, 1922	Jan. 3, 1922	Feb. 1, 1921
Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Sheets, black, No. 28, 1" gh	3.00	3.00	3.00	4.35
Sheets, galv., No. 28, 1" gh	4.00	4.00	4.00	5.70
Sheets, blue an't'd, 9 & 10	2.25	2.25	2.25	3.55
Wire nails, Pittsburgh...	2.50	2.50	2.50	3.25
Plain wire, Pittsburgh...	2.25	2.25	2.25	3.25
Barbed wire, galv., 1" gh...	3.15	3.15	3.15	4.10
Tin plate, 100-lb box, 1" gh	\$4.75	\$4.75	\$4.75	\$7.00

Old Material, Per Gross Ton:

Carwheels, Chicago...	\$15.00	\$15.00	\$15.50	\$22.00
Carwheels, Philadelphia...	16.50	16.50	16.50	25.00
Heavy steel scrap, Pgh...	11.00	14.00	14.50	16.00
Heavy steel scrap, Phila...	12.00	11.50	11.50	14.50
Heavy steel scrap, Chgo...	11.25	11.50	11.50	15.50
No. 1 cast, Pittsburgh...	16.00	16.50	16.25	28.00
No. 1 cast, Philadelphia...	16.50	16.50	16.50	23.50
No. 1 cast, Chgo (net ton)	13.00	13.00	12.50	18.50
No. 1 R.R. wrot, Phila...	14.50	14.50	14.50	20.00
No. 1 R.R. wrot, Chgo (net)	10.50	10.50	10.50	14.00

Coke, Connellsville, Per Net Ton at Oven:

Furnace coke, prompt...	\$2.75	\$2.75	\$2.75	\$4.50
Foundry coke, prompt...	3.75	3.75	3.75	6.00

Metals,

Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Lake copper, New York...	13 62 1/2	13.75	13.87 1/2	13.25
Electrolytic copper, refinery	13.37 1/2	13.50	13.62 1/2	12.75
Zinc, St. Louis...	4.50	4.65	4.82 1/2	5.00
Zinc, New York...	4.85	5.00	5.17 1/2	5.30
Lead, St. Louis...	4.40	4.40	4.40	4.60
Lead, New York...	4.70	4.70	4.70	4.85
Tin (Strait), New York...	32.00	31.25	32.75	33.00
Antimony (Asiatic), N. Y.	4.40	4.45	4.50	5.25

Composite Price, Jan. 31, 1922, Finished Steel, 2.048c. Per Lb.

Based on prices of steel bars, beams, tank plates, plain wire, open-hearth rails, black pipe and black sheets

These products constitute 88 per cent of the United States output of finished steel.

Jan. 24, 1922,	2.062c.
Jan. 3, 1922,	2.062c.
Feb. 1, 1921,	3.036c.
10 year pre-war average,	1.684c.

Composite Price, Jan. 31, 1922, Pig Iron, \$18.31 Per Gross Ton

Based on average of basic and foundry irons, the basic being Valley quotation, the foundry an average of Chicago, Philadelphia and Birmingham

Jan. 24, 1922,	\$18.39
Jan. 3, 1922,	18.80
Feb. 1, 1921,	30.35
10-year pre-war average,	15.72

and nearby districts are slight. As intimated in THE IRON AGE last week, the Jones & Laughlin Steel Co. has started up another blast furnace at its Woodlawn, Pa., works, and now has seven of its 12 stacks making iron. The Trumbull Steel Co., Warren, Ohio, and the Weirton Steel Co., Weirton, W. Va., have added to their active steel-making capacity, while among finishing mills we note the starting up of 12 more hot mills by the McKeesport Tin Plate Co., bringing the total number in operation to 36. The Washington Tin Plate Co., after being down for about eight months, to-morrow will resume operations at the rate of about 50 per cent of capacity. This plant resumes on an open shop basis after having been a union plant since the war. The American Sheet & Tin Plate Co. also has added to its active tin plate mills and taking the tin plate industry as a whole, close to 80 per cent of the mills are in operation. This is the most active spot in the entire industry. Pipe mills make the next best showing with about 70 per cent and then follow the sheet mills, which because of the fairly high rate of the leading interest are averaging more than 40 per cent of capacity.

The pig iron market has relapsed into dullness.

Continued weakness is noted in the heavier grades of scrap because the steel companies are out of the market and dealers are loath to take on tonnages since the prospect is poor for an early turnover.

The possibility of a strike of the union coal miners on April 1, on the issue of wages has stimulated slightly the inquiry for coal, but thus far there has been no corresponding stiffening in prices.

Pig Iron.—Both inquiries and sales have been small in the past week and it is impossible to make any change in prices, although the trend, if there is a definite one, is lower. The Allegheny Steel Co. has put out an inquiry for 1000 tons of basic for early delivery this being the only important business now before the trade. Makers having stocks of this grade on their yards are holding it at \$18, but there is a possibility that more of the re-sale iron which recently sold at \$17.75, will become available at that price or even less. Business in foundry iron has been entirely of carload lots, with the exception of 500 tons of No. 2 soft Southern iron sold to a local sanitary ware interest for its Southern works at \$16, Birmingham. The market on Northern No. 2 foundry iron now is \$19 Valley furnace for carload lots, leaving open the inference that less

could be done on larger tonnages. W. P. Snyder & Co. make the average price of basic iron from Valley furnaces for January \$18.1875 as compared with \$18.6375 in December, and on Bessemer \$19.594, in January compared with \$20 in December.

We quote Valley furnace, the freight rate for delivery to the Cleveland or Pittsburgh district being \$1.96 per gross ton:

Basic	\$18.00
Bessemer	19.50
Gray forge	19.00
No. 2 foundry	19.00
No. 3 foundry	\$18.75 to 19.00
Malleable	19.50

Ferroalloys.—Interest in the market has again subsided and practically the only important transaction of the week was a sale of 150 tons of 80 per cent ferromanganese to American Steel Foundries, the business going to Carnegie Steel Co. The common impression is that the sale was done at less than the equivalent of \$58.35 Atlantic seaboard. The general quotation of American, English and German makers is \$58.35 Atlantic seaboard on 80 per cent material, but it cannot be said that this price has very substantial basis in sales. There is almost no interest at all in 50 per cent ferrosilicon, but we note a sale of 50 tons of 12 per cent electric furnace Bessemer ferrosilicon at \$37 delivered, Pittsburgh. This compares with \$45.10 f.o.b. Jackson and New Straitsville, Ohio, on the same grade of material produced in a blast furnace. Hardly enough demand exists for spiegeleisen to establish prices. Leading makers are nominally quoting \$25 to \$26, f.o.b. furnace.

We quote 78 to 82 per cent ferromanganese \$62 to \$63.67 for domestic and \$58.35 c.i.f. Atlantic seaboard for English and German. Average 20 per cent spiegeleisen nominal at \$30 to \$32 delivered Pittsburgh or Valleys; 50 per cent ferrosilicon domestic, \$54 to \$55 furnace, freight allowed. Bessemer ferrosilicon is quoted f.o.b. Jackson and New Straitsville, Ohio, furnaces as follows: 10 per cent, \$38.50; 11 per cent, \$41.80; 12 per cent, \$45.10; 13 per cent, \$49.10; 14 per cent, \$54.10; silvery iron, 6 per cent, \$27; 7 per cent, \$28; 8 per cent, \$29.50; 9 per cent, \$31.50; 10 per cent, \$33.50; 11 per cent, \$36; 12 per cent, \$38.50. The present freight rate from Jackson and New Straitsville, Ohio, into the Pittsburgh district is \$4.06 per gross ton.

Billets, Sheet Bars and Slabs.—An effort is observed in some quarters to re-establish \$32 as the price of sheet bars, but so far as can be learned it has not yet been successful, due to the fact that demands are small. We still regard \$29 to \$30, Pittsburgh or Youngstown, as fair appraisal of today's price possibilities, with the lower figure likely to prevail on attractive tonnages. There is practically no interest at all in billets or slabs and quotations are merely an appraisal of what might be done if any business appeared.

We quote 4 x 4 in. soft Bessemer and open-hearth billets at \$28 to \$29; 2 x 2 in. billets, \$29 to \$30; Bessemer and open-hearth sheet bars, \$30; slabs, \$29 to \$30; forging billets, ordinary carbon, \$32 to \$33, all f.o.b. Youngstown or Pittsburgh mills.

Wire Rods.—As a sale price, \$38 Pittsburgh or Youngstown for the base size of common soft rods has disappeared and a range of from \$36 to \$37 is more representative of what lately has been done on domestic business. Even lower prices are going on export orders which have been fairly numerous during the past few weeks. Prices are given on page 381.

Steel Skelp.—The market is holding fairly well at 1.50c. for pipe skelp, but going business involves such small tonnages that this price must be regarded as nominal and largely untested.

Wire Products.—Producers in this district still insist that there has been no abandonment of \$2.50 base per keg, Pittsburgh, for nails, nor of \$2.25 base per 100-lb. Pittsburgh for bright wire as far as the Pittsburgh district is concerned, but it is admitted that sales of nails have been done at \$2.40 base Pittsburgh elsewhere, and that in competitive territory equalization of freights is essential to the securing of business. There is a fairly good run of orders for nails, but they are mostly for small lots to meet the immediate requirements of buyers. Advance buying is stifled by the uncertainty which surrounds prices. Demand for wire still reflects the depression in agricultural centers.

We quote wire nails at \$2.50 base per keg, Pittsburgh, and bright basic and Bessemer wire at \$2.25 base per 100 lb. Pittsburgh.

Steel Rails.—Light rails still are sold by leading makers rolling them from new steel, at 1.50c. base, but demand is very limited and sales at that figure are rendered difficult by the willingness of makers of re-rolled rails to take orders at 1.45c. base.

We quote 25 to 45-lb. sections, rolled from new steel, 1.50c. base; rolled from old rails, 1.45c. base; standard rails, \$40 per gross ton mill for Bessemer and open-hearth sections.

Iron and Steel Bars.—Orders run almost exclusively to carload or less than carload lots. On such business 1.50c. is the common base and it is probable that the appearance of sizable orders would bring out lower quotations. The demand for iron bars also is light and quotations are more of an asking than a selling basis.

We quote steel bars rolled from billets at 1.40c. to 1.50c.; reinforcing bars, rolled from billets, 1.40c. to 1.50c. base; reinforcing bars, rolled from old rails, 1.35c. to 1.40c.; refined iron bars, 2c. to 2.10c. in carloads, f.o.b. mill, Pittsburgh.

Structural Material.—Lettings of fabricated steel still are few and those exceeding 100 tons are rare. The McClintic-Marshall Co. will furnish 300 tons for a nurses' dormitory for the West Penn Hospital, Pittsburgh and 200 tons for a new slag crushing plant for the Shenango Furnace Co., Sharpsville, Pa., to replace one destroyed by fire a few weeks ago. The Jones & Laughlin Steel Co. will furnish 100 tons of steel for an extension to the B. F. Jones Building, Pittsburgh, and 75 tons for the Franklin Exchange of the Bell Telephone Co. of Pennsylvania. The Pittsburgh-Des Moines Steel Co. has taken 100 tons for a school building and dormitory for Shadyside Academy, Aspinwall, Pa. According to figures compiled by the Building Construction Employers' Association, work is under way or projected in the Pittsburgh district amounting to more than \$14,000,000. Most of this total, however, is projected work which has not been placed and the common belief among fabricators is that much of it will be deferred until labor costs are more reasonable. Plain material is in light demand and with small lots selling at 1.50c. base, it is commonly believed that sizable tonnages could be placed for less. Prices are given on page 381.

Plates.—The Phoenix Iron Works, Meadville, Pa., which recently secured the order for several tanks for the Sinclair Oil Co., requiring about 5000 tons of plates, is reported to have covered on the latter with a Youngstown maker at 1.40c., Pittsburgh, or its equivalent. The common quotation of Pittsburgh, Wheeling and Youngstown makers is 1.50c., Pittsburgh, but only small lots can be sold at that figure.

Sheets.—The leading interest continues to report a fairly satisfactory run of orders and specifications, but the report from independent companies is of a different tenor. This condition is finding reflection in a less rigid adherence to the regular market quotations. We note one sale of a fair sized tonnage of galvanized sheets for shipment to the Southwest at 3.90c. base, Pittsburgh, or its equivalent. There is a good deal of pressure against prices on the part of buyers and while manufacturers claim that anything less than 3c. for black or 4c. for galvanized sheets spells a loss, buyers counter by recalling sales \$5 per ton less when manufacturing costs were higher than they are to-day. This conflict of views over prices is confining purchases closely to actual needs. Prices are given on page 381.

We quote sheared plates, ¼ in. and heavier, tank quality, at 1.50c. f.o.b. Pittsburgh.

Iron and Steel Pipe.—Orders are fairly satisfactory in merchant pipe and makers are quoting against a number of line pipe inquiries, among them one for 100 miles of 12-in. pipe for a gas line out of the Monroe, La., field. Oil well pipe is slow. The trade is not expecting a very large spring business in oil country pipe because of the likelihood of an early drop in the price of midcontinent crude oil. The spring demand promises better in merchant pipe because of the bright prospect of much house construction this year. Concessions from card prices are being made, notably in the case of line pipe. Discounts are given on page 381.

Billet Tube.—There is so much irregularity to prices that the buyers are frightened off or are taking only such tonnages as they see a use for, in the fear of not getting in at the lowest prices. Discounts are given on page 381.

Hot-Rolled and Cold-Rolled Strips.—January proved a fairly good month with most makers, but orders, though fairly numerous, generally were for small tonnages, and the market was not particularly satisfactory, viewed from a price standpoint. There has been good observance of \$3.50 base, Pittsburgh, for cold-rolled strips, but this attitude has frequently resulted in a reduction in intended purchases, while on hot-rolled strips competition from the product of plate, skelp and jobbing mills has made difficult the maintenance of the official quotation of 2c. base, Pittsburgh.

Tin Plate.—The recent lull in buying was short lived, as the past week has seen a substantial rally. Specifications are heavier than they were recently, and new orders are more numerous. On production tin plate, the official quotation remains at \$4.75 per base box, Pittsburgh, but this is above the basis of contracts placed by the large container manufacturers. There has been some business in stock tin plate at \$4.50, and even as low as \$4.25, in cases where buyers were willing to take a fairly large percentage of undesirable sizes.

We quote standard production coke tin plate at \$4.75 per base box f.o.b. Pittsburgh for carload lots.

Cold-Finished Steel Bars and Shafting.—January was a better month in the number of orders than the trade had experienced in several months, but individually and in the aggregate the bookings were small in comparison with capacity. Occasional sales of screw stock are being made at 2c, but as a general proposition 1.90c. today is maximum on carload lots. It is claimed that at 1.90c. there is no profit with hot-rolled bars at 1.50c. Pittsburgh because that means 1.00c., including the straightening charge, which makers of the latter are insisting upon, while labor charges in the conversion are said to be at least \$4 per ton. Ground shafting is unchanged at 2.25c. base, f.o.b. mill, for carloads.

Hoops and Bands.—Business in these products is dull almost to the point of stagnation. As nearly as can be arrived at on the limited business doing, hoops are quotable at 1.90c. to 2c. base, Pittsburgh, and bands at from 1.75c. to 1.90c.

Nuts and Bolts.—There is no change in the situation with makers in this district, business being poor and prices very unremunerative, especially in competitive territory. Action of Chicago district makers in naming Chicago or mill bases practically shuts out makers in this district because of the high freight charges they would have to absorb to get into that district. Discounts are given on page 381.

Rivets.—There is no improvement in business and while leading makers here are holding heavy rivets at \$2.25 to \$2.35 base per 100-lb., they are losing more business than they are getting at those prices. Lower prices prevail both in the East and West and local makers are disinclined to meet this competition because of heavy freight charges which would have to be absorbed. Prices and discounts are given on page 381.

Spikes.—The interest of the trade is centered on an inquiry from New York Central Lines for 40,000 to 50,000 kegs for the various subsidiary systems of that road. The most recent large sales of standard spikes was at \$2.15 base per 100 lb. and it is probable that the New York Central business will go even lower because of its size and the keen competition among makers for orders. Interest in small spikes is limited. Prices are given on page 381.

Steel Chain.—In a new card dated Jan. 10, leading makers of steel chain have increased the discounts 5 to 10 per cent on butt, stage, breast and a number of other kinds of chain and products coming under the harness chains and saddlery hardware classification.

Coke and Coal.—The coke market has been featured by a rather brisk demand for foundry grade and while

this has not brought about any advance in price it has at least checked an impending decline. Spot tonnages of standard 72-hr. coke still are moving from \$3.75 to \$4.25 per net ton even. About the only outlet for such tonnages of furnace coke as are coming upon the market is to the bakeries, brick plants and for heating purposes. Hardly any demand is coming from the blast furnaces, as the stacks now in blast are covered by contract. Spot furnace grade of coke is selling from \$2.75 to \$3 per net ton oven. Non-union steam coal for spot or prompt shipment is quotable at \$1.35 to \$1.50 per net ton, mines, run-of-mine grade, and non-union by-product coal of the same grade from \$1.45 to \$1.75. Mine run gas coal holds within the range of \$2 to \$2.35. An effort is being made to obtain higher prices on all grades, but there is too much coal loaded in cars along sidings to allow of any advance in price.

Old Material.—Some demand from melters still exists for turnings, borings, and compressed sheets, while one steel company is in the market for a fair-sized tonnage of heavy breakable cast. The market on these grades in consequence, is holding firm, but on the heavier grades, the tendency of prices is in the opposite direction. Practically all users of heavy scrap are out of the market and this has caused dealers to reduce the prices they are willing to pay for material to throw down on their yards. Heavy melting steel is quoted at \$14 to \$14.50, but the more common bid of dealers now is \$14.

We quote for delivery to consumers' mills in the Pittsburgh and other districts taking the Pittsburgh freight rate, as follows:

Heavy melting steel, Steubenville, Follansbee, Brackenridge, Monessen, Midland and Pittsburgh	\$14.00 to \$14.50
No. 1 cast, cupola size	16.00 to 16.50
Revolving rails, Newark and Cambridge, Ohio; Cumberland, Md.; Huntington, W. Va., and Franklin, Pa.	15.00 to 15.50
Compressed sheet steel	11.75 to 12.00
Bundled sheets, sides and ends	10.50 to 11.00
Railroad knuckles and couplers	14.50 to 15.00
Railroad coil and leaf springs	14.50 to 15.00
Low phosphorus standard bloom and billet ends	17.50 to 18.00
Low phosphorus plates and other grades	17.00 to 17.50
Railroad malleable	12.50 to 13.00
Iron car axles	23.00 to 24.00
Locomotive axles, steel	21.00 to 22.00
Steel car axles	15.00 to 15.50
Cast iron wheels	15.00 to 15.50
Hot rolled steel wheels	14.50 to 15.00
Machine shop turnings	10.00 to 10.50
Sheet bar crop ends	14.00 to 14.50
Heavy steel axle turnings	11.50 to 12.00
Short shoveling turnings	11.50 to 12.00
Heavy breakable cast	14.50 to 15.00
Stove plate	12.50 to 13.00
Cast iron borings	11.50 to 12.00
No. 1 railroad wrought	11.50 to 12.00

The working force of the Minneapolis Steel & Machinery Co., Minneapolis, will be substantially increased within the next 30 days to handle the regular spring business, according to an announcement by G. M. Gillette, president. The company recently reopened its foundry and is making castings for motors and agricultural machinery.

It is reported by the National Safety Council that the number of persons killed in automobile accidents in the United States in 1921 was approximately 15,000, compared with 11,000 persons in 1920. It has been figured from this that, in 1921, there was on the average a death every 35 minutes, as a result of automobile accidents.

Lieut. Col. A. E. White, director department of engineering, University of Michigan, Ann Arbor, Mich., was the principal speaker at the monthly meeting, Jan. 3, of the Pittsburgh Chapter of the American Society for Steel Treating. His subject was "Top Discard and Its Relation to Quality."

The Western Electric Co., Chicago, is preparing plans for a copper wire mill 305 ft., and a large warehouse extension and a cabinet factory to be erected at the Cicero, Ill., plant. The mill will draw fine wire for the company's own use in the manufacture of telephone and telegraph equipment.

Chicago

CHICAGO, Jan. 31.

Both mills and warehouses report an improvement in demand. While individual orders and inquiries are usually small, they are numerous and come from widely distributed sources. The leading jobber failed to suffer a sharp drop in orders in the last week of the month, the first time in over a year. Although it is unlikely that any buyers are covering their needs for any considerable period ahead, it is evident that the passing of inventory taking has released a healthy volume of replenishment purchases. Mills continue to receive generous specifications from car builders and the impending purchase of 7300 cars by the Burlington will put additional tonnage on their books.

In the fabricating field the headhouse and concourse of the Chicago Union Station, requiring 20,000 tons, has been awarded to the American Bridge Co. While the trend of business appears to have turned upward, the tendency in prices is toward greater uniformity. On steel plates, shapes and bars the maximum ruling quotation seems to be 1.60c., Chicago, as little current business is moving at 1.65c. or 1.70c. It is felt in some quarters, however, that it would take little to change the complexion of the market. In this connection, it is to be noted that the merchant bar mill of the Inland Steel Co. started operating double turn to-day with three weeks' bookings ahead. The sheet capacity of the same producer is booked through March.

Betterment in demand is reflected in the improved operating situation among local producers. The Illinois Steel Co. is now on a 43½ per cent basis as against 37½ per cent last week. The Inland Steel Co. is operating at from 45 to 50 per cent of ingot capacity. Its entire No. 1 side is now active and the company expects to start the No. 2 side by the middle of February. The Gary rail mill of the Illinois Steel Co. resumed operation yesterday with a backlog which will justify an output of 7000 tons a week for three or four months.

Pig Iron.—Inquiry is more active, but actual bookings are still light. The Western Electric Co. has placed an order for 200 tons of Northern foundry for prompt shipment, and there have been a fair number of orders ranging in size from a carload to 100 tons. Shipments from local merchant furnaces are gradually increasing, but nevertheless some iron is still being piled. The trade finds its chief encouragement in the increase in inquiries. Among them may be mentioned 300 to 500 tons of malleable for February delivery, 100 tons of malleable for similar shipment, 100 tons of No. 2 Northern foundry for February and March delivery, 100 tons of 4 to 5 per cent foundry for February shipment, 300 tons of No. 2 foundry for February to April delivery, and 400 to 500 tons of low phosphorus wanted by a local interest for both Eastern and Western plants. On local foundry, basic and malleable \$19, base furnace, is still generally quoted, but some business is being taken at a concession of 50c. On copper free low phosphorus, \$36 delivered, or about \$30.50 f.o.b. furnace, appears to be the ruling market. A sale of a carload of 10 per cent silvery at the Jackson County schedule is reported.

Quotations on Northern foundry, high phosphorus malleable and basic irons are f.o.b. local furnace and do not include a switching charge averaging 70c. per ton. Other prices are for iron delivered at consumers' yards, or when so indicated, f.o.b. furnace other than local.

Lake Superior charcoal, averaging sil. 1.50, delivered at Chicago.	\$30.50 to \$31.50
Northern coke, No. 1, sil. 2.25 to 2.75.	19.00 to 19.50
Northern coke, foundry, No. 2, sil. 1.75 to 2.25.	18.50 to 19.00
Northern high phos.	18.50 to 19.00
Southern foundry, sil. 1.75 to 2.25.	22.17 to 22.67
Malleable, not over 2.25 sil.	18.50 to 19.00
Basic	18.50 to 19.00
Low phos. Valley furnace, sil. 1 to 2 per cent copper free.	30.50
Silvery, sil. 3 per cent.	32.82 to 34.82

Ferroalloys.—Two carload sales of spiegeleisen are reported, one of them for local delivery, having been made at \$36.10, freight allowed. The furnace which sold the material, however, is out of blast and has practically exhausted its stocks. The American Steel Foundries has closed for about 150 tons of ferromanga-

nese and is said to have done so at less than the prevailing market of \$56.35, seaboard.

We quote 73 to 82 per cent ferromanganese, \$44.75, delivered; 50 per cent ferroallicon, \$56 to \$57.50, delivered; spiegeleisen, 18 to 22 per cent, \$36.30 to \$37, delivered.

Railroad Rolling Stock.—The Santa Fe has placed eight dining cars with the Pullman Co. The New York, Chicago & St. Louis has ordered 300 steel underframe stock cars from the Illinois Car & Mfg. Co. The Baltimore & Ohio has let repairs on 500 hopper car bodies to the Pressed Steel Car Co.. Cudahy Brothers, packers, Cudahy, Wis., have ordered 500 refrigerator cars from the Pullman Co. The Delaware, Lackawanna & Western has bought five passenger locomotives from the American Locomotive Co.

Rails and Track Supplies.—The Illinois Central has bought 30,000 tons of rails, of which 14,000 tons will be rolled by the Tennessee Coal, Iron & R. R. Co., 11,000 tons by the Illinois Steel Co., and 5000 tons by the Inland Steel Co. A few small orders for rails ranging from 1000 to 2000 tons have been booked by the Gary mill within the past week. Local mills expect to get a share of the 24,000 tons of rails to be ordered by the Chesapeake & Ohio and the Hocking Valley. The Louisville & Nashville has distributed orders for track supplies as follows: 2700 tons of splice bars to the Inland Steel Co., 7500 kegs of spikes to the Jones & Laughlin Steel Co., 3500 kegs of bolts to the Illinois Steel Co. Track supplies still show a tendency toward weakness. On standard spikes 2.10c., Pittsburgh, appears to be the market, whereas 3.10c., Pittsburgh, is a common quotation on track bolts and even less than that is reported to have been done. The ruling price on iron and steel tie plates is \$35, f. o. b. mill. As noted in the New York market last week, the Great Northern is inquiring for 450,000 steel tie plates, but in view of the season it is not expected that the business will be placed immediately. There is little demand for light rails.

Standard Bessemer and open-hearth rails, \$40; light rails rolled from new steel, 1.60c. f.o.b. makers' mills.

Standard railroad spikes, 2.10c., Pittsburgh; track bolts with square nuts, 3.10c., Pittsburgh; tie plates, steel and iron, 1.75c., f.o.b. mill; angle bars, 2.40c., f.o.b. mill.

Bars.—Mills report a measurable improvement in the demand for mild steel bars. Both manufacturing consumers and jobbers are commencing to replenish their stocks of merchant bars and specifications are being received from carbuilders. The demand for reinforcing bars also promises to increase, as numerous building projects are being figured on. One reinforcing bar company has just placed an order for 2000 tons with a local mill. No material change is to be noted in prices, 1.60c. to 1.70c., Chicago, being quoted on ordinary tonnages, while it is conceded that large orders have gone at as low as 1.55c and 1.50c., Chicago. Purchases running into tonnage are confined principally to carbuilders. The demand for bar iron continues to fluctuate from week to week, bookings during the past few days having tapered off. That the situation is better, however, than during the closing months of 1921, is evidenced by the fact that one local mill is entering its eighth week of uninterrupted operation. Hard steel bar business is still light, although a betterment in demand for reinforcing purposes is to be noted.

Mill prices are: Mild steel bars, 1.60c. to 1.70c., Chicago; common bar iron, 1.60c., Chicago; rail carbon, 1.50c., mill or Chicago.

Jobbers quote 2.58c. for steel bars out of warehouse. The warehouse quotation on cold-rolled steel bars and shafting is 3.40c. for rounds and 3.90c. for flats, squares and hexagons. Jobbers quote hard and medium deformed steel bars at 1.38c. base. Hoops and bands, 3.13c.

Wire Products.—Buying is active in the South and Southwest where jobbers are replenishing their stocks. Orders for nails are fairly heavy and poultry netting is also in demand. A slight, though by no means pronounced, improvement in demand for wire by manufacturers is reported. Prices are fairly firm, although some localized shading by Southern mills is noted. For mill prices, see Finished Iron and Steel, f. o. b. Pittsburgh, page 381.

We quote warehouse prices f.o.b. Chicago, No. 1 and heavier black annealed wire, \$3.12 per 100 lb.; No. 2 and heavier bright basic wire, \$3.28 per 100 lb.; common wire nails, 12.25 per 100 lb.; current coated nails, 22.37 per 100 lb.

Sheet.—Further business has been booked for export to Japan and domestic consumers are beginning to take more interest in the market. The local independent has built up a backlog which will keep its mills running full for two months. Fully 50 per cent of these bookings is for foreign account. Prices are firm.

Mill quotations are 3c. for No. 28 black, 2.25c. for No. 10 blue annealed and 4c. for No. 28 galvanized, all being Pittsburg prices, subject to a freight rate to Chicago of 38c. per 100 lb.

Jobbers quote: Chicago delivery out of stock, No. 10 blue annealed, 3.85c.; No. 28 black, 4.15c.; No. 28 galvanized, 5.15c.

Cast Iron Pipe.—The United States Cast Iron Pipe & Foundry Co. has been awarded 800 tons for Rockford, Ill. The Lynchburg Foundry Co. was the successful bidder on 800 tons for Grand Rapids, Mich., its figure having been \$32.40, base Birmingham. The Central Foundry Co. was low bidder on 300 tons for Lawrence, Kan. Brillion, Wis., takes bids Feb. 7 on 375 tons. The present market appears to range from \$32.50, Birmingham, to \$33.50 for 6-in. and above. The extra for class A and gas pipe has been reduced to \$3. Sellers report much work in prospect.

We quote per net ton, f.o.b. Chicago, as follows: Water pipe, 4-in., \$45.60 to \$46.60; 6-in. and above, \$11.60 to \$12.60; class A and gas pipe, \$3 extra.

Bolts and Nuts.—Although demand is still far from satisfactory, some improvement in buying is to be noted. A number of fair-sized orders have been received from jobbers, and the automobile industry is commencing to take interest in the market. The Studebaker Corporation is inquiring for a considerable quantity of bolts. The price situation is still weak, and even nominal discounts in this territory are below those quoted on page 381. Asking prices on machine bolts appear to be 70, 10 and 10 off for small rolled thread, 70 and 10 off for small cut thread, and larger and longer; 70, 10 and 5 off for large carriage bolts; and 80, 10 and 10 off for stove bolts. In other respects the discounts quoted on page 381 represent the nominal market.

Jobbers quote structural rivets, 3.43c.; boiler rivets, 3.53c.; machine bolts up to $\frac{3}{4}$ x 4 in., 60, 10 and 10 per cent off; larger sizes, 60 and 10 off; carriage bolts up to $\frac{3}{4}$ x 6 in., 60 and 10 off; larger sizes, 55 and 5 off; hot pressed nuts, square and hexagon tapped, \$3.75 off; blank nuts, \$4 off; coach or lag screws, gimlet points, square heads, 65 and 5 per cent off. Quantity extras are unchanged.

Structural Material.—Interest is centered in the Chicago Union Station headhouse and concourse, the steel for which, amounting to 20,000 tons, was awarded to the American Bridge Co. late to-day. A fair amount of fabricating business is in prospect, although during the past week few new inquiries have appeared. Fabricating awards include:

Kittitas County, Wash., 200-ft. pin span; Ellensburg, Wash., 119 tons, to Minneapolis Steel & Machinery Co.

Lincoln Junior High School, Minneapolis, 139 tons, to American Bridge Co.

City National Bank, Long Beach, Cal., 600 tons reinforced concrete substituted for structural steel.

Municipal power plant, Lansing, Mich., 1470 tons, to American Bridge Co.

Pending business includes:

London Guarantee & Assurance Co. Building, Chicago, 2400 tons; Alfred S. Alschuler, architect.

The mill quotation on plain material ranges from 1.60c. to 1.70c., Chicago. Jobbers quote 2.63c. for plain material out of warehouse.

Plates.—There has been a noticeable expansion in buying during the past week. Not only have generous specifications been received from carbuilders, but numerous orders have come from widely distributed sources. Miscellaneous manufacturers who reduced their stocks to the vanishing point prior to the taking of inventory, are now buying for their immediate requirements. Jobbers are also commencing to replenish their stocks. In the opinion of the mills, a continuation of the buying movement now in its inception will meet in the re-establishment of the old differential between plates, shapes and bars.

The mill quotation ranges from 1.60c. to 1.70c., Chicago. Jobbers quote 2.55c. for plates out of stock.

Old Material.—Except for purchases of short turnings by a local blast furnace, orders for cast scrap by two local foundries, and a moderate purchase of bushing by an iron mill, the market has been practically devoid of consumptive buying. The price situation is unchanged except for a decline in heavy melting and allied grades and a slight advance in No. 1 bushing. Railroad lists include the Pennsylvania, Central Region, 1100 tons, and the Michigan Central a blind list.

We quote delivery in consumers' yards Chicago and vicinity, all freight and transfer charges paid, as follows:

Per Gross Ton	
Iron rails.....	\$16.00 to \$16.50
Relaying rails.....	20.00 to 25.00
Cast iron car wheels.....	15.00 to 15.50
Rolled or forged steel car wheels.....	13.00 to 12.50
Steel rails, rerolling.....	12.00 to 12.50
Steel rails, less than 3 ft.....	12.50 to 13.00
Heavy melting steel.....	11.25 to 11.75
Frogs, switches and guards cut apart.....	11.25 to 11.75
Shoveling steel.....	10.75 to 11.25
Low phos. heavy melting steel.....	13.50 to 14.00
Drop forge flashings.....	7.50 to 8.00
Hydraulic compressed sheet.....	7.50 to 8.00
Axle turnings.....	8.50 to 9.00
Per Net Ton	
Iron angles and splice bars.....	14.00 to 14.50
Steel angle bars.....	10.50 to 11.00
Iron arch bars and transoms.....	15.00 to 15.50
Iron car axles.....	19.50 to 20.00
Steel car axles.....	12.50 to 13.00
No. 1 bushing.....	8.50 to 9.00
No. 2 bushing.....	6.00 to 6.50
Cut forge.....	10.00 to 10.50
Pipes and flues.....	6.50 to 7.00
No. 1 railroad wrought.....	10.50 to 11.00
No. 2 railroad wrought.....	10.00 to 10.50
Steel knuckles and couplers.....	11.25 to 11.75
Coil springs.....	12.50 to 13.00
No. 1 machinery cast.....	13.00 to 13.50
No. 1 railroad cast.....	12.50 to 13.00
Low phos. punchings.....	11.00 to 11.50
Locomotive tires, smooth.....	9.50 to 10.00
Machine shop turnings.....	4.50 to 5.00
Cast borings.....	6.00 to 6.50
Stove plate.....	12.00 to 12.50
Grate bars.....	10.50 to 11.00
Brake shoes.....	10.50 to 11.00
Railroad malleable.....	11.25 to 11.75
Agricultural malleable.....	11.25 to 11.75

New York

NEW YORK, Jan. 31.

Pig Iron.—The market has been enlivened by inquiries amounting to about 12,000 tons, principally from radiator and other house heating companies. A company at Dover, N. J., is in the market for 5000 tons and another New Jersey heating concern is inquiring for second quarter without naming any definite tonnage. A considerable number of inquiries for moderate tonnages have been received and on the whole conditions are more encouraging. In eastern Pennsylvania, \$20 for No. 2 plain seems to be the minimum, but in the Buffalo district concessions are being freely granted. Reports indicate that \$18.50 Buffalo can be done on No. 2. On the contracts for the tunnel segments, most foundries are figuring on a basis of \$20, furnace, for No. 2 plain, eastern Pennsylvania.

We quote delivered in the New York district as follows, having added to furnace prices \$2.52 freight from eastern Pennsylvania, \$5.46 from Buffalo and \$6.16 from Virginia:

East. Pa. No. 1 fdy., sil. 2.75 to 3.25.....	\$23.52
East. Pa. No. 2X fdy., sil. 2.25 to 2.75.....	23.02
East. Pa. No. 2 fdy., sil. 1.75 to 2.25.....	22.52
Buffalo, sil. 1.75 to 2.25.....	24.96
No. 2 Virginia, sil. 1.75 to 2.25.....	28.16

Ferroalloys.—Demand for ferromanganese continues to be confined to carload and small lots for early delivery and there have been sales at \$58.35, seaboard. The spiegeleisen market is fairly active so far as small lots are concerned, sales in the week having amounted to 200 tons at prevailing quotations. It is reported that two cargoes of Russian manganese ore, probably Caucasian, will soon be shipped to this country, one sailing in February and the other in March, each containing 5000 and 6000 tons respectively. It is understood that 23.50c. per unit, seaboard, has been refused and that 25c. is being asked. A movement seems to be on to get ore into this country before any possible tariff is ordered by Congress. The 50 per cent ferrosilicon market is quiet and sales are confined to carload lots.

and small lots for delivery at prevailing quotations. One seller refuses to make any contracts for 1922 delivery.

Following are prevailing quotations:

Ferroalloys

Ferromanganese, domestic, seaboard, per ton.	\$58.35
Ferromanganese, British, seaboard, per ton.	\$58.35
Spiegel Eisen, 20 per cent, furnace, per ton.	\$26.00
Ferrosilicon, 50 per cent, delivered, per ton.	\$55.00 to \$60.00
Ferrotungsten, per lb. of contained metal, 40c. to 50c.	
Ferrochromium, 6 to 8 per cent carbon, 60 to 70 per cent Cr., per lb. Cr., delivered.	13c. to 14c.
Ferrovandium per lb. of contained vanadium	\$4.00
Ferrocobaltititanium, 15 to 18 per cent, net ton	\$200.00
Ferrocobaltititanium, 15 to 18 per cent, 1 ton to carloads, per ton.	\$220.00
Ferrocobaltititanium, 15 to 18 per cent, less than 1 ton, per ton f.o.b. Niagara Falls, N. Y.	\$250.00

Ores

Manganese ore, foreign, per unit, seaboard	22c. to 25c.
Tungsten ore, per unit, in 60 per cent concentrates	\$2.00 up
Chrome ore, 40 to 45 per cent Cr ₂ O ₃ , crude, per net ton Atlantic seaboard.	\$20.00 to \$25.00
Chrome ore, 45 to 50 per cent Cr ₂ O ₃ , crude, per net ton, Atlantic seaboard.	\$25.00 to \$27.00
Molybdenum ore, 85 per cent concentrates, per lb. of MoS ₃ , New York.	50c. to 60c.

Finished Iron and Steel.—Most of the current activity locally is in structural steel. The largest contract of the week was 8000 tons for the addition to the department store of R. H. Macy & Co., New York, which will be fabricated by the Levering & Garrigues Co. The American Bridge Co. will fabricate the third section of the new Standard Oil Co. building. Other jobs which have been let during the week bring the total up to 16,500 tons. Bids have gone in during the week on considerable tonnage. New work for which contracts have been let follow:

Addition to store of R. H. Macy & Co., New York, 8000 tons, to Levering & Garrigues Co.

Section of Standard Oil Co. building, 4500 tons, to American Bridge Co.

Apartment house for Joseph Paterno, New York, 700 tons, to Paterson Bridge Co.

Apartment house for Andrew Campagna, New York, 1200 tons, to Paterson Bridge Co.

Bridge at Annapolis, Md., 700 tons, to Phoenix Iron Works Co.

Factory at Bloomfield, N. J., for American Book Co., 300 tons, to Shoemaker-Satterthwait Bridge Co.

Machine shop for Florence Iron Works, Philadelphia, 200 tons, to Levering & Garrigues Co.

Two school houses in Brooklyn and Manhattan boroughs, 700 tons each.

Bridge for City of Philadelphia, 200 tons, to American Bridge Co.

New work on which bids have gone in follow:

Mill building for William Skinner & Sons, Holyoke, Mass., 300 tons.

Recreation building for Clark Thread Co., Newark, 350 tons.

Store at Richmond, Va., 400 tons; has been up once before for bids.

Manufacturing building for Bancroft & Sons, Reading, Pa., 800 tons.

Apartment house, Newark, 800 tons.

15 to 20 tanks of 55,000-bbl. capacity for the Mexican Petroleum Co. to be erected at Carteret, N. J., 3500 to 4000 tons.

Junior high school at Elizabeth, N. J., 600 tons.

Union Memorial Hospital, Baltimore, Md., 900 tons.

Reports of local sales offices for January will show only a slight improvement over December, while some companies report no improvement whatever. Those companies which make a varied line of products, including the lighter forms of steel, have fared much better than those making chiefly plates, shapes and bars. The lines which have enjoyed the best demand are sheets, tin plate, wire products and pipe. Jobbers have completed inventories and are buying in a small way for sorting up stocks. An oil company last week bought 400 tons of line pipe. Interest in plates is chiefly for oil tank work. Prices of most products are weak. Instances have been noted of plates selling in lots of not more than 100 tons at 1.40c., Pittsburgh. Railroads have been able to buy at this price from some mills for repair work. Prices generally quoted on plates, shapes and bars range from 1.45c. to 1.50c., Pittsburgh, but mills are frequently willing to shade

their quoted prices when an order is really in sight. Car builders and other users of steel are estimating their work on a 1.40c. basis. Sales of plates below 1.40c., Pittsburgh, are reported, but are not confirmed. The Lehigh Valley Railroad's orders for car repairs were divided as follows: Pressed Steel Car Co., 200; Buffalo Steel Car Co., 100; Lehigh Structural Steel Co., 100; American Car & Foundry Co., 500; Standard Steel Car Co., 350.

We quote for mill shipments, New York, as follows: Soft steel bars, 1.83c. to 1.88c.; plates, 1.83c. to 1.88c.; structural shapes, 1.83c. to 1.88c.; bar iron, 1.88c. to 1.88c. On export shipments the freight rate is now 28.5c. per 100 lb., instead of 38c., the domestic rate.

Cast-Iron Pipe.—The market is pervaded by a general feeling of optimism. Prices are firmer and there is a slightly greater volume of inquiries in hand than at this time a year ago. We quote per net ton, f. o. b., New York, carload lots, as follows: 6-in. and larger \$47.30; 4-in. and 5-in., \$52.30; 3-in., \$62.30, with \$4 additional for Class A and gas pipe.

Coke.—The coke market is showing more activity. At least one producer of by-product coke has made a quotation on the coke necessary for foundry use in making the castings for the New York-New Jersey tunnel. By-product coke is quoted at \$8.59, New Jersey points.

Old Material.—Although buying prices show a slight increase and there is some activity in small tonnages by mills in the Pittsburgh and other districts, dealers do not consider the present change as a permanent improvement or as setting the market at a higher level than the past few weeks. The market is fairly well established at \$8.50 per ton on heavy melting steel, based largely on buying during the past week by the Cambria Steel Co., which contracted for delivery to Johnstown, Pa., on a tonnage of No. 1 heavy melting steel at \$13.50 delivered, figuring back to about \$8.50 per ton, New York. The Worth Steel Co. and the Alan Wood Iron & Steel Co., have also contracted for small tonnages of No. 1 heavy melting steel, charging box size. Mixed borings and turnings are slightly higher, \$4.50 to \$5.00 being a fair range of quotations by dealers in the market for this material. In fact, one broker asserts that, if necessary, he might go as high as \$5.25 per ton in buying.

Buying prices per gross ton, New York, follow:

Heavy melting steel, yard.	\$8.00 to \$8.50
Steel rails, short lengths, or equivalent	8.50 to 9.00
Revolving rails	9.50 to 10.00
Relaying rails, nominal.	27.00 to 28.00
Steel car axles	10.00 to 10.50
Iron car axles	18.50 to 19.00
No. 1 railroad wrought.	10.00 to 10.50
Wrought iron track.	8.50 to 9.00
Forge fire	5.00 to 5.50
No. 1 yard wrought, long.	9.00 to 9.50
Cast borings (clean)	7.00 to 7.50
Machine-shop turnings	4.00 to 5.00
Mixed borings and turnings	4.50 to 5.00
Iron and steel pipe (1 in. diam. not under 2 ft. long)	7.25 to 7.75
Stove plate	10.00 to 10.50
Locomotive grate bars	9.00 to 10.00
Malleable cast (railroad)	8.00 to 8.50
Car wheels	10.50 to 11.00

Prices which dealers in New York and Brooklyn are quoting to local foundries, per gross ton, follow:

No. 1 machinery cast.	\$16.50 to \$17.00
No. 1 heavy cast (columns, building materials, etc.), cupola size	15.50 to 16.00
No. 1 heavy cast, not cupola size.	14.00 to 14.50
No. 2 cast (radiators, cast boilers, etc.)	10.00 to 10.50

Warehouse Business.—The second half of January was slightly better than the business done during the first two weeks, but the month's average in a majority of cases was scarcely better than December, an extremely poor month for business. There is some shading of prices on certain items and sheets are particularly weak. Galvanized continues to be quoted at 4.75c. per lb., base, which is an asking price, any reasonable order bringing out a lower quotation from some dealer, who is overstocked. Black sheets, too, are being shaded slightly, although generally they are stronger than the galvanized sheet market. Spring steel market is unchanged from the standpoint of warehouse prices, but recent rumors of concessions in price by

mills may affect warehouse prices. The brass and copper market is unchanged. Dealers in pipe are, as a rule, submitting quotations for furnishing the pipe included in the contract for the vehicular tunnel under the Hudson River. This is about the only large contract stirring in this market. Some iron and steel warehouses have been offered stocks of imported material; one offer was of horse shoe nails; another of high carbon Swedish tool steel, the latter being held in stock in England. We quote prices on page 393.

High Speed Steel.—Quotations are generally unchanged. One producer has reduced his quotation on 18 per cent tungsten high speed steel from 90c to 85c. per lb. On the whole, prices on this grade now range from 85c. to 90c. per lb. with special brands of some companies quoted up as high as \$1.05 per lb.

Cleveland

CLEVELAND, Jan. 30.

Iron Ore.—Some increase in mine operations is reported. Oglebay, Norton & Co. have started to operate their Berkshire mine in the Iron River, Mich., district Menominee range, one shift six days per week, an increase from one shift three days per week, and have reduced wages to the same basis recently placed in effect by the McKinney Steel Co. in that district. This scale is \$2.10 per day for common labor and \$3 per day for miners. The Charcoal Iron Co. of America has resumed full operations at its Yale mine in the Gogebic range. On Jan. 1 there was approximately 27,450,000 tons of Lake Superior ore on hand at interior, Eastern and lake front furnaces, making a total of 35,895,000 tons on hand at both furnaces and docks on that date. This compares with approximately 38,050,000 tons on hand at furnaces and Lake Erie docks on Jan. 1 last year. Lake Superior ore consumed by furnaces during December amounted to 2,577,000 tons as compared with 2,188,000 tons during November.

We quote delivered lower lake ports: Old range Bessemer, 55 per cent iron, \$6.45; Old range non-Bessemer, 51½ per cent iron, \$5.70; Mesabi Bessemer, 55 per cent iron, \$6.20; Mesabi non-Bessemer, 51½ per cent iron, \$5.55.

Pig Iron.—There is a steady but rather light demand for foundry iron in small lots for prompt shipment. Very few inquiries are being made for iron in extended deliveries, although some orders are for deliveries over a 60-day period. The largest sale reported is a 1000-ton lot of low silicon iron classed as No. 3 that was sold by a Valley interest to a Pittsburgh broker at \$18.50. One lake furnace reports sales aggregating 3000 tons during the week including one 500-ton lot placed by an Ohio foundry. Other sales range from around 200 tons down to car lots. Prices on No. 2 foundry iron continue to range from \$19 to \$20, lake furnace, with the lower price the more general quotation. Valley furnaces are quoting this grade at \$19.50. However, there are reports of quotations as low as \$18.50 on foundry iron. In some cases furnaces having contracts for high priced iron have shaded the \$19 price, the buyer taking part of the iron on his high priced contract and the remainder at the new contract price and it may be only in deals of this kind that quotations have gone below \$19. Shipments are fair, showing a little improvement. Low phosphorus iron is weak. A two-carlot sale of copper free iron being made at \$32, Valley furnace, a reduction of \$1 a ton. Report indicates that Eastern furnaces are naming low prices to Western consumers on copper bearing low phosphorus iron, buyers claim to have quotations as low as \$26 to \$26.50. We note the sale of 250 tons of Southern iron to a Pittsburgh district sanitary interest at \$16, which appears to be the minimum quotation in this territory. A few carlot sales of Ohio silvery iron were made during the week at scheduled prices.

Quotations below are f.o.b. local furnace for Northern foundry iron, not including a 56c. switching charge. Other quotations are delivered Cleveland, being based on a \$1.96 freight rate from Valley points, a \$3.36 rate from Jackson and a \$4.41 rate from Birmingham:

Basic	\$19.96
Northern No. 2 fdy., all 1.75 to 2.25	\$19.00 to 20.00
Southern fdy., all 1.75 to 2.25	22.67
Ohio silvery, all 3 per cent	32.86
Standard low phosph. Valley furnace	32.00

Semi-Finished Steel.—Slabs are weak. Quotations for Cleveland delivery are reported that would figure base to about \$24 at mill and should compel Youngstown mills to quote about \$26 to meet this competition. While Youngstown mills might quote about \$28, they are not inclined to name a lower price.

Finished Material.—Orders and inquiries for finished material show some improvement over the previous week, but buying is still almost wholly in small lots and consumers are not inclined to cover for more than their immediate requirements. Steel bars are in better demand than plates and structural material, although recent tank orders have resulted in some good plate business. The Warren City Tank & Boiler Co. has placed 1400 tons of plates for tanks for the Tidewater Oil Co. at Bayonne, N. J., and the Phoenix Iron Co., Meadville, has placed 3000 tons of plates for oil tanks for the Sinclair Oil Co. The price situation shows little change. On steel bars, plates and shapes prices are apparently firm at 1.50c. for carlots, but this price can be shaded \$1 or \$2 a ton on round lots. While there are rumors of prices lower than 1.40c., there is no confirmation of these reports which appear unfounded. The structural outlook has improved. The National Cash Register Co., Dayton, Ohio, has taken bids for a theater building requiring 250 tons and two new inquiries have come out for steel for manufacturing plants, one for 900 tons and the other for 1500 tons. The Cleveland Railway Co. is inquiring for 5500 street car wheels. Orders for four lake boats of Welland Canal size, two 235 ft. long, are reported to have been placed by the George Hall Coal Co., Ltd., of Montreal, to Frazer-Brace & Co. of Montreal to be built at the yards of the Tidewater Ship Building Co. at Three Rivers, Quebec, which were recently taken over by Frazer-Brace & Co. Boat inquiries recently received by American ship yards have not yet resulted in orders.

Jobbers quote steel bars, 2.36c.; plates and structural shapes, 2.46c.; No. 9 galvanized wire, 3.25c.; No. 9 annealed wire, 2.75c.; No. 28 black sheets, 3.75c.; No. 28 galvanized sheets, 4.75c.; No. 10 blue annealed sheets, 3.10c.; hoops and bands, 2.96c.; cold-rolled rounds, 3.25c.; flats, squares and hexagons, 3.75c.

Sheets.—Blue annealed sheets in No. 12 and heavier gages are weak owing to the competition of plate mills, some of which are quoting these sheets on a 1.75c. plate basis, making the price 2.10c. for No. 10 and there are fairly well authenticated reports that the 1.50c. plate base has been used, making a 1.80c. blue annealed price. Prices on lighter gages are firm, while regular prices on black and galvanized sheets are apparently being held, there are reports that some mills are using a Youngstown instead of a Pittsburgh basing point in making quotations. Consumers are buying only for early requirements.

Bolts, Nuts and Rivets.—The improvement noted early in the month continues and makers are getting a moderate volume of small orders, largely from jobbers. Local makers show no disposition to shade prices. Rivets are dull. January has been a disappointing month with the rivet makers, as the improvement in orders early in the month has not been maintained the past two weeks. Prices are irregular, the recognized market quotations of 2.25c. for structural rivets and 2.35c. for boiler rivets being shaded even on small orders.

Coke.—Two producers have advanced prices on foundry coke 25c. a ton to \$4.25, but other makers continue to quote standard Connellsville foundry coke at \$4 per ton. There is still a fair volume of carlot orders.

Old Material.—The market is quiet, but prices are firm. Activity at present is dull in blast furnace scrap and prices on these grades have advanced. Some dealers are offering \$9 at shipping point for machine shop turnings and a local consumer paid \$10 for a small lot of high quality. Owing to limited plant operations, the supply of borings and turnings is not plentiful. No mills have come in the market and trading is virtually all between dealers who are buying to cover on short sales. There is some demand from Youngstown dealers for open hearth scrap. Dealers' prices for Youngstown

delivery are \$14 to \$14.25 for heavy melting steel and \$12 for compressed steel scrap.

We quote per gross ton, f.o.b. Cleveland, as follows:

Heavy melting steel	\$12.00 to \$12.50
Steel rails, under 3 ft.	12.50 to 13.00
Steel rails, rerolling	14.00 to 14.50
Iron rails	12.00 to 12.50
Iron car axles	18.00 to 19.00
Low phosphorus melting	13.00 to 13.50
Cast borings	8.75 to 9.00
Machine shop turnings	8.75 to 9.00
Mixed borings and short turnings	8.75 to 9.00
Compressed steel	9.00 to 9.50
Railroad wrought	12.00 to 12.50
Railroad malleable	12.50 to 13.00
Light bundled sheet stampings	6.00 to 7.00
Steel axle turnings	9.00 to 10.00
No. 1 cast	15.00 to 16.00
No. 1 busheling	8.25 to 8.75
Drop forge flashings, over 10 in.	7.50 to 8.00
Drop forge flashings, under 10 in.	7.50 to 8.00
Railroad grate bars	12.75 to 13.00
Stove plate	13.00 to 13.25
Pipes and flues	8.50 to 9.00

Cincinnati

CINCINNATI, Jan. 31.

Pig Iron.—Several fair-sized tonnages were sold during the week, the most important of which was undoubtedly one of 500 tons of Southern iron taken by a local melter. This iron was sold on the basis of \$15.50, Birmingham. The specification called for an average silicon content of 2.25 and the entire tonnage was booked at \$16, Birmingham, or \$20.50 delivered. It is said that a slightly lower quotation was made on this business but that the analysis did not entirely meet requirements. At least one furnace quoted \$15.50 on base iron, with a 50c. differential for the higher silicon required to bring up the average. Several other round lots of Southern iron were disposed of, one lot of 600 tons going to an Indiana melter on a \$16 base price and another similar tonnage to a melter in Illinois at the same figure. It is reported that a Kentucky melter had purchased 400 tons on the basis of \$15, Birmingham, but this cannot be confirmed. A sale of charcoal iron is also reported to a car wheel maker, the price figuring back to a \$26, Lake Superior basis. On Northern iron, while \$19 is apparently the minimum of the Chicago furnaces, brokers are offering iron at \$18.75 and a lake furnace is reported to be booking business at \$18.50 for silicon up to 3.25 per cent. Included in sales of Northern iron was one of 1000 tons to a Michigan melter and 200 tons of high phosphorus to a Cleveland district melter. A Northern Ohio melter also bought 1000 tons of fluorspar. There was little activity in southern Ohio irons and furnaces are holding firmly to the \$19.50 to \$20 range. This price also applies to malleable as was evidenced by a quotation on a 200-ton inquiry from a northern Ohio implement manufacturer. There are very few inquiries current, one from Dayton being for 200 tons of Northern and a local melter being in the market for five cars of special analysis. Several 100-ton inquiries are also current as well as a number of carload lots, all indicating that the market is showing a little more activity than heretofore. An inquiry for a Southern pipe company is for 6000 tons, delivery to be made during the second quarter.

Based on freight rates of \$4.50 from Birmingham and \$2.52 from Ironton, we quote f.o.b. Cincinnati:

Southern coke, sil. 1.75 to 2.25 (base)	\$20.00 to \$20.50
Southern coke, sil. 2.25 to 2.75 (No. 2 soft)	20.50 to 21.00
Ohio silvery, 8 per cent sil.	22.02
Southern Ohio coke, sil. 1.75 to 2.25 (No. 2)	22.02 to 22.52
Basic, Northern	21.02
Malleable	22.02 to 22.52

Finished Material.—With the exception of an order for 450 tons of bars taken from a railroad company, business during the week was rather quiet. The Big Four Railroad is taking bids on several hundred tons of axles, and inquiries are also out for small tonnages of bars, shapes, plates and sheets. A slightly weaker tone is noticed on prices of bars, shapes and plates, it being reported that 1.45c. can now be done on carloads with 1.40c. on a fair tonnage. It is reported that the L. & N. railroad has closed for 3500 tons of splice bars, the order going to a Chicago mill. Sheet prices are holding very firmly at 3c. and 4c. for black and galvanized respectively, while on blue annealed

quotations are fairly steady at 2.50c. There is very little new activity in the structural field. Plans have been posted for the Business Men's Club in Cincinnati, in which 150 tons of steel are involved. U. S. Government Engineers are inquiring for three steel derricks for Louisville and another proposition to come up shortly will be a Federal Reserve Bank at Nashville, Tenn. Much interest is being shown in the Belknap Hardware Co.'s warehouse at Louisville, bids for which were opened in Chicago on Jan. 30. This is one of the largest jobs that has come up for some time. The U. S. Engineers' Office, Galveston, Texas, will receive bids until Feb. 23 for furnishing and delivering several 2000-barrel steel oil barges. There have been no lettings of consequence although the steel work on the Elk's Temple at Cincinnati has been awarded to the General Iron Works Co. at their bid of \$34,000. There has been a fair demand for wire products during the week, mostly coming from Southern districts. An improvement also is shown in wire nails which are now being regularly quoted at \$2.50 mill.

Warehouse Business.—Local jobbers report a fair demand for wire products during the week, but other lines continue rather quiet. Warehouse business is spotty, but orders are becoming a little more numerous and for heavier tonnages. It is expected that with increased manufacturing activities in the metal working field, which now seems possible, jobbers' business will show a steady improvement.

Iron and steel bars, 2.75c. base; hoops and bands, 3.35c. base; shapes and plates, 2.85c. base; reinforcing bars, 2.82 1/2c. base; cold rolled rounds, 1 1/2 in. and larger, 3.50c. base; under 1 1/2 in. and flats, squares and hexagons, 4c.; No. 10 blue annealed sheets, 3.60c.; No. 28 black sheets, 4.25c.; No. 28 galvanized sheets, 5.25c.; wire nails, \$3.00 per keg base; No. 9 annealed wire, \$2.85 per 100 lb.

Tool Steel.—A slight improvement is noted in the demand for tool steels and several fair sized orders were booked during the week. Prices are unchanged, 18 per cent tungsten high speed steel being quoted at 85c. per lb.

Coke.—There are signs of greater activity in the coke market, and melters are now preparing to accumulate a stock in anticipation of a coal strike on April 1. One inquiry for furnace coke for February and March shipment calls for 4000 tons a month. There is still a fair amount of contracting going on and as regards prices they have a much firmer tendency. This is true particularly of furnace coke, which has been quoted by some operators at \$3.25, Connellsville. Connellsville foundry coke is quoted at \$3.75 to \$4.50, New River foundry at \$7 to \$7.50 and Wise County at \$5 to \$5.50. By-product producers are on a \$6, Connellsville base.

Old Material.—There is very little activity in the local scrap market, but some sales are reported in the Chicago and St. Louis district. A sale of three cars of borings and turnings for Southern shipment is reported at \$13, delivered. The Big Four Railroad Tuesday closed bids on 13,000 tons. Prices are unchanged.

We quote dealers' buying prices, f.o.b. cars:

	Per Gross Ton	
Bundled sheets	\$3.50 to 4.00	
Iron rails	12.00 to 12.50	
Relaying rails, 50 lb. and up	25.00 to 26.00	
Rerolling steel rails	10.50 to 11.00	
Heavy melting steel	9.00 to 9.50	
Steel rails for melting	9.00 to 9.50	
Car wheels	12.00 to 13.00	
	Per Net Ton	
No. 1 railroad wrought	8.50 to 9.50	
Cast borings	3.00 to 3.50	
Steel turnings	2.00 to 2.50	
Railroad cast	12.00 to 12.50	
No. 1 machinery	12.50 to 14.00	
Burnt scrap	7.50 to 8.00	
Iron axles	15.50 to 16.50	
Locomotive tires (smooth inside)	8.50 to 10.00	
Pipes and flues	4.00 to 4.50	

George C. Jones and Robert M. Jones have organized the George C. Jones & Co., located at 505 Stambaugh Building, Youngstown, Ohio, dealers in refractories, ferroalloys, coal and coke. For the past 10 years George C. Jones was assistant superintendent of blast furnaces and the open-hearth department of the Youngstown Sheet & Tube Co. Robert M. Jones was a traveling salesman for the Republic Iron & Steel Co. out of its Philadelphia branch for the past two and one-half years.

Boston

BOSTON, Jan. 31.

Pig Iron.—The Eastern Malleable Iron Co., Naugatuck, Conn., in connection with the New Jersey-New York vehicular tunnel segment requirements, is asking bids on 25,000 to 50,000 tons of iron, silicon 1.50 to 2.00, equal 1922 monthly or equal 1922-1923 monthly deliveries. The Gurney Heater Co., Framingham, Mass., and Saco Lowell Shops, Boston, inquiries remain open. A Providence, R. I., foundry wants 100 tons No. 2X first quarter or 300 tons second quarter iron. No other inquiries of importance have developed. A local stove maker this week bought 300 tons No. 2X Buffalo first quarter iron at \$18.50 furnace, and a Connecticut foundry 400 tons No. 2X eastern Pennsylvania first quarter at about \$24.50 delivered. Other sales reported concern car lots of eastern Pennsylvania at \$19.50 to \$20 furnace, Buffalo at \$19 to \$19.50 furnace, and Alabama at \$16 to \$17 furnace. One car Alabama, silicon 2.75 to 3.25, sold locally at \$24.67 dock, the water rate being \$7.67, in competition with eastern Pennsylvania and Buffalo. The Essex furnace, Port Henry, N. Y., will go out of blast when orders on books are filled unless pig iron prices advance before then. Buffalo pig iron costs \$20.60 to more than \$21 a ton to produce. On this basis losses ranging 70c. per ton and higher are taken on every ton sold in this territory, yet iron, any silicon, is offered as low as \$18.50. Eastern Pennsylvania furnaces selling at \$19.50 to \$20 furnace base also are taking losses in this territory. One round tonnage No. 2X eastern Pennsylvania iron sold recently to Worcester, Mass., interests at \$18.75 furnace, but that price cannot be applied to-day.

We quote delivered at common New England points as follows, having added to furnace prices \$4.06 freight from eastern Pennsylvania, \$5.46 from Buffalo, \$6.58 from Virginia and \$10.66 from Alabama:

East. Penn., silicon 2.25 to 2.75	...	\$24.06 to \$25.06
East. Penn., silicon 1.75 to 2.25	...	23.56 to 24.56
Buffalo, silicon 2.25 to 2.75	...	23.96 to 25.46
Buffalo, silicon 1.75 to 2.25	...	23.96 to 24.96
Virginia, silicon 2.25 to 2.75	...	29.08 to 29.58
Virginia, silicon 1.75 to 2.25	...	28.58 to 29.08
Alabama, silicon 2.25 to 2.75	...	27.16 to 28.16
Alabama, silicon 1.75 to 2.25	...	26.66 to 27.66

Finished Material.—The New England Structural Co., Boston, is awarded 600 tons structural steel for a local Kresge building and 400 tons for an Everett, Mass., high school. Bids open this week on 150 tons for a Winter St., Boston job. Few bridge jobs involving 100 tons or more give indication of coming up within the next month or two, but office buildings, etc., tonnages of some importance are in the making. Mill representatives report three to five times more business booked in January than in December. Business is still far below normal, however. Individual orders involve small tonnages, mostly from manufacturers. Some buying by jobbers and structural steel firms for filling in stock purposes is noted. Steel bars recently sold in this territory at as low as 1.40c., Pittsburgh base, but business closed this week at 1.45c. and 1.50c.

Jobbers now quote: Soft steel bars, \$2.55½ per 100 lb. base; flats, \$3.05½; concrete bars, stock lengths, \$2.55½; structural angles and beams, \$2.65½; plates, \$2.65½ to \$2.85; tire steel, \$3.85 to \$4.25; open hearth spring steel, \$4.50; crucible spring steel, \$11.50; bands, \$3.15½ to \$3.53; hoop steel, \$8.15½; cold rolled steel, \$3.40 to \$3.90; toe calk steel, \$8; refined iron, \$2.55½ per 100 lb. base; best refined iron, \$4.25; Wayne iron, \$5.50; Norway iron, \$5.50; No. 10 blue annealed sheets, \$3.48 per 100 lb. base; No. 28 black sheets, \$4.50; No. 28 galvanized sheets, \$5.50.

Cast Iron Pipe.—The market on cast iron pipe is firmer than it has been before in months. Manufacturers are still quoting as heretofore, namely f. o. b. Boston and district, 3-in. at \$66.70; 4-in. at \$56.70; 6-in. and larger \$50.70, with \$4 differentials on class A and gas pipe. But they are adhering strictly to schedule prices on all sizes, whereas heretofore some wavering was noted on large tonnages. The Warren Foundry & Machine Co. has closed on 200 tons 6-in. to 12-in. pipe for Watertown, Mass., and 125 tons, same sizes, for Somerville, Mass. Bids were opened late yesterday afternoon by Portland, Me., on approximately 2300 tons 6-in. to 30-in. pipe and fittings, and an option on 1200 tons 10-in. and 12-in. pipe for de-

livery up to and including May datings. An award will probably be made this week. The Boston Elevated Railway Co. has purchased 50 tons 6-in. pipe. The firmer undertone of the market is based on the large amount of business already on the books of the manufacturers, as well as indications of a new high turnover record being hung up in 1922.

Warehouse Business.—From warehouse cold-rolled steel has been reduced 15c. per 100 lb., rounds from \$3.55 to \$3.40, and squares, flats and hexagons from \$4.05 to \$3.55. Otherwise prices remain as heretofore. The demand for iron and steel continues to expand, but very slowly. Quotations on wire nails still take a range, from \$3.50 to \$3.75 per keg base, but those on other kinds are more uniform. Competition for cap, set and machine screw business is keen, with quotations in favor of the buyer. Sheet zinc has declined another 1c. a lb. to 9½c. per lb. base, in large lots.

Old Material.—The market has grown inactive again. A Worcester, Mass., foundry this week bought No. 1 machinery cast at \$17.92 per gross ton delivered. The tonnage involved is small, however, and does not represent the real market. The available supply apparently is in the hands of one firm that refuses to sell at any such price. The narrow spread between pig iron and machinery cast prices limits New England foundry consumption of the latter. Pennsylvania mills, chemical works and a New Jersey manufacturer of a patented flooring are buyers of cast iron borings, which are firmer due to their scarcity. Parksburg Iron Co. buying of skeleton is reported as completed, and the American Steel & Wire Co., Worcester, apparently has covered heavy melting steel requirements. Pennsylvania mills bid \$12 delivered for heavy melting steel. The freight is \$4.90, leaving \$7.10 f. o. b. New England shipping point, easily \$1 less than the lowest price reported by any dealer.

The following prices are for gross ton lots delivered consuming points:

No. 1 machinery cast	...	\$18.00 to \$18.50
No. 2 machinery cast	...	16.00 to 16.50
Stove plate	...	15.00
Railroad malleable	...	13.00 to 13.50

The following prices are offered per gross ton lots f.o.b. Boston rate shipping points:

No. 1 heavy melting steel	...	\$8.00 to \$9.00
No. 1 railroad wrought	...	10.50 to 11.00
No. 1 yard wrought	...	9.50 to 10.00
Wrought pipe (4-in. in diam., over 3 ft. long)	...	7.00 to 7.25
Machine shop turnings	...	3.25 to 3.50
Cast iron borings, rolling mill	...	7.25 to 7.50
Cast iron borings, chemical	...	8.25 to 8.50
Blast furnace borings and turnings	...	3.50 to 3.75
Forged scrap and bundled skeleton	...	4.50 to 5.00
Street car axles and shafting	...	10.50 to 11.00
Car wheels	...	11.50 to 12.00
Revolving rails	...	10.00 to 10.50

Buffalo

BUFFALO, Jan. 31.

Pig Iron.—Four furnaces are quoting \$19.50 base. One maker is not deviating from the policy not to sell under present conditions and is using the output of one furnace in blast for its own needs in other departments and supplying subsidiaries. The weaker market has not brought out business. One producer sold 1000 tons of foundry iron and another 5000 tons. Malleable is offered at \$19.50, but very little has been placed. The furnace banked by the Donner Steel Co., several weeks ago has not been placed in blast and basic iron requirements in the steel making division of the plant will determine the date of re-opening.

We quote f.o.b. per gross ton Buffalo as follows:

No. 1 foundry, 2.75 to 3.25 sil.	...	\$20.00 to \$20.50
No. 2X foundry, 2.25 to 2.75 sil.	...	19.50 to 20.00
No. 2 plain, 1.75 to 2.25 sil.	...	19.00 to 19.50
Basic	...	18.25 to 18.50
Malleable	...	19.50
Lake Superior charcoal	...	31.75

Finished Iron and Steel.—Products which have not been in great demand in several months are being inquired for; bar and shape inquiry with one agency shows much improvement. Inquiry for the purpose of inventory computation is still coming in. Pipe and nail business has dropped off. Tin plate is steady and the demand is stable. A sheet buyer just outside Buffalo is asking prices on 500 tons of black sheets

and another inquiry is for 200 tons of black sheets. A Buffalo agency has sold 100 tons of corrugated sheets. The 1.45c. price on bars is more frequently heard and as low as 1.42½c. was quoted on an ordinary inquiry. Structural demand is poor; the only proposition of any magnitude now in prospect is the Niagara River bridge at Buffalo, but figures have not been asked, authority for the enterprise just having been granted.

Warehouse Business.—An improved demand in plates growing out of car work—both new and repair jobs—is evident the latter part of January. Other materials are quiet but sales organizations see prospective improvement in all lines in February.

We quote warehouse prices f.o.b. Buffalo as follows: Structural shapes, 2.65c.; plates, 2.65c.; plates, No. 8 gage, 3.35c.; soft steel bars and shapes, 2.55c.; hoops and bands, 3.15c.; blue annealed sheets, No. 10, 3.40c.; galvanized steel sheets, No. 28, 5.25c.; black sheets, No. 28, 4.25c.; cold-rolled strip steel, 5.90c.; cold-rolled round shafting, 3.40c.

Coke.—A prospective coal strike has served to cause improvement in the volume of inquiry. Best grades are freely quoted at \$4 ovens.

Old Material.—A price of \$14 on heavy melting steel is virtually in existence because of the failure of several dealers to release tonnages at \$13.50. One mill is in the market for any tonnage, but up to date has declined to pay more than \$13.50. Reports are current that the Steel Corporation is in the market for a considerable tonnage of steel, but dealers have not been approached here.

We quote dealers' asking prices per gross ton f.o.b. Buffalo as follows:

Heavy melting steel	\$13.00 to \$14.00
Low phos., 0.04 and under	17.00 to 18.00
No. 1 railroad wrought	15.00 to 16.00
Car wheels	16.50 to 17.50
Machine shop turnings	7.50 to 8.00
Cast iron borings	7.00 to 8.00
Heavy axle turnings	10.50 to 11.50
Grate bars	12.00 to 13.00
No. 1 busheling	10.00 to 11.00
Stove plate	15.00 to 16.00
Bundled sheet stampings	8.00 to 9.00
No. 1 machinery cast	17.00 to 18.00
Hydraulic compressed	10.50 to 11.50
Railroad malleable	13.00 to 14.00

St. Louis

St. LOUIS, Jan. 31.

Pig Iron.—Buying of pig iron is still largely confined to carloads, of which there was a fairly good run during the last week. These orders are almost entirely for immediate shipment, with requests to trace through. While melters are short of stocks, they are buying only for immediate needs to fill such orders for their products as may be in hand. For the first time since the World War, Southern iron is offered in this market at a lower price than the Northern product. Offerings are being made of Southern iron by a large producer at the equivalent of \$15.20 Birmingham, or \$20.94 St. Louis. Northern iron at \$19 Chicago plus \$2.72½ freight would cost \$21.72½ here. But the lower price of Southern iron as made by this concern, which has a freight differential of 80c. a ton over producers in Birmingham proper, is not being met by other producers. Nor is the lower price having the effect of producing any business. Some concerns are selling Northern iron on a basis of \$20, Chicago, and Inland is out of the market for January and February. The Eighth Federal Reserve Bank gives widely varying reports from stove manufacturers, showing decreases of as much as 50 per cent to slight increases as compared with December a year ago. Farm implement manufacturers and distributors show heavy decreases from December, 1920, but fair gains over November. Radiator plants are working full time, and report to the bank a continued brisk demand for their products.

We quote delivered consumers' yards, St. Louis, as follows, having added to furnace prices \$2.88 freight and war tax from Chicago and \$5.91 from Birmingham:

Northern foundry, sil. 1.75 to 2.25	\$21.725
Northern malleable, sil. 1.75 to 2.25	21.725
Basic	21.725
Southern foundry, sil. 1.75 to 2.25	21.74

Finished Iron and Steel.—While no tonnage of consequence is being purchased in any particular quarter, a fair amount of small orders is being placed for pipe use in the oil fields of Oklahoma and at Meria,

Tex. The structural demand is small here because of the failure of the union workers and employers and the building trades to get together. Bids will soon be opened on the Catholic orphanage at Alton, involving 200 to 300 tons of reinforcing bars, and the Jewish Hospital at Memphis, 125 tons of bars. New bids are to be asked on the auditorium and market house at Memphis, which likely will include revised plans, as previous bids were rejected because they exceeded the amount of the bond issue. The original plans called for 2500 tons of structural shapes and 500 tons of bars. Some wire nails are being sold, but the market price of \$2.50 Pittsburgh has failed to get the business. Railroad buying let up during the week, and no inquiries were issued.

For stock out of warehouse we quote: Soft steel bars, 2.62½c. per lb.; iron bars, 2.62½c.; structural shapes, 2.72½c.; tank plates, 2.72½c.; No. 10 blue annealed sheets, 3.47½c.; No. 28 black sheets, cold rolled, one pass, 4.15c.; cold drawn rounds, shafting and screw stock, 3.65c.; structural rivets, \$3.52½ per 100 lb.; boiler rivets, \$3.62½; tank rivets 7/16 in. and smaller, 65 and 5 per cent off list; machine bolts, large, 60-10 per cent; small, 60, 10 and 10 per cent; carriage bolts, large, 55-5 per cent; small, 60 and 10 per cent; lag screws, 65-15 per cent; hot pressed nuts, square or hexagon blank, \$4; and tapped, \$3.75 off list.

Coke.—Sales of foundry coke are being made almost entirely on a carload basis. Consumers are still buying for immediate needs and for quick shipment. There is more of a tendency among producers to sell for no later delivery than March, and a few are making no quotations beyond February delivery, indicating their confidence in the market. There is a better demand for domestic coke because of colder weather.

Old Material.—The market for old material is materially weaker and prices have been marked down from 50c. to \$1 a ton on most grades. One of the large consumers last week took on a tonnage of heavy melting steel and is now out of the market. Other buyers of steel and rolling mill grades in the St. Louis district are absolutely out of the market, and cannot be tempted to purchase even a small tonnage except at bargain prices. Yard dealers are loaded down with material and are unable to stock additional tonnages. So they are compelled to dispose of old material being daily received from the railroads at a severe loss. Current railroad offerings include: Missouri, Kansas & Texas Railway, 1750 tons; Louisville & Nashville, 2500 tons; Pennsylvania System, Northwest region, 750 tons, and an open list issued by the Cleveland, Cincinnati, Chicago & St. Louis (Big Four).

We quote dealers' prices f.o.b. consumers' works, St. Louis industrial district and dealers' yards, as follows:

Per Gross Ton	
Old iron rails	\$14.00 to \$14.50
Steel rails, rerolling	10.50 to 11.00
Steel rails, less than 3 ft.	12.50 to 13.00
Relaying rails, standard section	23.00 to 28.00
Cast iron car wheels	13.50 to 14.00
No. 1 heavy railroad melting steel	10.00 to 10.50
No. 1 heavy shoveling steel	9.75 to 10.00
Ordinary shoveling steel	9.50 to 10.00
Frogs, switches and guards, cut apart	10.00 to 10.50
Ordinary bundle sheet	4.00 to 4.50
Cast steel bolsters	9.50 to 10.00

Per Net Ton	
Heavy axles and tire turnings	6.00 to 6.50
Iron angle bars	13.00 to 13.50
Steel angle bars	9.00 to 9.50
Iron car axles	18.00 to 18.50
Steel car axles	12.50 to 13.00
Wrought iron arch bars and transoms	15.00 to 15.50
No. 1 railroad wrought	9.50 to 10.00
No. 2 railroad wrought	8.50 to 9.00
Railroad springs	10.00 to 10.50
Steel couplers and knuckles	10.00 to 10.50
Locomotive tires, 42 in. and over, smooth inside	8.00 to 8.50
No. 1 dealer's forge	8.00 to 8.50
Cast iron borings	5.50 to 6.00
No. 1 busheling	8.50 to 9.00
No. 1 boilers cut in sheets and rings	6.00 to 6.50
No. 1 railroad cast	12.00 to 12.50
Stove plate and light cast	11.00 to 11.50
Railroad malleable	8.50 to 9.00
Agricultural malleable	9.00 to 9.50
Pipes and flues	7.50 to 8.00
Heavy railroad sheet and tank	5.50 to 6.00
Light railroad sheet	3.50 to 4.00
Railroad grate bars	9.50 to 10.00
Machine shop turnings	3.00 to 3.50
Country mixed iron	5.00 to 5.50
Uncut railroad mixed	7.00 to 7.50
Horseshoes	9.50 to 10.00
Railroad brake shoes	9.50 to 10.00

Pierce, Butler & Pierce Mfg. Corporation, maker of radiators and heating apparatus, is erecting a new cupola building and installing a new cupola and blower at its Huntingdon, Pa., plant.

Philadelphia

PHILADELPHIA, Jan. 31.

All steel products, with the possible exception of sheets, continue to show weakness in price. Plates are conspicuously weak and 1.40c., Pittsburgh, has become a common quotation on desirable tonnages. Shapes and bars are obtainable at 1.45c., while concrete bars have dropped below this figure. The \$4.75 price per base box on tin plate is no longer the market, as sales are being freely made at \$4.60, while as low as \$4.50 has been quoted. Wire nails are weak at \$2.50 and shading of \$1 to \$2 per keg has been freely reported. On export inquiries, prices considerably below the domestic level have been quoted. For example, on 10,000 tons of open-hearth rerolling billets for England \$25.50, Pittsburgh, was quoted, while on a few hundred tons of bars 1.30c., Pittsburgh, was named by a leading maker. Foundry pig iron prices continue firm, though a concession has been made on basic in a recent sale of 1000 tons.

Slowness of business to improve is generally attributed to uncertainty as to the freight rate decision. Few gains in production have been made in January. Eastern mills, in which plate rolling capacity is a large factor, are apparently no better off than they were at the beginning of the month.

Pig Iron.—Several large consumers are apparently making every effort to buy foundry iron at prices lower than furnaces in this district appear willing to quote. The furnaces are adhering rigidly to \$20, furnace, for No. 2 plain and \$20.50 for No. 2X. Three New England consumers whose inquiries aggregate 5000 tons have delayed buying for more than a week. Two New Jersey heater manufacturers have each inquired for 5000 tons. In one case second quarter delivery is specified and in the other, half is wanted in second quarter and the other half in third quarter. In the immediate Philadelphia territory there are few inquiries and none exceeding 300 tons. Several Eastern furnaces have given protective bids to foundries which are figuring on the cast iron segments for the New York-New Jersey vehicular tunnel. A method of overcoming the objection which has been raised to deliveries extending over two or three years is to bid on the iron for delivery within six months, the foundry to carry the iron in storage at its own expense or by obtaining bank credit over the remaining period of consumption. Two large steel interests which have iron foundries are said to be in an ideal position to cast the segments economically. In one instance the foundry of a subsidiary shipbuilding company would be utilized, while in the other plant pig iron would be available without cost of transportation, thus eliminating a cost item which may make a low bid possible. There is little interest in steel-making iron. A sale of 1000 tons of basic at \$19.84, delivered, is about 40c. a ton below the last reported transaction. A few hundred tons of copper bearing low phosphorus iron were sold last week at \$28, furnace. The high cost of making iron and the unsatisfactory condition of the market have caused the Thomas Iron Co. to blow out its Hellertown furnace, while for similar reasons Witherbee, Sherman & Co. are putting out their stack at Port Henry, N. Y. The Thomas Iron Co. still has the Alburts furnace in blast, but this may go out in a few weeks unless conditions improve materially. The Brooke furnace has changed from foundry iron to basic.

The following quotations are, with the exception of those on low phosphorus iron, for delivery at Philadelphia, and include freight rates varying from 84 cents to \$1.54 per gross ton:

East Pa. No. 2 plain, 1.75 to 2.25 sil.	\$20.84 to \$21.26
East Pa. No. 2X, 2.25 to 2.75 sil.	21.34 to 21.76
Virginia No. 2 plain, 1.75 to 2.25 sil.	27.24 to 27.74
Virginia No. 2X, 2.25 to 2.75 sil.	27.74 to 28.24
Basic delivery eastern Pa.	19.84
Gray forge	20.50 to 21.50
Malleable	23.00 to 24.00
Standard low phos. (f.o.b. furnace)	30.00
Copper bearing low phos. (f.o.b. furnace)	28.00

Billets.—Philadelphia exporters have quoted on two lots of billets for England, one of 10,000 tons and another of 2000 tons. Sheet bars are also wanted by England, but it is not certain that any of this business will come to the United States. Domestic demand for

rerolling billets is light, but the demand for foreign quality is slightly improved. Prices range from \$28 to \$29 on rerolling and \$32 to \$33 on forging, f.o.b. Pittsburgh. On export inquiry \$25.50, Pittsburgh, has been quoted for rerolling billets.

Ferroalloys.—There is little demand for ferromanganese, which is still quoted by all interests at \$58.50 seaboard. Spiegeleisen is held at \$25 to \$27, furnace.

Plates.—Plates continue the most unsatisfactory of any of the steel products as to both demand and prices. It now appears easy to obtain quotations of 1.40c., Pittsburgh, on attractive lots, while 1.45c. is the ruling quotation on smaller lots. Most buyers do not seem interested in the 1.50c. quotation still adhered to by some mills, though some business is being booked at this price. An Eastern shipbuilding company bought about 200 tons of plates at 1.40c., Pittsburgh, while another shipbuilding company, which is figuring on tunnel shields for the New York-New Jersey vehicular tube, is reported to have received protection at 1.40c., Pittsburgh, on 10,000 tons. The Pusey & Jones shipyard at Wilmington will build two passenger boats for the Old Dominion Line, which will require a small tonnage of plates, shapes and bars, and the Sun Shipbuilding Co., Chester, is expected to build five barges for the Erie Canal. Bids are being taken on a number of other ships, but there is nothing definite yet as to whether the work will go ahead. Eastern mills have made no appreciable gain in operations in January. Chief sources of business are fabricators of oil tanks and marine boilers, while some orders, notably one of 100 tons, are being received from railroads for car repair work. We quote plates at 1.40c. to 1.50c., Pittsburgh.

Structural Material.—A gain in bookings of structural shapes is noted by some mills, but very little business is developing in the immediate Philadelphia district. Plain material is obtainable from 1.45c. to 1.50c., Pittsburgh. On especially attractive tonnage, the lower figure has been shaded.

Bars.—No marked improvement in the demand for steel bars is noted, though jobbers are buying a bit more freely. Eastern mills have quoted on 1700 tons for a pier at Seattle, Wash., and about 2000 tons will be required for a hardware warehouse at Louisville, Ky. Bar iron makers quote 1.45c., Pittsburgh, but this is frequently shaded to 1.40c.

Sheets.—For Eastern shipment, Youngstown mills are frequently quoting f.o.b. Youngstown instead of Pittsburgh. Otherwise sheet prices appear to be firm at 2.25c. for blue annealed, 3c. for black and 4c. for galvanized, Pittsburgh.

Rivets.—The Merchant Shipbuilding Co., Chester, is inquiring for 500 tons of special quality rivets for fabricating pipe for the New York aqueduct.

Warehouse Business.—Prices are unchanged, and for Philadelphia delivery are as follows:

Soft steel bars and small shapes, 2.50c.; iron bars (except bands), 2.50c.; round edge iron, 2.80c.; round edge steel, iron finish, 1½ x ½ in., 2.95c.; round edge steel planished, 3.70c.; tank steel plates, ¼-in. and heavier, 2.75c.; tank steel plates, 3/16-in., 2.92c.; blue annealed steel sheets, No. 10 gage, 3.50c.; light black sheets, No. 28 gage, 4c.; galvanized sheets, No. 28 gage, 5c.; square twisted and deformed steel bars, 2.65c.; structural shapes, 2.60c.; diamond pattern plates, ¼-in., 4.60c.; 3/16-in., 4.785c.; ½-in., 4.90c.; spring steel, 4.10c.; round cold-rolled steel, 3.25c.; squares and hexagons, cold-rolled steel, 3.75c.; steel hoops, No. 13 gage and lighter, 3.25c.; steel bands, No. 12 gage to 3/16-in., inclusive, 3.10c.; iron bands, 3.90c.; rails, 2.75c.; tool steel, 8c.; Norway iron 6c.; toe steel, 4.50c.

Coke.—Furnace coke prices stiffened somewhat today, and it is now difficult to buy either for prompt shipment or on contract at less than \$3.25, Connellsville. Foundry coke is quoted from \$4 to \$4.50, ovens, according to quality.

Old Material.—The Alan Wood, Iron & Steel Co. last week bought 2500 tons of steel from a New York dealer at \$12.50, delivered. A Delaware steel maker is offering \$12. Another Eastern mill has paid \$12.50 at its plant. A steel company has sold 1000 tons of low phosphorus plate scrap at \$17.50, f.o.b. its mill. The United States Shipping Board will take bids up to noon on Feb. 15 on 105,000 tons of steel at the Hog Island shipyard. This material was bid on before but

was considered solely as scrap and the bids were rejected. We quote various grades of old material for delivery at consumers' works in this district as follows:

No. 1 heavy melting steel.....	\$12.00 to \$12.50
Scrap rail.....	12.00 to 12.50
Steel rails, re-rolling.....	15.00 to 15.50
No. 1 low phos., heavy 0.04 and under.....	18.00 to 19.00
Car wheels.....	16.50 to 17.00
No. 1 railroad wrought.....	14.50 to 15.00
No. 1 yard wrought.....	12.00 to 12.50
No. 1 forge fire.....	10.00 to 10.50
Huddled sheets (for steel works).....	9.50 to 10.00
No. 1 busheling.....	11.00 to 12.00
No. 2 busheling.....	9.00 to 10.00
Turnings (short shoveling grade for blast furnace use).....	9.25 to 10.25
Mixed borings and turnings (for blast furnace use).....	9.25 to 10.25
Machine-shop turnings (for rolling mill and steel works use).....	9.00 to 9.50
Heavy axle turnings (or equivalent).....	9.50 to 10.00
Cast borings (for steel works and rolling mills).....	12.00 to 12.50
Cast borings (for chemical plants).....	13.50 to 14.00
No. 1 cast.....	16.50 to 17.00
Railroad grate bars.....	11.00 to 11.50
Stove plate (for steel plant use).....	14.00 to 14.50
Railroad malleable.....	13.00 to 14.00
Wrought iron and soft steel pipes and tubes (new specifications).....	12.00 to 12.50
Iron car axle.....	No market
Steel car axle.....	17.00 to 18.00

Birmingham

BIRMINGHAM, ALA., Jan. 31.

Pig Iron.—Iron makers of Birmingham express conviction that the market is stronger than it has been in some time. Surface indications point that way. If Sheffield iron is quoted under Birmingham iron the 40c. to 80c. freight differential in favor of Sheffield must be considered. It is a district to itself. One Sloss-Sheffield stack is in operation there. The base at Birmingham is \$16. Among transactions of the week were two 500-ton lots for Southern consumption and one of 500 to 700 tons for the Pacific Coast. These went at \$16. Pacific Coast business is helped by low rates via ship out of Mobile. Bookings were more widely scattered over competitive territory than in many weeks. Two lots went to northern Michigan, one to a northern Ohio stove maker, several others into Illinois and Ohio. The Pacific Coast took two car lots besides the 500 to 700-ton lot. A lot of 750 tons leaves Mobile for Pacific Coast this week and a similar amount has been booked for February sailing. Texas took several lots and the Carolinas were again in the market. The leading interest is credited with having booked 10,000 tons for the leading pipe interest some time ago. Total business for the week seems to have been about 6,000 tons. The Woodward Iron Co. banked a stack about Jan. 20, but it is to resume this week. The company has been operating three merchant stacks several months. Steel and iron men attending the commission hearings in Washington held conferences while there with executives of Southern railroad systems regarding freight rates and report a very receptive mood on part of the executives with reference to some initiative on their part to reduce rates so as to enable Birmingham iron to get further afield and give the makers business.

We quote per gross ton f.o.b. Birmingham district furnaces as follows:

Foundry, silicon 1.75 to 2.25.....	\$16.00
Basic.....	15.00
Charcoal, warm blast.....	32.00

Cast Iron Pipe.—High pressure base remains at \$33 with quotations up and down. The base of standard sanitary is at \$37, extra heavy \$28. The Pacific Coast took a total of 7000 to 8000 tons, half and half, of high pressure and sanitary pipe in January, and 12,000 to 15,000 tons of same, two-thirds high pressure and one-third sanitary, in December, a total of approximately 20,000 tons in the two months. At least three makers of each class of pipe participated. The United States Cast Iron Pipe Foundry Co. has begun the installation of five De Lavaud centrifugal pipe casting machines in the North Birmingham plant.

Coal and Coke.—Coke has weakened to a base of \$5 to \$5.25. The Federal coal terminal at Mobile will be in operation next month. It has a capacity of

40,000 tons and is alongside the Federal fuel oil stations.

Finishing Mills.—The Tennessee company went to 66 2-3 per cent capacity in its open hearth department this week, operating six instead of five furnaces. Rail mill, car works and tie-plate plants are in continuous operation at normal. The Gulf States Steel Co. closed its open-hearth department, but has steel on hand for finishing mills. The blast furnace is to resume soon to replenish depleted iron stocks. Operations are around 60 per cent.

Old Material.—Scrap dealers are buying from one another. There is no other business. Reduced freight rates can alone enable other than district business.

We quote per gross ton f.o.b. Birmingham district yards as follows:

Steel rails.....	\$11.00 to \$12.00
No. 1 steel.....	10.00 to 11.00
No. 1 cast.....	14.00 to 15.00
Car wheels.....	13.00 to 14.00
Tramcar wheels.....	12.00 to 13.00
No. 1 wrought.....	12.00 to 13.00
Stove plate.....	11.00 to 12.00
Cast iron borings.....	6.00 to 7.00
Machine shop turnings.....	6.00 to 7.00

San Francisco

SAN FRANCISCO, Jan. 25.

Pig Iron.—The time has not yet come to report a recovery of buying in pig iron in the San Francisco market. Practically no new business of any note has been done since the first of the year, and the largest handlers apparently have nothing better than a small-lot routine turn-over. Foundry activity shows no perceptible improvement, although there is more confidence in the future. It is understood there is an inquiry for about 200 tons of iron here, and both Los Angeles and Tacoma are said to be in the market for 500 tons. Just recently the Conference rates from Gulf points to San Francisco were lowered from \$10.10 a short ton to \$8.36½, which will tend to reduce the differential between foreign materials and domestic. There has been no noticeable change in the price of pig iron, although probably there is a softening tendency.

Cast Iron Pipe.—Business has been better in pipe during the past week or two. Demand shows improvement both from municipal and private sources, it being said that one large fabricator has around 1000 tons from the latter. Portland receives bids on Jan. 30 for 2000 tons of 4 to 12-in. pipe. Santa Cruz, Cal., is in the market for 109 tons of 8-in. pipe and fittings, and Seal Beach is letting a contract on Jan. 26 for 230 tons of 4, 6, 8-in. pipe. It is reported that Schofield Barracks, Honolulu, will require 5 miles of 24 and 18-in. pipe. Bids are to open on March 9. Prices are in the neighborhood of \$31 base, and some are expecting an advance shortly.

Finished Iron and Steel.—Interest at present is centering on one project, the Harbor Commission's Islas Creek warehouse. The Healy-Tibbets Construction Co., San Francisco, has been appointed manager of general construction, but the contract for 800 tons of bars for the substructure has not yet been placed. It is this which is providing the interest. Competition among the local mills is very keen, perhaps because it is the only sizable prospect in view. During the past fortnight, improvement in demand has failed to materialize perceptibly. There is a little better feeling, but it has hardly taken definite form yet. A little export business is reported being done, and some replacement buying is keeping a semblance of life in the situation. As far as can be ascertained, prices are about steady, although slightly variant figures are occasionally heard.

Coke.—Business has been fair in this commodity of late. The Southern Pacific Co. placed 600 tons at a very low figure, and also has taken 500 tons of smelting coke for its West Oakland shops. More consignments of foreign material have arrived, totaling approximately 1100 tons. Inquiries are picking up, and buyers seem a little more disposed to take supplies, even though small. As in the case of pig iron, activity is checked by the prevailingly quiet demand

the British products. Two other lots, comprising 300 long tons and 550 long tons, are said to be en route to this port. The market price is around \$21, ex ship, San Francisco.

Old Material.—This is a routine market only. Movement is confined to the small daily needs of consumers, as foundries are operating in a very limited way. It is reported that there are only two open-

hearth furnaces operating in California at present, and rolling mills are on a hand-to-mouth basis. Perhaps the most interesting feature of the scrap situation is the offering of between 15,000 and 20,000 tons of railroad scrap of various grades, being placed on the market by the Southern Pacific Co. No disposition has yet been made. Prices on the regular scrap offerings are nominal at about the same levels.

THE ECONOMIC SITUATION

What the Individual Is Called On to Consider to Bring About Improvement

BY CHARLES A. CARPENTER*

If we assume that export trade cannot be expanded to give work to our unemployed, we must seek a domestic solution. It has been stated that unemployment is a local issue for our cities to settle individually. This is a grave mistake. If through war forces, population has shifted from one center to another, it should be evident that in a return to peaceful pursuits as great a shift is necessary. The securing of labor for war purposes was not a local issue and so the returning of ex-soldiers and munitions workers to peace time activities becomes the nation's problem.

Undoubtedly economic forces are working this out. As our excessive potential production capacity in any industry is unable to operate, labor drawn to that industry is compelled to seek other means of earning a living. Capital so invested may be dissipated or diverted. Out of a tangle of unemployed and business failures, we are slowly righting ourselves. Why shouldn't national aid be given to these forces? Why try to prolong the agony by ill advised legislation? We assuredly have men in the United States capable of directing the public thought in channels which would show many people the futility of sitting idly by waiting for some miraculous boom to help them out. Our ancestors hewed their way as pioneers and lived happily. We still have land unworked which will support many people.

We can hasten competition in industries seeking too great profit. We can deflate industries which are over-extended by tightening credit. We can frankly face the facts and bring true prosperity back right among ourselves. Then we can charitably aid other peoples solve their ills. When our labor and capital are redistributed in peaceful pursuits, we can size up the foreign situation and by admitting more imports through tariff adjustment, prevent over-expansion here. It is not too much to believe that the United States faces a great era of prosperity, provided selfish forces are curbed and wise leaders secured at this time.

Righting the Dislocation

Facing our present business pause and the lowered buying power due to reduced incomes, let us strive to find the least painful way out. Under current circumstances, business which is normal and essential for the country is suffering through causes beyond its control. The speculative ventures unfortunately do not get all the grief. The former are entitled to help—the latter should face the stern law of the survival of the fittest.

Candid publication of potential capacity, basic demand and present stocks on hand in various industries would turn the spotlight on the overcrowded lines.

War requires a great shifting of wealth and labor to fields which we hope are very temporary. In fact, they must be such, as war causes a reduction in our real wealth as a nation. Following a war this mis-directed capital and labor must be diverted back to normal. An orgy of extravagance cannot be called normal, as its effects in the final analysis are about the same as war.

We surely wish to progress in civilization. Our people should get proper food, clothing, sanitation, protection of life and property and some enjoyment. Is

Under, Forging Co., Verona, Pa.

it not possible to reawaken the pioneer spirit of old and get each and every one of us to resolve here and now to look to the finer things for true happiness? Let us create a demand for healthy life, the home, reasonable comfort and peace of mind, induced by having a little reserve for unusual conditions. Why not get away from the idea that wasting the efforts of mankind is generosity? Why not see that the waster, rich or poor, is tempting capital and labor into dangerous temporary fields and, therefore, it is against the best interests of the nation to encourage the profligate spender, whose trade is good when he has the money and who stops buying when he is "broke."

The world, as constituted to-day, furnishes mankind with a great abundance of things, making life worth while. There should be no danger of a shortage of necessities and there is ample opportunity for much luxury. As the individual progresses, it is only fair that additional comforts and pleasures should be obtained. The acquirement of these is the mainspring of human progress.

Consequently, the man of steady high income is within his ethical rights when he has a fine home, choice foods, good clothes, luxuries, etc. Provided he lives a life from year to year with similar demands, he is not causing wealth and labor to be misapplied. He has legitimately earned the right to some of nature's surplus, which the less successful or meritorious cannot have. It is also just that an individual who has not squandered his wealth should leave his surplus to others, so they may be given this earned share of the excess.

Time Alone the Cure

However, when an individual in times of exceptional prosperity for his particular enterprise or nation, recklessly spends his earnings, he is contributing to the dislocation of economic society. For a brief time he lives in luxury. When bad times come he has no reserve, his income is reduced and he ceases to buy. Reserve and surplus wealth have been dissipated, labor and capital induced to enter non-essential fields due to the lure of large profits, are left standing idle. Time alone can cure the trouble. Nature must be given a chance to re-establish her excess of good things.

Thus, in a general way we account for our periodic ups and downs. War is but an instance of abnormal waste. It would, therefore, seem reasonable to suppose that steady living within natural economic resources would prevent business depressions of the kind with which we are all familiar. We no doubt would still have ups and downs, as there is no guarantee from year to year that nature will always favor us, but the difference between good and bad times would be lessened materially.

Patriotism is as necessary now as it was during the war. The development of the old fashioned home, habits of thrift, and the will to work can be taught. Those who want too much can be curbed. A little altruism and leadership would soon bring us out of our present problem into a golden age of American history. When our acute problem is solved, desirable aliens, willing to be true Americans could be admitted to share our blessings, but we should keep out those who wish to exploit us, giving little or nothing in return. The United States should easily be the leading nation in the evolution of civilization following the world war and it is our duty to take our trust seriously so that the spirit of democracy successfully guiding this country in prosperity, shall be a beacon light to less fortunate peoples—leading them to a higher destiny in peaceful pursuits.

NON-FERROUS METALS

The Week's Prices

Cents Per Pound for Early Delivery
Copper, New York* Straits Lead Zinc

	Lake	Electro-lytic	Tin New York	New York	St. Louis	New York	St. Louis
Jan. 25.....	13.75	13.50	30.75	4.70	4.40	5.00	4.65
26.....	13.75	13.50	31.00	4.70	4.40	4.95	4.60
27.....	13.75	13.50	31.25	4.70	4.40	4.90	4.55
28.....	13.75	13.50		4.70	4.40	4.90	4.55
30.....	13.62½	13.37½	31.50	4.70	4.40	4.87½	4.52½
31.....	13.62½	13.37½	32.00	4.70	4.40	4.85	4.50

*Refinery quotation

New York

NEW YORK, Jan. 31

Copper and zinc are inactive and lower, while tin and lead have been bought fairly freely at steady prices.

Copper.—Despite the fact that large consumers bought heavily in the last quarter of last year and are specifying on contracts steadily each week, there has been enough inquiry from a few fairly large consumers, together with demand for small lots here and there, so that the temptation to sell on the part of some interests has been yielded to and the market for electrolytic copper is down to 13.62½c., delivered, or 13.37½c., refinery. At these levels some business has been done in quantities larger than small lots. Very little is heard of foreign demand, but it is understood that this is keeping up fairly well. Lake copper is slightly lower at 13.62½c., delivered.

Copper Averages.—The average price for Lake copper for the month of January, based on daily quotations in THE IRON AGE, is 13.81c. The average price of electrolytic copper is 13.55c., delivered or 13.30 c., refinery.

Tin.—Excepting last week Thursday, January 26, the market was dull and quiet, but on that day large sales of Straits tin were made, variously estimated at from 600 to 1000 tons. The latter figure is regarded by some as high because some sellers were buyers and others were not anxious to sell. The activity on the day referred to started in the morning with brisk inquiry which resulted in immediate business and by afternoon the market was in full swing and all reasonable offers were accepted. Dealers and importers were the principal buyers, but consumers were also among the purchasers. On the following day, Friday, the small advance in the London market was disappointing in view of the activity here the day before and the market turned dull and stagnant and has been so up to the present time. On Jan. 25 on the New York Metal Exchange 25 tons of Straits tin for May-June shipment was sold at 30.25c., and also 50 tons for delivery in 1922, at seller's option, was sold at 30c. To-day the market has been quiet and Straits tin is quoted at 32c., New York, while the London market advanced £2 per ton over yesterday's price, with spot standard quoted at £159 10s., future standard at £161 5s. and spot Straits at £161 10s., with the market active and strong. Interest centers in speculation as to deliveries into consumption in January, being variously estimated from 4000 to 4500 tons. Arrivals thus far this month have been 3910 tons, while the quantity afloat is reported at 6935 tons.

Lead.—Demand continues steady and prices are unchanged, with that of the leading interest at 4.70c., New York and St. Louis, and that of the independents at 4.40c., St. Louis and 4.70c. to 4.75c., New York and eastern points. In the opinion of one seller, if consumption continues at the present rate, scarcity of lead may develop unless production is increased.

Zinc.—This market continues lifeless and devoid of feature. Prices have declined almost daily and prime Western for early delivery is now quoted at 4.50c., St. Louis, or 4.85c., New York, a decline of 15 points in

the week. Sales are still confined to carload and 100-ton lots for immediate shipment, but these are by no means numerous.

Antimony.—Wholesale lots for early delivery are slightly easier at 4.40c. per lb., New York, duty paid.

Aluminum.—Virgin metal, 98 to 99 per cent pure, in wholesale lots for early delivery, continues to be quoted by the leading interest at 19c. to 19.10c. per lb. f. o. b. plant, depending on the quantity. Importers' metal of the same grade is obtainable at 17.50c. to 18.50c., New York, duty paid.

Old Metals.—Business is very quiet as a result of the discouraging conditions in the copper market. A few holders are inclined to lower prices while the others have faith in the ultimate rise in copper. Dealers' selling prices are as follows:

	Cents Per Lb.
Copper, heavy and crucible.....	13.00
Copper, heavy and wire.....	12.25
Copper, light and bottoms.....	9.75
Heavy machine composition.....	10.25
Brass, heavy.....	8.00
Brass, light.....	6.00
No. 1 red brass or composition turnings.....	8.25
No. 1 yellow rod brass turnings.....	6.25
Lead, heavy.....	4.25
Lead, tea.....	3.25
Zinc.....	3.00

Chicago

JAN. 31.—Efforts to sell in a reluctant market have resulted in further price declines in copper and zinc. Tin, however, has advanced. No changes in old metal prices are reported. We quote in carload lots: Lake copper, 18.50c.; tin, 33c.; lead, 4.50c.; spelter, 4.60c.; antimony, 6.50c., in less than carload lots. On old metals we quote: Copper wire, crucible shapes and copper clips, 10c.; copper bottoms, 7.50c.; red brass, 7.50c.; yellow brass, 5.75c.; lead pipe, 3.25c.; zinc, 2c.; pewter, No. 1, 22c.; tin foil, 23c.; block tin, 25c.; all buying prices for less than carload lots.

St. Louis

Jan. 31.—Lead for the week was slightly lower, while slab zinc was 10 points lower. We quote: Lead, 4.35c. to 4.40c., carlots; slab zinc, 4.65c. On old metals prices are: Light brass, 3.50c.; heavy red brass and light copper, 7c.; heavy yellow brass, 4c.; heavy copper and copper wire, 7.50c.; zinc, 2c.; pewter, 15c.; tin foil, 16c.; tea lead, 2c.; aluminum, 9c.

General Fireproofing Co. Loss

YOUNGSTOWN, OHIO, Jan. 31.—General Fireproofing Co. showed a loss of \$201,000 last year after an inventory shrinkage of \$285,000 and payment of \$97,500 in preferred dividends, but before common dividend. Gross sales were \$5,120,000 and average operations 60 per cent, share holders were informed at annual meeting.

The sale of tractors in Peru has been laboring under serious handicaps during the past year due to the adverse rates of exchange and to the general business depression, according to a report compiled by the Agricultural Implement Division, Department of Commerce. But few sales have been made in the past few months, resulting in the accumulation of considerable stocks. The American tractor has a practical monopoly of the market, as it was first introduced and is best known.

A directory of firms whose trade touches the United States, South America or Germany is to be issued shortly as Guia Aleman Americana. It will be in three languages, English, Spanish and German. The book will contain 1500 large pages and it is issued at \$6 by the Caxton Translations Institute, 47 Victoria Street, London, S. W. 1, England, whose agent in the United States is the Ford Corporation, 97 Broadway, New York.

Prices Finished Iron and Steel, f.o.b. Pittsburgh

Freight Rates

Freight rates from Pittsburgh on finished iron and steel products, in carload lots, to points named, per 100 lb., are as follows:

Philadelphia, domestic...	\$0.36	Kansas City	\$0.815
Philadelphia, export...	0.265	Kansas City (pipe)...	0.77
Baltimore, domestic...	0.35	St. Paul	0.665
Baltimore, export	0.255	Omaha	0.815
New York, domestic...	0.38	Omaha (pipe)	0.77
New York, export	0.285	Denver	1.35
Boston, domestic	0.405	Denver (wire products)...	1.415
Boston, export	0.285	Pacific Coast	1.665
Buffalo	0.295	Pacific Coast, ship plates	1.335
Cleveland	0.24	Birmingham	0.765
Detroit	0.325	Jacksonville, all rail...	0.555
Cincinnati	0.325	Jacksonville, rail and	0.46
Indianapolis	0.345	water	0.515
Chicago	0.38	New Orleans	0.515
St. Louis	0.475		

The minimum carload to most of the foregoing points is 35,000 lb. To Denver the minimum loading is 40,000 lb., while to the Pacific Coast on all iron and steel products, except structural material, the minimum is 80,000 lb. On the latter item the rate applies to a minimum of 50,000 lb., and there is an extra charge of 9c. per 100 lb. on carloads of a minimum of 40,000 lb. On shipments of wrought iron and steel pipe to Kansas City, St. Paul, Omaha and Denver the minimum carload is 46,000 lb. On iron and steel items not noted above the rates vary somewhat and are given in detail in the regular railroad tariffs.

Rates from Atlantic Coast ports (i.e., New York, Philadelphia and Baltimore) to Pacific Coast ports of call on most steamship lines, via the Panama Canal, are as follows: Pig iron, 55c.; ship plates, 75c.; ingot and muck bars, structural steel, common wire products, including cut or wire nails, spikes and wire hoops, 75c.; sheets and tin plates, 60c. to 75c.; rods, wire rope, cable and strands, \$1; wire fencing, netting and stretcher, 75c.; pipe, not over 8 in. in diameter, 75c.; over 8 in. in diameter, 2 1/4c. per in. or fraction thereof additional. All prices per 100 lb. in carload lots, minimum 40,000 lb.

Structural Material

I-beams, 3 to 15 in.; channels, 3 to 15 in.; angles, 3 to 6 in., on one or both legs, 1/4 in. thick and over, and zeos, structural sizes, 1.50c.

Sheared plates, 1/4 in. and heavier, tank quality, 1.50c.

Wire Products

Wire nails, \$2.50 base per keg; galvanized, 1 in. and longer, including large-head barbed roofing nails, taking an advance over this price of \$1.25 and shorter than 1 in., \$1.75; bright Bessemer and basic wire, \$2.25 per 100 lb.; annealed fence wire, Nos. 6 to 9, \$2.25; galvanized wire, \$2.75; galvanized barbed wire, \$3.15; galvanized fence staples, \$3.15; painted barbed wire, \$2.65; polished fence staples, \$2.65; cement-coated nails, per count keg, \$2.00; these prices being subject to the usual advances for the smaller trade, all f.o.b. Pittsburgh, freight added to point of delivery, terms 60 days, net, less 2 per cent off for cash in 10 days. Discounts on woven-wire fencing are 68 to 70 1/2 per cent off list for carload lots; 67 to 69 1/2 per cent for 1000-rod lots, and 66 to 68 1/2 per cent for small lots, f.o.b. Pittsburgh.

Bolts and Nuts

Machine bolts, small, rolled threads,

70, 10 and 5 to 70, 10 and 7 1/2 per cent off list

Machine bolts, small, cut threads,

70 and 5 to 70 and 10 per cent off list

Machine bolts, larger and longer,

65, 10 and 5 to 70 and 10 per cent off list

Carriage bolts, 1/2 in. x 6 in.:

Smaller and shorter rolled threads,

65, 10 and 10 per cent off list

Cut threads 65 and 10 to 70 per cent off list |

Longer and larger sizes 65 and 10 to 70 per cent off list |

Leg bolts 70 and 10 to 70, 10 and 5 per cent off list |

Flow bolts, Nos. 1, 2 and 3 heads 60 and 10 per cent off list |

Other style heads 20 per cent extra |

Machine bolts, c.p.c. and t. nuts, 1/2 in. x 4 in.:

Smaller and shorter 65 and 5 per cent off list |

Larger and longer sizes 65 per cent off list |

Hot pressed sq. or hex. blank nuts \$5.50 off list |

Hot pressed nuts, tapped \$5.00 to \$5.25 off list |

C.p.c. and t. sq. or hex. blank nuts \$5.25 off list |

C.p.c. and t. sq. or hex. blank nuts, tapped \$5.00 off list |

Small finished hex. nuts:

1/4 in. to 9/16 in. inclusive 80, 10 and 10 per cent off list |

Small sizes S. A. E. 80, 10, 10 and 10 per cent off list |

1/2 in. to 1 in. inclusive, U. S. S. and S. A. E.:

70, 10, 10 and 10 per cent off list

Stove bolts in packages 80, 10 and 5 per cent off list |

Stove bolts in bulk 80, 10 and 7 1/2 per cent off list |

Tire bolts 65, 10 and 10 per cent off list |

Track bolts, carloads 3c. to 3.25c. base |

Track bolts, less than carloads 4c. to 4.25c. |

Upset Square and Hex. Head Cap Screws

1/4 in. and under 80 and 10 to 80, 10 and 10 per cent off list |

3/16 in. to 1/2 in. 80 and 10 to 80, 10 and 10 per cent off list |

Upset Set Screws

1/4 in. and under 80, 10 and 5 to 85 per cent off list |

3/16 in. to 1/2 in. 80, 10 and 5 to 85 per cent off list |

Milled Square and Hex. Cap Screws

All sizes 75 and 10 to 80 per cent off list |

Milled Set Screws

All sizes 70, 10 and 10 per cent off list |

Rivets

Large structural and ship rivets \$2.25 |

Large boiler rivets 2.85 |

Small rivets 70, 10 and 10 to 70, 10, 10 and 5 per cent off list |

Wire Rods

No. 5 common basic or Bessemer rods to domestic consumers, \$36 to \$37; chain rods, \$36 to \$37; screw stock rods, \$41 to \$42; rivet and bolt rods and other rods of that character, \$36 to \$37, high carbon rods, \$43 to \$49, depending on carbons.

Railroad Spikes and Track Bolts

Railroad spikes, 9/16-in. and larger, \$2.15 to \$2.20 base per 100 lb. in lots of 200 kegs of 200 lb. each or more; spikes, 1/2-in., 3/4-in. and 7/16-in., \$2.25 to \$2.30 base; 5/16-in., \$2.35 to \$2.30 base. Bolt and barge spikes, \$2.25 to \$2.30 base per 100 lb. in carload lots of 200 kegs or more, f.o.b. Pittsburgh. Track bolts, 3c. to 3.25c. base per 100 lb. Tie plates, \$2 per 100 lb. Angle bars, \$2.40 per 100 lb.

Terne Plates

Prices of terne plates are as follows: 8-lb. coating, 200 lb., \$9.30 per package; 8-lb. coating, 1 C., \$9.60; 15-lb. coating, 1 C., \$11.80; 20-lb. coating, 1 C., \$13; 25-lb. coating, 1 C., \$14.25; 30-lb. coating, 1 C., \$15.25; 35-lb. coating, 1 C., \$16.25; 40-lb. coating, 1 C., \$17.25 per package, all f.o.b. Pittsburgh, freight added to point of delivery.

Iron and Steel Bars

Steel bars, 1.50c. from mill. Refined bar iron, 2c. to 2.10c.

Welded Pipe

The following discounts are to jobbers for carload lots on the Pittsburgh basing card:

Steel		Butt Weld		Iron	
Inches	Black	Galv.	Inches	Black	Galv.
1/4	54 1/2	28	1/4 to 3/4	36 1/2	+22 1/2
1/2	60	32 1/2	1/2	42 1/2	27 1/2
3/4	65	50 1/2	3/4	44 1/2	29 1/2
1	69	56 1/2	1 to 1 1/2	44 1/2	29 1/2
1 1/4	71	58 1/2			

Lap Weld

Inches	Black	Galv.	Inches	Black	Galv.
2	64	51 1/2	2	39 1/2	25 1/2
2 1/2 to 6	68	55 1/2	2 1/2 to 6	42 1/2	29 1/2
7 to 8	65	51 1/2	7 to 12	40 1/2	27 1/2
9 to 12	64	50 1/2			

Butt Weld, extra strong, plain ends

Inches	Black	Galv.	Inches	Black	Galv.
1/4	50 1/2	33	1/4 to 3/4	36 1/2	+27 1/2
1/2	56	38 1/2	1/2	42 1/2	23 1/2
3/4	62	50 1/2	3/4	42 1/2	28 1/2
1	67	55 1/2	1 to 1 1/2	44 1/2	30 1/2
1 1/4	69	57 1/2			
2 to 3	70	58 1/2			

Lap Weld, extra strong, plain ends

Inches	Black	Galv.	Inches	Black	Galv.
2	62	50 1/2	2	40 1/2	27 1/2
2 1/2 to 4	66	54 1/2	2 1/2 to 4	43 1/2	31 1/2
4 1/2 to 6	65	53 1/2	4 1/2 to 6	42 1/2	30 1/2
7 to 8	61	47 1/2	7 to 8	35 1/2	23 1/2
9 to 12	55	41 1/2	9 to 12	30 1/2	18 1/2

To the large jobbing trade the above discounts are increased by one point, with supplementary discounts of 5 and 2 1/2 per cent.

Boiler Tubes

The following are the discounts for carload lots f.o.b. Pittsburgh:

Lap Welded Steel		Charcoal Iron	
Inches	Discount	Inches	Discount
1 1/4 in.	26 1/2	1 1/4 in.	5
2 to 2 1/2 in.	41	1 1/4 to 1 1/2 in.	15
2 1/2 to 3 in.	52	2 to 2 1/2 in.	25
3 1/4 to 13 in.	57	2 1/2 to 3 in.	30
		3 1/4 to 4 1/2 in.	32

Standard Commercial Seamless Boiler Tubes

New discounts have been adopted on standard commercial seamless boiler tubes, but manufacturers are not yet ready to announce them for publication, and for that reason we publish no discounts this week.

Sheets

Prices for mill shipments on sheets of standard gage in carloads, f.o.b. Pittsburgh, follow:

Blue Annealed		Cents per Lb.	
No.	Discount	No.	Discount
No. 8 and heavier	2.20	Nos. 11 and 12	2.30
Nos. 9 and 10 (base)	2.25	Nos. 13 and 14	2.35
		Nos. 15 and 16	2.45

Box Annealed, One Pass Cold Rolled

Cents per Lb.		Cents per Lb.	
No.	Discount	No.	Discount
Nos. 17 to 21	2.80	No. 28 (base)	3.00
Nos. 22 to 24	2.85	No. 29	3.10
Nos. 25 and 26	2.90	No. 30	3.20
No. 27	2.95		

Galvanized

Cents per Lb.		Cents per Lb.	
No.	Discount	No.	Discount
Nos. 10 and 11	3.00	Nos. 25 and 26	3.70
Nos. 12 to 14	3.10	No. 27	3.85
Nos. 15 and 16	3.25	No. 28 (base)	4.00
Nos. 17 to 21	3.40	No. 29	4.25
Nos. 22 to 24	3.55	No. 30	4.50

Tin-Mill Black Plate

Cents per Lb.		Cents per Lb.	
No.	Discount	No.	Discount
Nos. 15 and 16	2.80	No. 28 (base)	3.00
Nos. 17 to 21	2.85	No. 29	3.05
Nos. 22 to 24	2.90	No. 30	3.05
Nos. 25 to 27	2.95	Nos. 30 1/2 and 31	3.10

381

PERSONAL

At a recent meeting of the Cleveland Worm & Gear Co., Cleveland, J. W. Hertzler, who has been vice-president, secretary and general manager of that company, was made president, succeeding F. M. Gregg in that capacity. Mr. Hertzler continues as general manager. Arthur H. Clark, who has been treasurer, was given the additional duties of the secretaryship. A. V. Cannon was elected vice-president.

Samuel Mather, of Pickands, Mather & Co., Cleveland, has made a gift of approximately \$2,500,000 to the Western Reserve University, Cleveland, having offered to bear the entire cost of erecting the new Medical School buildings for the university. This gift makes a total of more than \$4,000,000 given by Mr. Mather to this Cleveland institution.

Frank G. Payson of the Frank G. Payson Co., 9 South Clinton Street, Chicago, general sales agent for the Logan air-operated chucks and labor-saving devices, has been appointed manager of sales for the Logansport Machine Co., at Logansport, Ind., effective Feb. 1. The Frank G. Payson Co. will discontinue business and the corporation has been dissolved.

M. B. Hoagland, formerly of the United States Steel Corporation, has been elected president and general manager of the Signal Motor Truck Co., Detroit.

F. J. Griffiths, who recently announced his resignation as vice-president and general manager of the Central Steel Co., Massillon, Ohio, will remain with the company in his former capacity, having been re-elected at a recent meeting, when the reorganization of the company was completed. The reorganized company, with the consolidation of formerly affiliated units, has practically the same organization as before. R. E. Bebb is chairman and president; C. E. Stuart, secretary and treasurer; C. C. Chase, vice-president, and in charge of the sheet division; H. M. Naugle, vice-president and in charge of the metal lumber division; J. M. Schlendorf, manager of sales; B. F. Fairless, superintendent and manager of operations; Myron Phillips, manager of production; E. C. Smith, chief metallurgist, and George D. Evans, purchasing agent.

Charles A. Irwin, until recently vice-president and general manager of the Canton Sheet Steel Co., Canton, Ohio, has become president and treasurer of the Milwaukee Rolling Mill Co., Milwaukee, Wis., which completed a sheet mill plant last year. He left for Milwaukee this week to assume his new duties. Mr. Irwin was president of the Canton company from the time its plant was built in 1909 until it was taken over a few years ago by the Hydraulic Steel Co. of Cleveland. His son, Jay Irwin, who has been assistant auditor of the Canton company, has resigned and will be associated with his father at the Milwaukee plant.

Ambrose Swasey, Warner & Swasey Co., Cleveland, has been appointed for the third term to serve on the National assay committee, this appointment being made by President Warren G. Harding. Mr. Swasey was first appointed on this committee in 1909 by President Theodore Roosevelt and was reappointed in 1913 by President William H. Taft. The assay committee tests the quality and weight of samples of coins made in the Government mints each year.

Charles M. Foote, for 24 years with the American Tube & Stamping Co., Bridgeport, Conn., latterly as sales manager, has resigned that position to become sales manager of the Columbia Steel Co., Elyria, Ohio,



J. W. HERTZLER

manufacturer of cold-rolled strip steel. Mr. Foote will make his headquarters at the New York offices of the company at 258 Broadway.

At the annual meeting of the Duquesne Steel Foundry Co., Pittsburgh, D. C. Bakewell was elected president; W. E. Hoblitzelle, first vice-president; L. A. Way, second vice-president; B. P. Bakewell, secretary, and E. S. Eggers, treasurer.

Iow L. Harr, vice-president and director, Graton & Knight Mfg. Co., Worcester, Mass., belting, has resigned, effective April 1, for the purpose of devoting his entire time to various interests in China.

The following officers of the Alan Wood Iron & Steel Co. were elected at the annual meeting held on Jan. 25: President, Richard G. Wood; vice-president, Jonathan R. Jones; vice-president, Ledyard Heckscher; vice-president and treasurer, Howard Wood, Jr.; vice-president and assistant treasurer, Alan D. Wood; secretary, John W. Logan; assistant treasurer and assistant secretary, A. Markley Harry; assistant secretary, J. H. Woodhead. On the same day Howard Wood, Jr., was elected president of Upper Merion and Plymouth Railroad Co.

George B. Mitchell has resigned, effective Feb. 1, as assistant sales manager, cold-rolled department, Jones & Laughlin Steel Co., Pittsburgh, to become special sales representative, Wyckoff Drawn Steel Co., Pittsburgh. Mr. Mitchell was associated with the Jones & Laughlin Steel Co. for more than 20 years, rising through various grades in the sales department to the position he has just relinquished. He takes with him to his new affiliation a wide experience in the sale of cold-finished steel products and has an extensive acquaintance in the trade. He is a member of the Duquesne, Union, Pittsburgh Field Club, Pittsburgh Athletic Association, Pittsburgh, and Society of Automotive Engineers of New York.



GEORGE B. MITCHELL

Frank S. Slocum, special representative, Jones & Laughlin Steel Co., Pittsburgh, has gone on a brief vacation in Bermuda.

John Stambaugh, director of the Brier Hill Steel Co., Youngstown, Ohio, leaves this week for a tour of Europe, accompanied by his wife.

M. J. Ward, for the past seven years superintendent of the sheet galvanizing department of the Youngstown Sheet & Tube Co., Youngstown, Ohio, has resigned to accept a position with the Empire Rolling Mill Co., Cleveland. He will install a galvanizing department at the Empire company's plant and take charge following its completion. Mr. Ward was formerly in charge of the galvanizing department of the American Sheet & Tin Plate Co.'s sheet mill plant at Gary, Ind., prior to becoming identified with the Sheet & Tube company.

Howard E. Handy has severed his connection with the Washington Steel & Ordnance Co. as assistant metallurgical superintendent. His temporary address is 773 Elmwood Avenue, Providence, R. I.

Carl F. Deitz, president Bridgeport Brass Co., Bridgeport, Conn., announces a reorganization of the personnel to meet the requirements of a new cost-accounting system. Walter R. Clark has been made general works manager; Arthur Brewer, manager mill costs department; E. K. Feicht is in charge of the engineering and maintenance department; G. E. Oakley, manager fabricating department, and Warren D. Blatz is general sales manager. Mr. Deitz formerly was prominently identified with the Norton Co., Worcester, Mass., abrasives and grinding machinery.

Ralph Leavenworth has returned to the Standard Parts Co., Cleveland, as advertising manager, which position he relinquished some months ago to take up another line of work.

Robert Steinemann has been elected vice-president and general manager of the Tide-Water Corporation, 8 West Fortieth Street, New York, pulverizer of iron. Mr. Steinemann resigns from the National Aniline & Chemical Co., Inc., to take up his new duties. Since Feb. 1 the officers of the company have been as follows: Martyne H. Newman, president; Robert Steinemann, vice-president and general manager; John Hall Jones, secretary and treasurer.

G. M. Ruhf, president and factory manager Exeter Machine Works, Inc., West Pittston, Pa., has resigned.

H. G. Schaeffer, formerly assistant district manager of the Continental Iron & Steel Co., at Chicago has joined the Reliable Iron & Metal Co., dealer in iron, steel and metals, Peoria, Ill. He assumes charge of a new department handling steel on a general brokerage basis.

Rumsey W. Scott, an engineer, has been elected a vice-president of the Chemical National Bank of New York, which in October, 1920, created an industrial department for the purpose of giving technical assistance to credit officers of the bank. Mr. Scott, then Vice-President of the Technical Advisory Corporation, consulting industrial engineers, was appointed manager of the department.

The Ajax Metal Co., Philadelphia, has appointed H. L. Carpenter, Jr., formerly in charge of their Pittsburgh Office and later connected with its main office in Philadelphia, traveling representative in western Pennsylvania.

William J. Cleary has been appointed assistant general sales manager of the Sharon Pressed Steel Co., Sharon, Pa., headquarters at 1214 Dinie Bank Building, Detroit. He was identified for 14 years with the automotive industry, most of the time with the Studebaker Corporation as assistant general purchasing agent and for two years as general purchasing agent of the Willys Corporation, with headquarters at Elizabeth, N. J.

W. W. Scott, Jr., formerly manager of sales in St. Louis for Carnegie Steel Co., Illinois Steel Co. and Tennessee Coal, Iron and Railroad Co., has become general manager of sales of the Laclede Steel Co., St. Louis.

T. H. Hays has been appointed manager of the Indianapolis office of the Westinghouse Electric & Mfg. Co. A. E. Hitchner, assistant to the manager, industrial department, in general charge of the mining and electro-chemical industries, until further notice will have general charge of the sections formerly handled by W. H. Patterson, who recently resigned to accept the position of vice-president of the Kaestner & Hecht Co., Chicago, elevator manufacturer.

Charles M. Sullivan has resigned as sales engineer in the Pittsburgh office of Manning, Maxwell & Moore, Inc., to become Cleveland district sales representative for Kaestner & Hecht Co., Chicago, elevator manufacturer, effective Feb. 1. Mr. Sullivan, prior to becoming affiliated with Manning, Maxwell & Moore, Inc., was Pittsburgh district sales manager, Milwaukee Electric Crane & Mfg. Co., Milwaukee. He was graduated from the University of Illinois, with the degree bachelor of science in electrical engineering.

Robert W. Wolcott has been made manager of the New Orleans branch of the Lukens Steel Co., Coatesville, Pa., succeeding the late James W. Porch. Mr. Porch died in July, 1921, after 23 years' service at New Orleans. Mr. Wolcott has been connected with the sales department of Bethlehem Fabricators, Inc., Bethlehem, Pa.

OBITUARY

Henry A. Carpenter

HENRY ALDEN CARPENTER, aged 55, of the General Fire Extinguisher Co., Providence, R. I., died at his home Jan. 27. He was born in Providence, July 7, 1867. In 1889, together with his father and brother, he established the Alva Carpenter & Sons Foundry Co., becoming vice-president and treasurer. The Carpenter company was merged with the General Fire Extinguisher Co. in 1911 and Mr. Carpenter joined the new organization, becoming by successive steps manager of the five foundries of the company, plant manager of the Auburn establishment, member of the executive board, publicity and promotion manager, and a director. He held these offices at the time of his death.



HENRY A. CARPENTER

Mr. Carpenter was president of the New England Foundrymen's Association for a number of years. Joining the American Foundrymen's Association in 1896, he was vice-president in 1905 and 1913 to 1916, and was one of the incorporators when the association was incorporated July 3, 1916. Mr. Carpenter was also a member of the National Founders' Association, holding office as vice-president for three years prior to November, 1908, when he became president, succeeding O. P. Briggs. He served as president during 1908-1909.

Always active in city affairs in Providence, he was a member of the city council from 1905 to 1907 and one of the leaders in the Providence Chamber of Commerce, over which he presided in 1917. He was also a director of the Union Trust Co., the Rhode Island Insurance Co. and the Homeopathic Hospital. Mr. Carpenter was prominent in Masonic circles and had held some of the highest offices in the order. He was also a member of the Benevolent and Protective Order of Elks, and among the many clubs, was a member of the Engineers' Club of New York. He was credited with great service in the prevention of fires.

MRS. ELIZABETH COCHRANE SEAMAN, who was president of the Ironclad Mfg. Co. and American Steel Barrel Co., Brooklyn, for a number of years, died Jan. 27. She was born in 1867 and in 1897 married Robert L. Seaman, an aged and wealthy Brooklyn manufacturer, who died in 1904, leaving his entire property, including the two companies, to her. She assumed management of the properties and encountered many difficulties, including much litigation in which she was finally successful. Many years before her marriage, Mrs. Seaman, under the pen name of Nellie Bly, was engaged in newspaper work and became well known on account of a trip around the world which she made in 1889-1890 in 72 days, 6 hours and 11 minutes, to show that Jules Verne's imaginative romance "Around the World in Eighty Days" was not an exaggeration. A few years ago she returned to newspaper work.

HOWARD V. LEWIS, Fitchburg Machine Works, Fitchburg, Mass., died Jan. 26, aged 43. Mr. Lewis was educated at Harvard University, and after leaving college was employed for a number of years by the American Tool Works, Cincinnati. He then became a manufacturer's representative in New York and later, for about a year, was with the Allied Machinery Co., making a trip to Europe. Since November, 1915, he had been with the Fitchburg Machine Works.

WALTER A. COOK, president of the Acme Road Machinery Co., Frankport, N. Y., died, Jan. 23, age 60 years.

British Iron and Steel Market

General Softening Tendency to Prices—Tin Plate Demand Falling Off—Continental Competition Not Entirely Distanced

(By Cable)

LONDON, ENGLAND, Jan. 31.

There is further improved demand for pig iron, but the business placed is still unimportant. Buyers are disinclined to commit themselves for forward business. The demand for hematite is expanding, but it is still insufficient to absorb the total output, and makers are granting small concessions.

Foreign-ore consumers are showing more interest. Best Bilbao Rubio is being sold at 26s. (\$5.54) ex-ship Tees.

Cammell, Laird & Co., Ltd., and United Steel Companies, Ltd., have secured home rail orders to the amount of 15,000 tons. Vickers, Ltd., has been awarded the contract for electrification of the South African railroads. There is an unconfirmed report to the effect that the international steel rail pool is to be revived.

Scotland is quoting ship plates at £9 (1.71c. per lb.) delivered. Export business generally is quiet.

German merchant bars are being sold at £7 15s. to £8 (1.47 to 1.52c. per lb.) f.o.b., for April and May shipment. Belgian and French merchant bars are held at £8 to £8 5s. (1.52 to 1.545c. per lb.) f.o.b., for April and May delivery. Luxemburg merchant bars are quoted at £7 15s. (1.47c. per lb.) f.o.b., for March and April shipment.

German plates are held at £8 10s. (1.62c. per lb.) f.o.b., for April and May shipment. French plates are being sold at £9 (1.71c. per lb.) f.o.b., for April and May delivery. German structural steel is quoted at

£7 10s. to £7 15s. (1.43 to 1.47c. per lb.) f.o.b., for April and May shipments.

Continental pig iron prices are practically nominal, owing to scarcity of supplies being offered.

American soft wire rods are offered here at \$11 12½s. (\$49.02) c.i.f. United Kingdom.

Tin plate demand is slow, and there are further mill stoppages. Some trades are hoping that the makers may agree to a definite restriction of output. It is anticipated that Australian demand will shortly revive.

Galvanized sheets are being sold at £15 15s. (3c. per lb.) f.o.b. Some makers are quoting £15 12½s. (2.97c. per lb.). Rangoon specifications are quoted at £23 10s. (4.47c. per lb.) f.o.b.

Far Eastern specifications for black sheets are being filled at £16 5s. (3.09c. per lb.) f.o.b. Some 24-gage has been sold at £12 15s. (2.42c. per lb.) f.o.b.

We quote per gross ton, except where otherwise stated, f.o.b. maker's works, with American equivalent figured at \$4.26 per £1 as follows:

Durham coke, delivered..	£1 5s.	to £1 7s.	\$5.33 to \$5.75
Cleveland No. 1 foundry..	4 15		20.24
Cleveland No. 3 foundry..	4 10		19.17
Cleveland No. 4 foundry..	4 7½		18.64
Cleveland No. 4 forge....	4 10		19.17
Hematite	7 0*		29.82*
East Coast mixed	4 14	to 4 15	20.03 to 20.24
Perronmanganese	15 0	& 14 10*	63.90 & 61.77*
Rails, 60 lb. and up.....	8 0	to 9 10	34.08 to 40.47
Billets	7 0	to 7 10	29.82 to 31.95
Sheet and tin plate bars..			
Welsh	7 5	to 7 7½	30.89 to 31.42
Tin plate, base box.....	0 19	to 0 19½	4.05 to 4.16
			C. per Lb.
Ship plates	9 0	to 10 10	1.71 to 2.00
Boiler plates	12 10	to 14 0	2.38 to 2.66
Tees	9 10	to 11 0	1.81 to 2.09
Channels	8 15	to 10 5	1.66 to 1.95
Beams	8 5	to 10 0	1.57 to 1.90
Round bars, ½ to 3 in....	10 10		2.00
Galvanized sheets, 24 g..	15 12½	to 16 0	2.97 to 3.04
Black sheets	12 15	to 13 0	2.43 to 2.47
Steel hoops	12 0	& 12 5*	2.28 & 2.33*
Cold rolled steel strip, 20 g.	24 5		4.61

*Export price.

Further Reductions in Pig Iron and Steel— Shipbuilding Outlook Now Promising —Labor Less Exacting

LONDON, ENGLAND, Jan. 11.—General conditions are not bright although the business community has got into a way of telling one another that things are better. In some respects they are, in that iron and steel prices, which have lagged behind the others in the decline, are now gradually coming down to a more economic level. Wage reductions are accepted, if not without demur at least without strikes, and there is a general disposition to help the reconstruction of business in every way practicable.

It is stated that, while there is nothing much to boast about, yet in the shipping position, the outlook is considered to be more promising and the return of optimism seems to be permanent. A good sign is the steady demand for second-hand tonnage. Of course it is realized that during the next year or two British ship owners will have to face severe competition from foreign lines and will be called on to do so at a time when their resources are weakened by war taxation. The merchant tonnage under construction in the United Kingdom at the end of December was 2,640,319 tons or a reduction of 643,000 tons compared with the total at the end of the previous quarter. Of course in order to make a correct comparison with normal times two factors must be remembered, namely, that over 720,000 tons included in the present total, represent ships under construction, though work on them has been suspended; also a number of vessels, the completion of which has been postponed.

Until the last few days business in the Cleveland iron market was more or less under the influence of the holidays, but Cleveland No. 1 and No. 3 foundry irons have been reduced 10s. to £4 15s. and £4 10s. per ton respectively. Meantime No. 4 foundry and No. 4 forge

are down 7s. 6d. to £4 7s. 6d. and £4 2s. 6d. At these lower levels there are fairly strong hopes that more business will develop. In finished materials, steel prices are gradually coming down and getting nearer to the continental level, so that prospects of increased bookings by British works are undoubtedly broadening, largely owing to the fact that they have the advantage of being able to give quick delivery.

Some little time ago it was reported that a large quantity of scrap steel had been sold by this country to Germany. This, however, seems to have been hardly accurate, as in actual fact what was sold to Germany was several warships for breaking up purposes.

It is reported that a new Sheffield company called Industrial Steels, Ltd., has been formed with a capital of £700,000 for the purpose of acquiring from Messrs. Jonas & Colver the Novo works.

Edgar T. Ward's Sons Co., iron and steel merchant, has removed its New York office to its Waverly warehouse, 394 Frelinghuysen Avenue, Newark, N. J. The stock formerly carried in the New York warehouse at 260 West Street is being divided between the Brooklyn warehouse at the foot of Forty-ninth Street, Brooklyn, and the New Jersey establishment. The warehouse at 260 West Street will be closed. To avoid confusion in telephoning, the number Cortlandt 2066 will be connected with the Newark office as well as the former Newark number of Waverly 8700. The Brooklyn warehouse number continues to be Sunset 7520.

In the study of the reduction of iron oxides by methane, being made at the Pacific Station of the U. S. Bureau of Mines, it has been established that, at temperatures up to at least 800 deg. C., methane is a very slow reacting reducing agent as compared with hydrogen or carbon monoxide.

BOOK REVIEWS

Fraser's Metal Products Directory.—Fourth Annual Edition. Pages 312, 6½ by 9 in. Published by the Fraser Publishing Co., Montreal, Canada. Price \$3.

A registry of Canadian manufacturers, wholesale dealers and agents connected with the hardware, metal, foundry, engineering, electrical and machinery industries. Wholesale dealers, merchants and others listed who do not manufacture are indicated by an asterisk before the name. The index is classified alphabetically by the product, and numbered consecutively for greater convenience. The number of the page is shown on the right of the index classifications, which aids materially in locating the list desired.

Outspinning the Spider. A Story of Wire and Wire Rope. By John Kimberly Mumford. Pages 137, 6 x 8½, illustrated. New York: Robert L. Stillson Co.

This is the story of the Roeblings. It visualizes the developments which made possible the Brooklyn Bridge, and all of the myriad activities which present day industrialism has called for from the maker of wire and wire rope. Written in an interesting manner, yet giving facts of manufacture and use in an authoritative way, the work carries the reader through the history of development from the earliest phases to the present. It relates in a vivid way the various processes used, the exacting care necessary in the manufacture of wire rope, and some of the multitudinous uses to which the rope is put. One of the most recent was the wire rope barrage laid down in the English Channel during the World War.

NEW TRADE PUBLICATIONS

Electric Motor.—Wagner Electric Mfg. Co., St. Louis. Bulletin No. 129. Contains a description of the Wagner "Pow-It-Full" polyphase motor and numerous illustrations. The bulletin describes how a motor was produced to be cool running; having better bearings; heavier shaft; protected conduit connections, easy to connect and disconnect; silent operation; strength and quality.

Drop Forgings.—Union Switch & Signal Co., Swissvale, Pa. A catalog entitled "Forging Ahead." The equipment and capacity of the company is described and typical forgings produced by the Union Switch & Signal Co. are illustrated and sizes and weights given. The booklet is printed on good paper and the illustrations are particularly clear.

Small Tools.—Rockford Milling Machine Co., Rockford, Ill. A pamphlet describing the company's line of arbores, collets, cutters, spring chucks, etc. for use on Rockford milling machines. All sizes are given and there are numerous illustrations.

Electric Cranes.—Northern Engineering Works, Detroit. A 16-page booklet illustrating Northern cranes operating in power houses, locomotive shops, foundries, car shops, railroad yards and machine shops. There are also detail photographs of electric hoists and hand power cranes. The booklet is called "a pigeon-hole reminder."

Patching Boiler Settings.—Quigley Furnace Specialties Co., 26 Cortlandt Street, New York. Bulletin No. 51 describes and illustrates the method of applying successfully boiler setting patches where Hytemplate and Carbo sand are used.

Recorders.—Bristol Co., Waterbury, Conn. Catalog No. 1501, superseding No. 1500 and made to the size standard for the Bristol company's binder. Illustrates and describes the line of recording voltmeters, ammeters and wattmeters made by the company and the various charts for these instruments are illustrated in colors.

Piston Rings.—Waterhouse Welding Co., 15 Pelham Street, Boston. Catalog dated Jan. 1, 1922; it illustrates, describes with complete tables, showing the sizes and prices, piston rings and pins for various passenger automobiles, trucks, motorcycles and motors. The booklet, which is intended for use as a reference by the buyer, contains blank memoranda pages for notes.

Heavy Forging Chain.—American Forge & Machine

Co., Canton, Ohio. A small folder describing a chain for heavy forging, with drop forged links of chrome vanadium steel, which was perfected by this company for its own use about ten years ago and later sold to forge shops. This is the first advertising of the chain that the manufacturer has attempted.

Pulverized Coal System.—Bonnot Co., Canton, Ohio, which mentions it is the exclusive licensee in the United States of the Holbeck system of firing annealing furnaces with pulverized coal. Bulletin 61, with illustrations of annealing ovens equipped with the Holbeck system, covers costs, time saving, elimination of smoke, labor saving, temperature control, elimination of coal storage and simple construction as factors in the system.

Waste in Power Plant Chimneys.—Uehling Instrument Co., 71 Broadway, New York. Two bulletins, No. 220, "Magnitude of the Power Plant's Chimney Loss," and No. 221, "Relation Between CO₂ and Money Wasted Up the Chimney," contains a graphic presentation of these problems. Both bulletins are replete with tables, formulas and diagrams.

Calendar.—Youngstown Sheet & Tube Co., Youngstown. About 17½-in. by 26-in., printed in colors. On the January sheet is a reproduction of a photograph of Bessemer converters in operation and a table of products and annual capacity of the company. The succeeding sheets are headed with photographs of the ore handling docks at Lake Superior, blast furnace, open hearth furnace, blooming mill, tube mills, a sheet mill, wire mill and the manufacture of forged couplings.

Calendar.—Park & Williams, Philadelphia. Carries a photograph of the Swede furnaces, which this company represents. Three months are shown at a time, the current month, the previous and the coming month.

Cinder Cars.—Welmer Machine Works Co., Lebanon, Pa. Two folders of six pages each illustrate in full page photographs Edgar A. Welmer's patent cinder cars, styles J and K respectively. Each style is shown tilted in various directions and there is brief description accompanying the illustrations.

Babbitt Motor Bearings.—Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa. Circular reprint No. 104. The publication is a discussion of the production of babbitt metal by J. S. Dean, railway motor engineering department, Westinghouse company, and contains a number of photographs of equipments used in the manufacture of babbitt metals as well as the results of various tests of samples of alloys.

New Books Received

Essentials of Industrial Costing. By George S. Armstrong. Pages 297, 5½ x 8½ in.; illustrations 80. Published by D. Appleton & Co., 35 West Thirty-second Street, New York.

A Life of George Westinghouse. By Henry G. Prout. Pages xii + 375, 6 x 9 in. Published by Charles Scribner's Sons, 597 Fifth Avenue, New York. Price \$2.50.

Fraser's Metal Products Directory, covering all Canada. Fourth Edition. Pages 312, 6 x 9 in. Published by the Fraser Publishing Co., 128 Bleury Street, Montreal, Canada. Price \$3.

Proceedings of the American Society for Testing Materials. Vol. 21, 1921. Pages 1197, 6 x 9 in.; 31 committee reports, 24 technical papers, 93 tentative standards. Published by the Society, 1315 Spruce Street, Philadelphia. Price \$10 in paper binding.

The Modern Gas Tractor. By Victor W. Page. Pages 574, 4¼ x 7¼ in. illustrations 265. Published by the Norman W. Henley Publishing Co., 2 West Forty-fifth Street, New York. Price \$3.00.

The Blacksmith's Pocket Book. By Tom Wormald. Pages 84, 4¼ x 7¼ in. Published by Scott, Greenwood & Son, 8 Broadway, Ludgate, London, E. C. 4, England. For sale by D. Van Nostrand Co., 8 Warren Street, New York.

The Ship Compendium and Year Book 1922. Pages 1008, 8½ x 11 in. 8 maps and 800 sections containing names and addresses of 30,000 firms interested in ship and shipping. Published by Compendium, Ltd., 18 Old Compton Street, London, W. 1, England.

Le Sciage des Metaux. By C. Codron. Pages 468, 9 x 11 in. illustrations 536. Published by Dunod, 47 Quai des Grands-Augustins, Paris (VI), France.

IRON AND INDUSTRIAL STOCKS

Selling of Steel Shares on Merger Talk Noted the Past Week

Indications the past week were that at least some people, who previously bought shares of those steel properties concerned in proposed mergers, sold their holdings because it was talked about the financial districts that these mergers would not materialize, the parties interested not being able to agree on various details. Such selling, coupled with earnings reports by the larger steel companies showing deficits, has resulted in a lower range of prices. All things considered, however, values of iron and steel shares hold up remarkably well, which bespeaks confidence in the future rather than conditions which have passed.

The range of prices on active iron and industrial stocks from Monday of last week to Monday of this week was as follows:

Albis Chal. com.	41 - 44 1/2	Midvale Steel	29 1/2 - 32
Albis Chal. pt.	90 - 91 1/2	Nat. Acme	12 1/2 - 13 1/2
Am. Can. com.	33 1/2 - 38	Nat. B. & S. com.	35 1/2 - 36 1/2
Am. Can. pf.	95 1/2 - 96 3/4	Nat. B. & S. pf.	85 - 88 1/2
Am. C. & P. com.	145 - 147	N. Y. Air Brake	58 1/2 - 59 1/2
Am. C. & P. pf.	117 1/2 - 118 1/2	Nova Scotia Steel	25 - 27
Am. Loco. com.	104 1/2 - 108 1/2	Press. Steel com.	63 1/2 - 65
Am. Loco. pf.	114 - 114 1/2	Ry. S. Spg. com.	95 1/2 - 98
Am. Rad. com.	83	Ry. S. Spg. pf.	108 1/2 - 110 1/2
Am. Sil. P. com.	30 1/2 - 33 1/2	Republic Steel	30 - 32 1/2
Am. Sil. P. pf.	94 - 94 1/2	Republic com.	49 1/2 - 55 1/2
Bald. Loco. com.	94 1/2 - 97 1/2	Republic pf.	84 1/2 - 87 1/2
Bald. Loco. pf.	106	Sloss com.	40 - 42
Beth. Steel com.	55 - 57	Sloss pf.	77
Beth. Stl. Cl. B.	59 - 61 1/2	Superior Steel	30
Beth. Stl. 8 1/2 pf.	107 1/2 - 108	Trans.-Williams	33
Colorado Fuel	26 - 27 1/2	Un. Alloy Steel.	26 1/2 - 27 1/2
Cruc. Steel com.	59 1/2 - 64	U. S. Pipe com.	18 1/2 - 21
Cruc. Steel pf.	81 - 82	U. S. Pipe pf.	57 - 60 1/2
General Elec.	141 - 144 1/2	U. S. Steel com.	85 1/2 - 86 1/2
Gl. No. Ore Cert.	31 1/2 - 32	U. S. Steel pf.	116 1/2 - 117
Gulf States Steel	64 - 78 1/2	Vanadium Steel.	33 - 35 1/2
Int. Har. com.	81 1/2 - 83 1/2	Va. T. C. & C.	78 - 87 1/2
Int. Har. pf.	106 1/2	Westhouse Elec.	50 1/2 - 51 1/2
Lack. Steel	45 1/2 - 48 1/2		

Industrial Finances

The preliminary statement of Virginia Iron, Coal & Coke Co. for year ended Dec. 31, 1921, shows net earnings after interest and taxes of \$423,889. Inventory adjustments for the year have yet to be made, and estimates of their effect on earnings are not yet available.

At the directors' meeting it was decided to omit the dividend of 1 1/2 per cent on the cumulative preferred stock of the Taylor-Wharton Iron & Steel Co.

The annual report of W. A. Layman, President Wagner Electric Mfg. Co., St. Louis, shows that the bank and broker obligations reached their maximum on Jan. 15, 1921, at \$5,050,000 and were reduced approximately \$2,000,000 or 33 1/2 per cent, to \$4,027,950 on Nov. 15 last. The total obligations on January 1, 1921, were \$7,139,283, which was reduced to \$4,277,950 on Nov. 15. Mr. Layman was re-elected president, and Paul Brown, a director, was elected first vice-president to succeed Walter Robbins, who resigned last July.

The receivership of the Fulton Motors Corporation, 34 Pine Street, New York, operative since 1919, has been terminated, and the property returned to the company. All obligations have been paid.

Attorneys for stockholders of Pusey & Jones, Wilmington, Del., with shipbuilding plants at Wilmington and Gloucester City, N. J., have filed a petition in the United States District Court at Wilmington asking that the bankruptcy proceedings against the company be dismissed.

A petition in bankruptcy has been filed against the Brooklyn Alloys Co., 15 Fulton Street, Brooklyn, by a number of creditors. Louis J. Castellano has been appointed receiver.

The Large-Baker Corporation, Phoenix, N. Y., manufacturers of couplings, etc., has filed an involuntary petition in bankruptcy.

The Collins Co., Collinsville, Conn., edge tools, recently declared a quarterly dividend of 2 per cent. The company heretofore paid at the rate of 16 per cent on its stock. Sales are about one-third the company's capacity.

During the three months ending Dec. 31 the Virginia Iron, Coal & Coke Co., after interest and taxes, but before inventory adjustments, operated at a net loss of \$71,698, contrasted with a profit of \$834,108 in the last three months of 1920. Net earnings for 1921 were \$423,889 after taxes and interest, whereas in 1920 they were \$3,263,026. The directors have declared a stock dividend of 50 per cent, payable in 5 per cent cumulative preferred stock on Feb. 15 to common shareholders of record Feb. 1.

Sidney B. Phillips, Spencer Turbine Co., Hartford, Conn., has been made receiver for the Connecticut Blower Co., Inc., that city, to succeed William A. Foley, temporary receiver. The plant, which was closed, is to resume operations.

Net sales of the J. I. Case Plow Works Co. for the 11 months ending Sept. 30 last were \$4,728,557; operating expenses, inventory adjustment, etc., \$7,396,520; the operating loss, \$2,667,963, and the net loss for the period, \$2,985,794.

The Michigan Securities Commission has authorized the sale of \$791,000 of stock in the new Iron Mountain Mining & Furnace Co., which is to make charcoal iron at Iron Mountain, Mich. The project is backed by the Cleveland-Chiffs Iron Co.

The Michigan Securities Commission has authorized the sale of \$500,000 of stock in the Cyclone Motors Co., Benton Harbor, Mich. The company is headed by J. N. Eaton, formerly of the Lincoln Motors Co., Detroit. The proceeds of the stock sale are to be used in extending the operations of the company, which manufactures motorcycles.

Owing to the demand for foundry sand, the volume of business of the Portage Silica Co., Youngstown, Ohio, this month is double the rate of January, 1921. Last year business was at an average rate of 55 per cent of capacity, shareholders were informed at the annual meeting Jan. 24. Joseph G. Butler, Jr. was elected president and treasurer of the company; E. E. Klooz, first vice-president and general manager; J. B. Chambers, second vice-president and Lee H. Farrell, secretary and manager of sales.

Business of the Youngstown Foundry & Machine Co., Youngstown, Ohio, averaged 35 per cent of capacity in 1921, shareholders were told Jan. 24 at the yearly meeting. The company produces chilled, sand and semi-steel rolls, iron castings, rolling mill machinery, ingot cars, roll lathes, shears and the like. Directors were re-elected.

The Brier Hill Steel Co., Youngstown, Ohio has declared the regular quarterly preferred dividend of \$1.75 per share, payable April 1 to holders of record March 20.

The Otis Steel Co., Cleveland, reports for the first three quarters of 1921 a net loss of \$1,214,550 after charges but before depreciation. Its net operating loss was \$924,187, and other income \$68,983. The company's income charges amounted to \$297,464, and its subsidiary companies' losses to \$61,882. Preferred dividends of \$309,071 were declared by the company, making its final deficit for the year \$1,523,621.

Earnings of Bethlehem Steel Corporation

The Bethlehem Steel Corporation had gross sales and earnings of \$147,794,352 in 1921, as compared with \$274,431,236 for 1920. After deducting manufacturing cost and operating expenses there was a net manufacturing profit of \$21,850,533, as compared with \$34,982,371 in 1920.

Other income amounted to \$3,904,144, making total net earnings \$25,754,677. After deducting for interest, discount, depreciation and depletion and expense of bond and note issues applicable to subsequent years, there was left a balance of \$8,028,803.

President Grace said the net income of \$8,028,803 represented an earning of 7.6 per cent on the \$60,000,000 common stock, after payment of \$3,450,000 for preferred dividends. These earnings, he said, were largely from orders on the books at the beginning of the year, carried over from the war and the subsequent period of prosperity.

The year 1921, he said, was one of the worst ever experienced by the modern steel industry. On Dec. 31 last orders on hand amounted to only \$50,184,000, while at the end of 1920 booked orders were \$145,287,000. Business booked last year was \$52,672,000.

Mr. Grace said, however, that the corporation's current assets were \$89,636,875 more than current liabilities, whereas a year ago the excess had been \$77,474,000. Cash and liquid securities, largely United States Treasury obligations, amounted to \$54,881,227 on Dec. 31, 1921, compared with \$20,078,788 on the same date in 1920.

Value of all inventories at the end of the year was \$41,115,700, compared with \$73,208,678 at the close of 1920. Allowance for depreciation and depletion during the year was \$6,002,715. Total allowance for depreciation, depletion and amortization made out of earnings from 1916 to 1920, inclusive, was \$90,300,000 and adequately provided for the elimination from the corporation's plant values of its entire investment in ordnance plants made subsequent to 1914, as well as the excess cost of commercial plants constructed during the war period. Of a property account of \$335,000,000, less than \$8,000,000 is now represented by investment in ordnance works.

The directors declared the regular dividends on both classes of preferred stocks for the entire year 1921.

regular quarterly dividend of 1½ per cent was declared on common stock, payable April 1 to stock of record March 14.

Gulf States Deficit

Net operating income of Gulf States Steel Co. for quarter ended Dec. 31, 1921, was \$74,610, after deductions for taxes, depreciation and other charges, there was a deficit of \$11,937. After depreciation and taxes, and after marking down inventories as of Dec. 31, to the market, the deficit for the year 1921 was \$467,602

Inland Makes Excellent Showing in 1921

Whereas most of the large independent steel manufacturers suffered heavy losses during the year 1921, the Inland Steel Co., Chicago, with plants at Indiana Harbor, Ind., and Chicago Heights, Ill., made net earnings after deducting charges for repairs and maintenance, inventory adjustment and reserve for taxes, of \$1,728,031. Allowance for depreciation of plants, provision for exhaustion of minerals, and deduction for bond interest, left net profits of \$510,728. This is regarded as a remarkable record in view of the long-continued depression in the steel industry which forced prices to a low level and permitted only partial operation of plant facilities. The company is prominently mentioned as a probable unit in the proposed merger of independent steel mills. The statement of earnings and condensed balance sheet follow:

Statement of earnings.	
Year ending Dec. 31, 1921.	
Net earnings from operations.....	\$1,728,031.07
Less—	
Provision for depreciation of plants	\$877,059.00
Provision for exhaustion of minerals	34,934.29
Bond interest	305,310.00
	1,217,303.29
Net profits for year	\$510,727.78
Add previous surplus	18,708,681.69
	\$19,219,409.47
Deduct—	
Dividends paid	1,013,964.00
Final surplus	\$18,205,445.47
Condensed balance sheet	
Dec. 31, 1921.	
Assets	
Capital assets—	
Land, plants and buildings.....	\$45,220,987.17
Current assets	18,009,797.75
Deferred charges—	
Advance royalty on ore, etc.	318,642.85
	\$60,549,427.77
Liabilities	
Capital liabilities—	
Capital stock	\$25,331,475.00
Bonded debt	4,961,000.00
	30,292,475.00
Current liabilities—	
Accounts payable	709,496.06
Current payrolls	225,321.69
General taxes accrued.....	407,192.21
	1,342,009.96
Interest accrued on bonded debt.....	15,750.00
Reserves	10,693,747.34
Surplus	18,205,445.47
	\$60,549,427.77

The Lincoln Steel Co., 112-118 North May Street, Chicago, has been appointed by the Pittsburgh Cold Rolled Steel Co., Verona, Pa., to act as its agent in the Chicago district in the sale of cold rolled strip steel, flat wire, etc.

The Holden Co., of Toronto, Montreal, Winnipeg and Vancouver, announced that it has assumed control of the Canadian Brake Shoe Co., Sherbrooke, Que. All business pertaining to the latter company will be transacted at the head office of the Holden Company, 354 St. James Street, Montreal.

Trade Changes

The Doullut & Williams Co., Inc., engineer and general contractor, New Orleans, announces the reorganization, consolidation and incorporation under the above title, with a capitalization of \$1,000,000, of the following companies and their various interests: Doullut & Williams, Inc., Southern Lighterage & Wrecking Co., Inc., Shell Beach Land & Improvement Co., Inc., with the increased capitalization and enlarged organization, the new company will continue to carry on the different operations previously handled by the above named companies. It will extend its operations to various kinds of construction.

The Alfred O. Blatch Co., manufacturer of Blatch modern carbonizers, announces removal from Chicago to its new plant at 181 Beaufort St., Detroit.

Mutually satisfactory arrangements have been made between the Combustion Engineering Corporation and the George J. Hagan Co., Pittsburgh, whereby the Hagan company discontinues representation of the Combustion Engineering Corporation. The Combustion Engineering Corporation has opened its own office in the First National Bank Building, Pittsburgh, and will soon open an office in Cleveland, both of which will be in charge of W. C. Stripes, former manager of the Philadelphia office. The George J. Hagan Company will retain the exclusive agency for the type "H" stoker formerly known as the American stoker, for use in Hagan industrial furnaces.

The Fisher Tool & Supply Co., Detroit, has removed from 451 East Jefferson Avenue to 45 East Baltimore Avenue.

The Pressed Steel Car Co. and Western Steel Car & Foundry Co. have discontinued their Washington office, effective Feb. 1. J. O. Cameron, who has been a representative of these companies in the Southern territory for many years, has severed his connections with the companies, but will continue his office in the Munsey Building to handle other accounts.

The Gray Machine Co., Benton Harbor, Mich., has changed its name to the Video Machine Co.

The sales and engineering departments of the New England Structural Co., 19th floor, 110 State St., Boston, as of Feb. 1, will be consolidated with the general offices of the company at its Everett Mass. plant. No departure from the established methods of operation are contemplated by the company.

The Skinner Engine Co. Erie Pa. has placed its account for the Pittsburgh district in the hands of the Andrews-Bradshaw Co., 812 E. F. Jones Building, Pittsburgh.

The name of the Brown McDonald Machinery Co., St. Louis, has been changed to Brown Machinery Co.

The Dominion Asbestos & Rubber Corporation, now located at 154 Nassau Street, New York, will move its executive offices to more commodious quarters at 1780-82 Broadway. It will retain its present store and shipping office at 67 Murray Street, for the convenience of its marine and industrial patrons, but will remove its stock of automotive equipment lines to its new address.

The Robert Gordon Co., Chicago, has moved from 624 Monroe Street to 1355 W. Washington Street.

The Dayton-Dowd Co., manufacturer of centrifugal pumps, Quincy, Ill., has opened a district office in Pittsburgh at 809 Keenan Building, covering the sale of centrifugal pumps and underwriters' fire pumps. The office will be in charge of T. J. Barry, who for the past several years has been with the home office on engineering and sales.

The Morley Machinery Corporation (successor to the W. A. Wilson Machine Co. and the Rochester Boiler Works), manufacturer of iron planers and special machinery, is now located in the plant formerly occupied by the Inflexible Check Writer Corporation, 782-814 St. Paul Street, Rochester, N. Y. New equipment has been purchased. The new property has a railroad siding.

The Stow Flexible Shaft Co., manufacturer of portable drilling and grinding machines and flexible shafts, has moved to its new plant at 3452 Ludlow Street, Philadelphia.

Reports to the U. S. Geological Survey indicate a very large decrease in the output of chemical lime in 1921, due to the decline and depression in the metallurgical and chemical industries. The production of dead-burned dolomite, which has replaced calcined magnesite for use in patching and lining basic open-hearth furnaces, decreased from 316,000 tons in 1920 to 140,000 tons in 1921. Decreases of 25 to 65 per cent were reported for the plants that produce dead-burned dolomite. Decreases were also reported by plants that manufacture lime for use by paper mills, sugar factories, alkali works, carbide plants, and other chemical industries.

British coal competes with American in the West Indies and South and Central America, according to the Department of Commerce, because of a 46 per cent reduction in British miners' wages, while American miners still get war-time wages; a cut of 12½ per cent in coal rates on British railroads and a reduction of 25 per cent in British dock charges. In the three chief coal fields of Britain the average weekly wage of coal heavers is now reported at 57s. 4d. (\$12.04 at \$4.20 per £1). American coal has a great advantage in the use of machinery, 59 per cent of the 1919 product having been machine-mined, compared with 12.8 per cent of the British 1920 output.

Machinery Markets and News of the Works

MORE LARGE ORDERS

Automobile and Parts Manufacturers Are Buyers of Shop Equipment

Improvement in Machine-Tool Business Noted in Many of the Leading Centers

Though there are still many dull spots in the machine-tool trade, a trend toward improvement in business is noticeable. Orders recently placed by automobile manufacturers have created a much more hopeful feeling. A Cincinnati manufacturer received an order for 40 machines and an Eastern maker of grinding machines has booked an order for 25. A manufacturer of universal joints in Indiana has bought 20 small manufacturing lathes and three turret lathes.

In every market, with the possible exception of New York, there are some evidences of betterment. A Chicago dealer reports that if succeeding months of 1922 are as good as January, he will, at least, be able to conduct his business without loss. Cincinnati manufacturers of tools report an improvement over the pre-

vious week, though inquiries are mostly for single machines. New England business for January is reported to be well above that of December and fully 30 inquiries are pending, some for single tools, but a few running into larger quantities. A Westfield, Mass., manufacturer of heating equipment is in the market for about \$25,000 worth of tools for an experimental shop.

The Zigler Mfg. Co., Alexander, Ind., is inquiring for about a dozen tools. The Cleveland Board of Education is asking bids on six wood-working machines and two metal-working tools.

A new company in New England which contemplates entering into the manufacture of power plant equipment may close this week on a fairly large list of tools.

Railroad buying has dropped off, the theory being that the carriers are awaiting results of the freight rate hearings now being conducted by the Interstate Commerce Commission. The Maine Central is inquiring for a driving wheel lathe and two other tools.

About 115 used tools were sold last week by the Standard Parts Co., Cleveland. Most of the tools were sold to dealers, and the prices paid were very low.

New York

New York, Jan. 31.

Judging by reports which machine-tool selling representatives in New York are receiving from their home offices there has been some improvement in machine-tool orders throughout the country, but apparently this improvement is more marked in other districts than the New York territory. Most of the large companies in the East which ordinarily are the most active buyers of machine tools are still pursuing a cautious policy. Such orders as are being received come more frequently from the smaller manufacturers. Demand for used tools is fairly active, and there is a slightly better demand for new machines, but inquiries are almost entirely for single tools.

Although sales of cranes are not numerous, a few good inquiries have appeared in the market the past week and there are prospects of greater activity next month. An old list, issued several months ago, by the American Brake Shoe & Foundry Co., New York, calling for 12 electric cranes ranging up to 7½-ton capacity, has appeared again for new prices. This company is submitting bids for the cast iron segments for the New York-New Jersey vehicular tunnel and the cranes will be purchased provided this contract is obtained. The Electric Bond & Share Co., 71 Broadway, New York, has inquired for a 40-ton, one-motor, overhead traveling crane for a power house in Pennsylvania. A hand-power crane inquiry from the General Engineering & Management Association, 141 Broadway, New York, calls for bids on a 5-ton, 31-ft. 6-in. crane, which will probably be shipped to a point in Texas. The Third Avenue Railway System, 2396 Third Avenue, New York, is receiving bids on a 2-ton, 42-ft. span, 3-motor, overhead traveling crane. The American Locomotive Co., 30 Church Street, New York, is in the market for a 3-ton electric hoist.

Among recent crane sales were: Chesapeake Iron Works, a 5-ton, 13-ft. span, single I-beam crane to the American Sugar Refining Co. for its Baltimore plant; Roeper Crane & Hoist Works, a 5-ton electric hoist to the Ransome Concrete Machinery Co., Dunellen, N. J.; Northern Engineering Works, a 25-ton, 36-ft. span, overhead traveling crane to the W. S. Barstow Co., 50 Pearl Street, New York, for the Pennsylvania Edison Co., Reading, Pa.

The Cook Spring Co., which for a quarter of a century has been manufacturing springs for mechanical purposes in New York City, has completed a new and thoroughly equipped plant for the same purpose at Ann Arbor, Mich. During

recent years the center of the company's trade has moved steadily westward, and the Ann Arbor plant is nearer its trade center. The Eastern plant and office have been closed and dismantled.

The Superintendent of Lighthouses, Staten Island, N. Y., will take bids until Feb. 14 for two 30-hp. vertical double-cylinder air compressors, with twin air cylinders, oil engine driven.

The New York Edison Co., Irving Place and Fifteenth Street, New York, will soon take bids for the superstructure of its new one-story power house, 50 x 100 ft., at Park Avenue and 188th Street, estimated to cost about \$75,000. It has filed plans for a two-story power house, 25 x 103 ft., at 122 East Thirteenth Street, estimated to cost a like amount. William Whitehill, Forty-first Street and Sixth Avenue, is architect for both structures.

Fire, Jan. 26, destroyed a number of shops at the plant of the Morse Dry Dock & Repair Co., foot of Fifty-sixth Street, Brooklyn, including boiler shop, tool and pipe shop and company garage, with loss estimated at about \$200,000, including buildings and equipment. Edward P. Morse is president.

F. M. Schilldewachter, 4130 Park Avenue, New York, is having plans completed for a four-story ice-manufacturing plant, 75 x 110 ft., on Webster Avenue, to cost about \$1,000,000 with machinery. William H. Meyer, 1861 Carter Avenue, is architect.

Gen. Franklin W. Ward, secretary to the State Board of Armory Commissioners, 158 State Street, Albany, N. Y., will take bids until Feb. 8 for a quantity of metal lockers.

The Acme Lighting Fixture Co., 132 West Fourteenth Street, New York, manufacturer of electric lighting and gas fixtures, has leased the entire six-story building, 40 x 100 ft., at 107-9 West Thirteenth Street for headquarters.

The Village Council, Rockville Center, L. I., is planning for extensions and improvements in the municipal electric light and power plant to cost about \$60,000.

The Janusch Mfg. Co., 282 East 135th Street, New York, manufacturer of brass goods, has inquiries out for a number of lathes and a screw press.

Fire, Jan. 23, destroyed the power house of the National Light & Power Co., Port Washington, L. I., with loss estimated at close to \$50,000. It will be rebuilt.

Albert Kellar, 1744 Garfield Street, New York, will take bids at once for a one-story cold storage plant at 408-15 East 188th Street, estimated to cost about \$150,000. A. Landrum, 705 Ninety-sixth Street, Woodhams, L. I., is architect.

The William Bayley Co., 110 West Fortieth Street, New York, manufacturer of steel sash, etc., has purchased four city lots at Van Alst Avenue and Seventh Street, Long Island City, for new works. Plans will be drawn at an early date.

The Christian Feigenspan Co., 50 Freeman Street, Newark, N. J., will commence the immediate erection of a one-story ice-manufacturing plant at 71-85 Bishop Street, Jersey City, N. J., estimated to cost about \$50,000.

The Ingram Motor Co., 2 Rector Street, New York, Joseph Ingram, president, will build a one-story foundry in connection with its new automobile plant at Egg Harbor City, N. J. H. B. Perry is engineer.

A one-story power house will be erected by the Bogota Paper & Board Co., Bogota, N. J., in connection with a one-story addition, estimated to cost about \$40,000. The Austin Co., 217 Broadway, New York, is the contractor.

A vocational department will be installed in the new high school to be erected at Swedesboro, N. J., plans for which have been completed. Bids for construction are being taken until Feb. 6. Simon & Simon, 249 South Juniper Street, Philadelphia, are architects.

Motors, power and other mechanical equipment will be installed in the new plant to be erected by the Cumberland Glass Mfg. Co. Bridgeton, N. J., estimated to cost \$1,750,000. Keeley Brothers, Brighton, have the building contract.

John Keavey, 375 Palisade Avenue, West Hoboken, N. J., will take bids at once for a one-story automobile repair and service building, 75 x 100 ft., at Palisade Avenue and Mahne Street, estimated to cost about \$50,000. McDermott & Binda, 582 Bergenline Avenue, are architects.

The Fords Porcelain Works, Lehigh Avenue, Perth Amboy, N. J., has been incorporated as the Fords Porcelain Works, Inc., with capital of \$1,000,000, to manufacture wash basins, sinks, lavatories, etc. It will operate two plants at Perth Amboy and one at Fords, near Perth Amboy. Abel Hansen is president.

Grinding mills, motors and other mechanical equipment will be installed in the new plant to be erected by the Orbis Products Trading Co., Wyckoff Avenue, Brooklyn, at Newark, N. J., occupying about 4 acres, recently purchased. It specializes in the production of essential oils. Plans will be completed at an early date.

The Department of Parks and Public Property, City Hall, Newark, N. J., is arranging for the erection of a new power plant to cost about \$150,000, in connection with the municipal market building, now in course of construction. Frank Grad, 245 Springfield Avenue, is architect.

A vocational department will be installed in the new two-story high school to be erected by the Board of Education, Hightstown, N. J., estimated to cost \$150,000. Guilbert & Betelle, 546 Broad Street, Newark, architects, will prepare plans.

Philadelphia

PHILADELPHIA, JAN. 30

E. J. McAlcer & Co., 1422 North Eighth Street, Philadelphia, manufacturers of tinware, metal products, etc., have awarded contract to the A. Raymond Raff Construction Co., 1635 Thompson Street, for an addition to cost about \$60,000.

The Moore & White Co., 2701-31 North Fifteenth Street, Philadelphia, manufacturer of friction clutches, machine products, etc., has awarded contract to Clarence W. MacDowell, 2118-20 Diamond Street, for a new foundry, estimated to cost \$33,000.

George W. Lindley, 5122 Wakefield Street, Philadelphia, operating a general machine works, has awarded contract to John F. Frith, 5817 Osceola Street, for a three-story addition, 32 x 102 ft., estimated to cost \$20,000.

The Philadelphia & West Chester Traction Co., Sixty-ninth Street Terminal, Philadelphia, will make extensions and improvements in its signal system and other mechanical departments to cost about \$75,000.

A one-story power house, 30 x 63 ft., will be constructed by the Ferris Shoe Co., Monmouth and Juniper streets, Philadelphia, in connection with its new five-story factory at Sixth and Duncannon streets. Plans are being prepared.

The Philadelphia Electric Co., Tenth and Chestnut streets, Philadelphia, is arranging for the sale of a bond issue for \$4,000,000, to be used in part for enlargements at its generating plant, including the installation of new equipment, and other extensions.

The E. V. Reeves Steel & Foundry Co., Twenty-second and Hayden streets, Camden, N. J., will soon break ground for a new two-story plant, 40 x 40 ft. S. V. Reeves is head.

The Norton Mfg. Co., Merchantville, N. J., manufacturer

of metal products, William Hinck, local representative, has awarded contract to M. T. James, Merchantville, for a new one-story factory, 60 x 175 ft.

The New Jersey State Highway Department, Trenton, N. J., has awarded contract to the Austin Co., Bulletin Building, Philadelphia, for its one-story automobile repair and service works at Fernwood, N. J., 106 x 400 ft., estimated to cost \$25,000. R. J. Wasser, Broad Street Bank Building, Trenton, is engineer.

George A. Swartz, York, Pa., and associates, have acquired the plant of the Pullman Automatic Ventilator Mfg. Co., York, and will use the structure for a similar line of production.

The Anthracite Brick & Tile Corporation, Wilkes-Barre, Pa., recently organized in Delaware with capital of \$265,000, has taken over the properties of the Keystone Clay Co., Wyoming, Pa., and plans for extensive operations for the manufacture of brick, tile, etc. It is represented by the Corporation Trust Co. of America, du Pont Building, Wilmington, Del.

A vocational department will be installed in the new high school to be erected at Barnshorn, Pa., plans for which are being prepared by Hersh & Sheller, Commerce Building, Altoona, Pa., architects. Bids will be asked in the spring.

The Lehigh Coal & Navigation Co., Lansford, Pa., has construction under way on a new coal breaker at Coakville, estimated to cost close to \$1,000,000 with machinery.

The Du Roth Steel Truck & Car Wheel Co., Granite City, Pa., has commenced the erection of a new plant to manufacture car-wheels and trucks under a new process. E. B. Du Roth heads the company.

A vocational department will be installed in the new high school to be erected at Easton, Pa. Bonds for \$1,000,000 were provided some time ago but the project has been held in abeyance. Plans will be prepared in the near future.

The Royersford Needle Works, Royersford, Pa., will commence the immediate erection of a two-story addition, 50 x 150 ft., with extension, 25 x 32 ft. estimated to cost about \$25,000.

The Floyd-Wells Co., Royersford, Pa., manufacturer of stoves, ranges, etc., has completed foundations for a two-story addition, 32 x 120 ft., and will commence work on the superstructure at once. A. S. Kepner, 121 Hanover Street, Pottstown, Pa., is architect.

A vocational department will be installed in the new two-story and basement high school to be erected at Monessen, Pa., 155 x 200 ft., estimated to cost about \$300,000. J. M. Broll & Sons, Monessen, are architects.

Fire, Jan. 25, destroyed a portion of the south shop at the plant of the American Car & Foundry Co., Berwick, Pa., with considerable loss. An estimate of the damage has not been announced.

A cold storage plant will be installed by the Franklin Brewing Co., Wilkes-Barre, Pa., in connection with its two-story addition, estimated to cost about \$25,000. Schmitt & Schroeder, Weitzenkern Building, are architects.

The Kolb Baking Co., Tenth and Reed streets, Philadelphia, has taken bids for the erection of a one-story automobile service and repair building 125 x 260 ft., at Broad and Greene streets, to cost \$60,000. H. E. Weldon, 10 South Eighteenth Street, is architect.

Buffalo

BUFFALO, JAN. 30.

The Board of Education, Buffalo, is having plans prepared for remodeling of a three-story building, 65 x 150 ft., at Georgia and Front streets, for a new vocational school, and will call for bids in February. H. L. Beck, Municipal Building, is architect.

The Artizan Factories, Inc., North Tonawanda, N. Y., recently organized to manufacture metal products, with capital of \$100,000, has acquired about two acres of land near Division Street as a site for a new plant. Plans will be prepared at once.

Acer & Wheadon, Commercial Street, Medina, N. Y., manufacturer of sheet metal products, are arranging for the erection of a one-story addition, 85 x 100 ft., to double the present capacity.

A vocational school will be erected by the Board of Education, Rochester, N. Y., in connection with the new three-story high school, 345 x 450 ft., at Hudson Avenue and Norton Street, estimated to cost about \$4,000,000. It will include machine shop, foundry, automobile shop, etc. Work will commence at once. E. S. Gordon, 125 Sibley Building, is architect.

The vocational department, chemical laboratory and other portions of the high school at Pine Avenue and Portage Road, Niagara Falls, N. Y., were destroyed by fire, Jan. 24, with loss estimated at \$500,000, of which about \$100,000 represents equipment. The Board of Education will prepare plans for rebuilding the structure.

The Morely Machinery Co., Rochester, N. Y., comprising a merger of the W. A. Wilson Machine Co. and the Rochester Boiler Works, has acquired a plant at 792 St. Paul Street, formerly occupied by the Defiance Check Writer Corporation, and will manufacture planers, special machinery and parts.

The Board of Supervisors, Buffalo, has authorized Thomas H. McElvich, County purchasing agent, to purchase a new steam roller for road work. Bids will be called at once. Machinery for a municipal asphalt plant will be purchased at the same time. An appropriation of \$30,000 has been made for the plant.

Chicago

CHICAGO, Jan. 30.

January proved a better month for local houses than December. One dealer, in fact, states that if business is as good during the succeeding months of 1922, he will be able to keep red figures out of his books. Current buying is principally confined to individual machines and a good proportion of current orders is for second hand equipment. Notable among orders recently placed may be mentioned three used 24-in. boring mills, one new 42-in. boring mill, two new 72-in. gear cutters, and one new 22-in. x 10-ft. engine lathe. Business is coming from miscellaneous sources and while no one class of consumers stands out prominently, it is to be noted that automobile accessory manufacturers seem to have taken a new lease on life and are placing some orders for machine tools and supplies. As a whole, pending railroad bids are still held in abeyance. The Santa Fe, however, has placed orders for a large boring mill, an axle lathe and a steam hammer, and has put out an inquiry for three motor-driven internal and external tool post grinders. The American Steel Foundries is in the market for a No. 1½ Cincinnati cutter and tool grinder.

The Consumers Power Co., Jackson, Mich., has bought a 20-ton overhead electric traveling crane for its Roger dam plant near Grand Rapids.

The Cicero-Chicago Corrugated Co., 1542 South Fifty-first Court, Cicero, Ill., has let a contract for the reconstruction of its one-story plant, 130 x 130 ft.

The Vienna Model Bakery Co., 1040 Vern Park Place, Chicago, is receiving bids on a three-story plant, 121 x 140 ft., to cost \$150,000.

The municipal commission, Hibbing, Minn., is considering plans and specifications for an addition to its light and water plant to cost \$150,000.

E. W. Ferrol has opened a machine shop at 225 West Main Street, Robinson, Ill. He will specialize on small machine and automobile parts.

The Gray Iron Foundry Co. and the Alamo Heating Co., Muskegon, Mich., have merged under the name of the Gray Iron Foundry & Furnace Co. E. L. Meier will be president and the other officers have not yet been named.

The American Parts Corporation, Toluca, Ill., was recently incorporated with \$250,000 capital stock to take over the assets and properties of the Automotive Radiator Corporation and several other smaller plants. It is now constructing a plant, 135 x 480 ft., and expects to purchase stamping machinery and presses, sheet metal tools and a general line of machine shop equipment. The company is at present manufacturing automobile radiators both for replacement and for the equipment of all makes of cars, and is also producing various other mechanical and metallic parts for automobiles. The officers are Phil F. Sperry, president; John W. Schult, treasurer; and George G. Anderson, secretary. The Chicago office is at 519-21 West Van Buren Street.

The Axtell Auto Accessories Co., 1507 Michigan Boulevard, Chicago, was recently incorporated with \$24,000 capital stock. The company's business consists principally of the jobbing of automobile accessories, motor parts and garage equipment. Its manufacturing operations are confined to a line of special bodies for Ford and Chevrolet automobiles. The officers are Joseph E. Axtell, president, and Charles L. Runyan, secretary.

The Roger Dam Power Plant of the Consumers Power Co., Grand Rapids, Mich., which was recently destroyed by fire, will be replaced at a cost of \$150,000. Work will begin as soon as the insurance is adjusted, and plans provide for equipment with 50 per cent greater capacity than that of the old plant.

The Illinois Traction System contemplates the construction of a large electric power generating plant at Decatur, Ill.,

according to an announcement by H. E. Chubbuck, general manager. Plans for the erection of the plant, he said, are contingent on securing permission from the city to use water for condensing purposes from a new artificial lake at Farjes Park. Preliminary estimates place the cost between \$600,000 and \$1,000,000.

The D. V. Reedy Elevator Co., manufacturer of passenger elevators, Indianapolis, plans to construct a two-story factory, 44 x 202 ft., at 520-522 South New Jersey Street, at a cost of \$35,000.

The city of Ottumwa, Iowa, contemplates the erection of a \$600,000 hydroelectric power plant. Permission to dam the Des Moines River near Harvey has been granted by the United States War Department.

The city of Centralia, Ill., has awarded contract for a pumping station and the installation of other equipment, including the laying of a 14-in. pipe line to the Beeson Machinery Co., Kansas City, Mo.

The J. L. Ferguson Co., a newly organized corporation to manufacture labor-saving package machinery, has leased the former plant of the Quaker Oats Co. at Railroad and Shelby streets, Joliet, Ill. At present 30 men are at work in the plant and this number will be gradually increased. Others connected with the company besides J. L. Ferguson, the president, are J. R. Montgomery, sales manager, and E. H. Barr, superintendent.

The State Board of Regents, Pierre, N. D., T. W. Dwight, president, will commence the erection early in March of its new power plant at the State College of Agriculture and Mechanical Arts, Brookings, N. D. H. F. Berg, Pierre, is State engineer.

A vocational department will be installed in the new high school at Scottsbluff, Neb., plans for which are being prepared by R. A. Bradley & Co., Hastings, Neb., architects. The total cost is estimated at \$500,000.

The Western Electric Co., 500 South Clinton Street, Chicago, manufacturer of telephone and other electrical equipment, is planning for the early installation of machinery in the new building now being completed at its plant at Hawthorne, near Chicago. The structures represent an investment of close to \$2,000,000, and the machinery to be installed will approximate \$1,500,000.

The Pendergast Implement Co., Bemidji, Minn., manufacturer of agricultural implements, etc., is planning for the erection of a two or three-story building, 65 x 125 ft., estimated to cost about \$60,000.

The Commonwealth Edison Co., 72 West Adams Street, Chicago, has filed plans for a new one-story power house, 25 x 58 ft., at 5547 Lowe Avenue.

The Board of Education, Fremont, Neb., is taking bids until Feb. 20 for a three-story junior high school, 101 x 160 ft., to include a vocational department, estimated to cost about \$200,000. The A. H. Dyer Co., Fremont, is architect. S. S. Sidner is chairman of the school board.

G. C. Brown and W. C. Gridley, 1826 Hoffman Boulevard, Rockford, Ill., are taking bids for a new one-story machine and repair shop, 35 x 60 ft.; one-story power house, 25 x 30 ft., and one-story main automobile service works, 60 x 145 ft., estimated to cost close to \$80,000. C. E. Woolley, 610 Stewart Building, is architect.

New England

Boston, Jan. 30.

Sales of machine tools in the past week have been comparatively small, although they include a few large and costly machines. Sentiment among the manufacturers of metal working equipment and sales representatives has taken a pronounced turn for the better, however. In individual instances it borders on optimism, and is based on several constructive facts. Preliminary estimates disclose bookings well above those for December and compare favorably with the November record. Additional prospects have developed the past week, most of them involving small amounts of equipment but having all earmarks of being urgent requisitions. Some of the more important inquiries on which prices have been out give strong evidence of maturing within the next fortnight, and other concerns have given assurances that the needed funds for required single machines will shortly be forthcoming. In the aggregate, inquiries for new machines equal those for used. Heretofore used tools have led in activity. Small shops, for the first time in months, are busier, and in quite a few cases have taken on or are about to take on additional machinists. Many of the larger industrial plants are gradually increasing outputs, although still operating well below normal.

A Westfield, Mass., manufacturer of heaters is planning to start an experimental shop and is looking for about

\$15,000 worth of equipment. The list includes a boring machine, planing, upright drilling, turning and other equipment. The Maine Central Railroad is inquiring for three tools, one of which is a large driving wheel lathe. This inquiry has no connection with the one sent out last September, which apparently has been abandoned. A local representative of a lathe manufacturer contemplates closing next week with a nearby manufacturer on a 16-in. x 10 ft. lathe, and has more than half a dozen inquiries on smaller turning tools. A New England maker of pumps has closed for a large horizontal drill, and signifies an intention of doing likewise on a special four-spindle drill and large lathes in the immediate future. A new company to manufacture power equipment is scheduled this week to close on a fairly large list of metal-working equipment involving new and used machines. As near as can be estimated there are 30 other inquiries, varying in size and value, that give promise of being closed in February. It is upon this comparative activity, and the more encouraging industrial outlook that the machine tool trade is basing expectations.

Sales the past week include an 11,000-lb. new power press and a used 500-lb. power hammer to a South Boston manufacturer, who contemplates additional equipment purchases; a new 8-in. surface grinder to a maker of electrical equipment; bulldozer or bending machine, a large punch and shear, all new equipment, to a central Massachusetts interest; one 16-in. x 10-ft. gap lathe to a Hyde Park, Boston, manufacturer, and a 9 x 4-ft. lathe to a local garage. Dealers in used equipment report prices as firmer. The only developments regarding prices on new machine tools are confirmations received from some Western manufacturers verifying lists issued in October and November.

Rockwell & Sherwin, Elm Street, Brattleboro, Vt., carriage manufacturers, have leased their plant to the Roberts Auto Co., and will retire from business. The automobile company will conduct a service department.

The Segal Metal Products Co., Springfield, Stamford, Conn., has awarded contract for a one-story, 45 x 81-ft. foundry to replace one recently destroyed by fire.

The Wallingford Steel Co., Wallingford, Conn., a new organization, contemplates the erection of three plant units, 100 x 130 ft., 50 x 100 ft., and 100 x 300 ft., respectively, on the east side of Quinnipiac River. Rolling mill equipment will be installed.

George U. Ladd, Worcester, is president, and George D. Morse, treasurer of the G. U. Ladd Co., recently incorporated under the laws of Massachusetts to manufacture pumps and steam devices. Details regarding production have not yet been worked out.

The plant formerly occupied by the Consolidated Motor Co., Middlefield, Conn., has been sold to the National Auto Stores Co., New Haven, Conn. It will be ready for operation before spring.

The Great Northern Paper Co. is completing at Greenville, Me., a 116 x 226 ft. plant containing a machine shop, wood-working shop, repair and paint shops, tool and stock rooms.

Richard H. Long, Framingham, Mass., states that the plant erected by him on Millbrook Street, Worcester, will be used for the manufacture of automobiles. Equipment requirements have not been made public.

Improvements are being made at the plant of the American Brass Co., Torrington, Conn., including the installation of electric furnaces and the changing over from steam to electric shop power.

The interests which recently acquired the Harley Co., Springfield, Mass., foundry and drop forging properties from motorcycle interests of that city have received an order for \$150,000 worth of maintenance accessories from a large Eastern railroad. Plans call for extensions and improvements in the near future, with possibilities of machine tool purchases.

The Kress Carriage Co., Concord Street, Lawrence, Mass., manufacturer of automobile bodies, etc., will build a two-story addition, 45 x 93 ft.

A vocational department will be installed in the new high school to be erected at Winchester, N. H., estimated to cost about \$50,000. Clarence Hoyt, 8 Beacon Street, Boston, is architect.

The J. L. Anthony Co., 161 Dorrance Street, Providence, R. I., manufacturer of metal specialties, jewelers' findings, etc., has awarded a contract to Mahoney & Tucker, 72 Weybosset Street, for a new one-story plant, 55 x 130 ft.

Work has been commenced on a new high school at Spoughton, Mass., with vocational department, estimated to cost about \$125,000. E. F. Leonard is chairman of the Spoughton School Board.

The Rhode Island Fittings Co., Hills Grove, R. I., manufacturer of metal fittings, etc., has awarded a contract to

Carl E. Carlson, 142 Atlantic Avenue, Providence, R. I., for a new one-story plant, 65 x 260 ft., on Narragansett Avenue.

Officials of the Potter & Johnston Machine Co., Pawtucket, R. I., manufacturer of automatic machinery, have organized the Potter Fine Spinners, Inc., with capital of \$300,000, and contemplate the erection of a new plant in the vicinity of the present works. The company is headed by James C. Potter and John Johnston, president and treasurer, respectively, of the Potter & Johnston company.

A vocational department will be installed in the new two-story high school to be erected at Palmer, Mass., estimated to cost about \$150,000. Morris W. Maloney, 145 Chestnut Street, Springfield, Mass., is architect.

A one-story power house, 40 x 50 ft., will be built in connection with a new industrial plant, 156 x 201 ft., at New Haven, Conn., plans for which are being prepared by Dwight E. Smith, Liberty Building, architect. The owner's name will be announced at an early date. It will cost about \$100,000.

A vocational department will be installed in the new junior high school to be erected at New Haven, Conn., site for which will be purchased at an early date. Local architects have been asked to submit competitive plans.

Pittsburgh

PITTSBURGH, JAN. 30.

The United Engineering & Foundry Co., Pittsburgh, has closed for a 15-ton crane with 5-ton auxiliary which is the first of several cranes the company will buy in connection with the enlargement of the Frank Kneeland works. The Cleveland Crane & Engineering Co., Wickliffe, Ohio, through its Pittsburgh office has been awarded a 5-ton, 37-ft. span special low-head crane by the Elliott Co., Jeannette, Pa. These sales constitute the only crane business of the past week and in both instances old rather than new business was represented. In new business the crane market in this district has not been so dull in several years. Several manufacturers' representatives state that they have had no new inquiries in more than a month and quotations put out have been for estimating purposes rather than against real prospects. The Allis-Chalmers Mfg. Co., Milwaukee, has been awarded a 48 x 60-in. twin tandem 3300-kw. blast furnace gas engine electric unit by the National Tube Co., for its Lorain, Ohio, works. Machine-tool activities are extremely small and sales out of dealers' stocks also have decreased in the past week. The West Penn Steel Co., Brackenridge, Pa., is said to be in the market for a couple of key-seating machines, but having only occasional use for them it is believed that used, rather than new machines will be bought.

The Frick & Lindsay Co., Sandusky and Robinson streets, Pittsburgh, manufacturer of railroad and mine equipment, is completing excavations for the erection of its proposed addition, estimated to cost about \$90,000.

The Jeffrey-Dewitt Insulator Co., Kenova, W. Va., has been organized with a capital of \$800,000, as a subsidiary of the Jeffrey-Dewitt Co., Detroit, to operate a local plant for the manufacture of electrical insulation products. M. L. Burnett and J. S. McNeer, both of Huntington, W. Va., are among the incorporators.

The Board of Education, Princeton, W. Va., will take bids in February, for a new two-story and basement high school, 60 x 190 ft., to include vocational department, estimated to cost about \$150,000. J. V. Woodson is president of the board. Wygong, Tufts & Jones, Princeton, are architects.

A vocational department will be installed in the new high school to be erected by the Stab Fork District School Board, Statesbury, W. Va., plans for which have been completed.

Detroit

DETROIT, JAN. 30.

The Rich Steel Products Co., Battle Creek, Mich., has reincorporated with a capital of \$3,500,000 and will soon start production of automobile parts. It will build an extension to take care of the additional business, and will probably double the present working force of 350 men.

The Superior Combustion Engine Corporation, Detroit, will start production of a new type of heavy duty internal combustion engine as soon as manufacturing facilities can be procured. The company is backed largely by Detroit capital and includes a number of prominent Detroit business men among its officers and directors. Announcement of its personnel and plans will be made in a short time.

The Citizen's Light & Power Co., Adrian, Mich., will proceed immediately to double the capacity of its plant.

A turbine generator of 2,000-kw. capacity and additional boilers will be purchased.

The Michigan Crown Fender Co., Ypsilanti, Mich., has purchased the Jackson Stove Co., Jackson, Mich., and will move the plant to Ypsilanti. It will manufacture oil stoves, heaters and ranges with its regular line.

The Gratiot Mining Co., Calumet, Mich., has plans under way for a new power house at its properties.

The Motor Wheel Corporation, Lansing, Mich., will defer until March the erection of its new one-story and basement plant, 120 x 240 ft., contract for which was awarded recently to the H. G. Christman Co.

A vocational department will be installed in the two-story and basement high school to be erected at Mt. Clemens, Mich., estimated to cost about \$200,000. Plans are being prepared by T. Van Duinme, 11 North Front Street, architect.

The Kalamazoo Ice & Fuel Co., 113 East Kalamazoo Street, Kalamazoo, Mich., is completing plans and will call for bids early in February for a new ice manufacturing plant. George R. Bright, 105 Marquette Building, Detroit, is architect. Benjamin Steel is secretary and treasurer.

The Village Council, Union City, Mich., is completing plans for a municipal hydroelectric power plant to cost about \$150,000. John L. Moore is president. Holland, Akerman & Holland, Ann Arbor, Mich., are engineers.

Cincinnati

CINCINNATI, Jan. 30.

The past week the machinery market showed an improvement over the previous one. While a number of fair sized inquiries are still being figured on, most of the orders placed were for single tools, with the exception of an order for approximately 10 machines booked by a local manufacturer from an automobile maker. This is one of the largest orders placed locally for some time. The inquiry from Japan for 15 lathes mentioned last week, is still active, and in addition several local manufacturers are in receipt of single orders for lathes and drilling machines from the Far East. Very little railroad business is offering at present, although local manufacturers are participating in some of the business recently placed. Altogether, the sentiment in the trade is much more optimistic and orders booked in January, with most manufacturers, will be the best for many months.

The Precision Truing Machine & Tool Co., 25 East Third Street, Covington, Ky., has purchased the plant and equipment of the Chicago Steel & Valve Co. and has moved it to Covington, where production of the Ross-Murray truing tool will be continued in connection with the devices now being made by the company. The Precision company recently moved its plant from 407 Madison Avenue to its present location and is now completely equipped for production.

The city of Hamilton, Ohio, is preparing to rebuild its electric lighting plant at a cost of about \$650,000. The Froehlich & Emory Engineering Co., Toledo, Ohio, is engaged in preliminary surveys preparatory to submitting cost estimates and complete plans which are expected to be ready on May 1.

The Dayton Steel Racquet Co., Dayton, Ohio, has been incorporated with a capitalization of \$200,000 to manufacture steel tennis racquets. W. A. Larned, noted tennis player, is president of the company. The company will at present carry on manufacturing operations at the plant of the Dayton Pneumatic Tool Co., Miami Chapel Road, Dayton.

The Murphy Valve Co., Columbus, Ohio, has been incorporated with a capitalization of \$50,000 to manufacture a valve invented by Daniel R. Murphy, Newark, Ohio. Offices have been opened in the Majestic Building, Columbus, and plans are being completed for the production and distribution of the product.

The Norton-Broadway Machinery Co., 238 Broadway, Cincinnati, is making inquiries for a number of water-tube boilers, Babcock & Wilcox type, of about 200-hp. rating.

Baltimore

BALTIMORE, JAN. 30.

The American Ice Co., Calvert Building, Baltimore, has acquired a site on Register Street, for a new ice manufacturing plant, estimated to cost about \$50,000.

The Citizens' Improvement Association, Riverdale, Md., is considering the erection of a municipal electric lighting plant. Dr. J. S. Caldwell is president.

The American Oil Co., American Building, Baltimore, is perfecting plans for a new plant to cost about \$200,000, including equipment. A number of steel tanks will be built for the storage department. Louis Blaustein is manager.

The Eastern Shore Gas & Electric Co., Salisbury, Md., is planning for extensions and improvements in its electric power plant and system, and has arranged a budget of \$500,000, for work during the next 24 months, of which amount \$300,000, will be expended this year.

M. L. Himmel & Son, 107 North Frederick Street, Baltimore, manufacturers of store fixtures and equipment, have awarded contract to John Kunkel, 29 South Linwood Avenue, for an addition and improvements estimated to cost about \$35,000.

The Chamber of Commerce, Wilmington, Del., is negotiating with the Clark Vending Machine Co., capitalized at \$100,000, and headed by Dr. V. K. Clark, relative to the establishment of a plant to manufacture a new type of package vending machine, electrically operated. Consideration is being given to the plant of the Artillery Fuse Co., South Wilmington, which has been idle for more than two years. The proposed works will give employment to more than 500 men.

The Pomona Terra Cotta Co., Greensboro, N. C., has broken ground for the erection of a new unit, to be known as Plant No. 4, comprising a main four-story building, 70 x 225 ft., with adjoining structure, 30 x 50 ft., estimated to cost about \$100,000, including machinery. It will be equipped for the manufacture of pipe and kindred products. W. C. Boren, Jr., is secretary and treasurer.

The Chamber of Commerce, Atlanta, Ga., is considering plans for the establishment of a factory to manufacture wire door mats and kindred products. A company will be formed to build and operate the works. Frank Weldon is acting secretary.

The Market Engineering & Development Co., 1606 Candler Building, Atlanta, Ga., is arranging for the construction of a new refrigerating plant to cost \$50,000. A cold storage plant will also be built. Roberts & Co., Atlanta, are architects and engineers.

The Hoody River Power Co., Laurens, S. C., is taking bids for its proposed new steam-operated electric power plant, two-stories, 50 x 65 ft., and estimated to cost about \$100,000, including equipment. The J. E. Sirrine Co., Greenville, S. C., is engineer in charge.

A vocational department will be installed in the new two-story and basement high school to be erected at Lincolnton, N. C., plans for which are being prepared by James A. Salter, Raleigh, N. C., architect.

The Common Council, Hagerstown, Md., is having plans completed for its municipal electric light and power plant and will call for bids in the spring. A. B. Grubmeyer, 21 East Franklin Street, is engineer.

Plans are being completed by the Board of Education, Tarboro, N. C., for a two-story high school, to include a vocational department. Charles C. Hook, 207 Trust Building, Charlotte, N. C., is architect.

The Guilford Building Co., Fidelity Building, Baltimore, is constructing a public garage and repair shop at Calvert and Thirty-fourth streets, 50 x 122 ft.

The American Concrete Tie & Products Co., Galther Building, Baltimore, has been organized and plans to build a factory for the manufacture of concrete products. J. W. Ritter is secretary.

Cleveland

CLEVELAND, Jan. 30.

The local machine tool market improved somewhat during the week. The Arvac Mfg. Co., Anderson, Ind., continued its buying, placing orders for 20 small manufacturing lathes and three turret lathes. A Cleveland manufacturer of drilling machinery reports an improvement in orders from the East. The Cleveland Heater Co. purchased a used press of 1000-ton capacity. The Zigler Mfg. Co., Alexander, Ind., is said to be in the market for about a dozen machines. The Cleveland Board of Education is inquiring for eight machines, all wood-working but two.

Machinery disposed of at auction from the Cleveland plants of the Standard Parts Co. last week brought low prices. There were 115 machines sold, mostly to dealers. A considerable part went to Chicago and Pittsburgh dealers. The list included 36 engine and turret lathes, 12 automatic screw machines, 25 milling machines, 30 grinders and 12 milling machines.

Old machines brought comparatively better prices than fairly good used tools. Some of the selling prices of machines in good condition were as follows: Brown & Sharpe and Becker milling machines, \$225 to \$235; large Brown & Sharpe milling machine, \$600; La Blond universal milling machine, \$900; Warner & Swasey 1A turret lathes, \$580; automatic screw machines, \$350 to \$375.

The Wheeling Steel Corporation has sent out its inquiry

for about a dozen traveling cranes that will be required in connection with its plant extensions.

The Cleveland Board of Education has issued a list of equipment for the West Technical High School for which bids will be received Feb. 13. The list, which calls for motor-driven machines, includes:

- One hand sawing machine.
- One 18-in. hand planer and jointer.
- One 30-in. single surface planer.
- One double arbor universal saw bench.
- One universal revolving oil stone tool grinder.
- Two wood turners.
- One combined band saw setting and filing machine.

The Foote-Burt Co., Cleveland, manufacturer of drilling machines, has purchased the assets and business of the Bell Washer & Wringer Co., Cleveland, manufacturer of electric washing machines. The Foote-Burt Co. for some time has been manufacturing these machines for the Bell company.

Mechanical equipment aggregating in excess of \$800,000, according to the architect's estimate, will be required in the erection of new Medical School buildings for the Western Reserve University of Cleveland. The principal items of mechanical construction are \$530,000 for the Medical School and \$261,000 for power house equipment.

The Gartland & Carroll Foundry Co., Sandusky, Ohio, which has been operated as a partnership, has been incorporated. No change will be made in the management.

The Scott & Son Fan Co., Martins Ferry, Ohio, has purchased the plant of the South Zanesville Gear & Woodwork Co., Zanesville, Ohio, and will move to its new quarters shortly. It manufactures ventilating fans and heating systems.

The proposed merger of the Kelley Island Line & Transport Co., Cleveland, and the Dolomite Products Co., Maple Grove, Ohio, which was recently announced to have been effected, has been declared off, according to official announcements made by representatives of these two companies.

The Akron General Japanning Co., Akron, Ohio, incorporated with a capital stock of \$50,000, has established a japanning plant at Thornton and Nathan streets.

The Standard Parts Co., Cleveland, has taken an order from the Wills Sainte Clair Co. for 5000 sets of automobile axles, approximating \$1,000,000, deliveries of which will start in March and extend over several months.

The Mueller Electric Co., 2143 Fairmount Road, Cleveland, manufacturer of electrical products, has completed plans for the erection of a new one and two-story plant, 65 x 95 ft., on East Thirty-first Street, to cost about \$50,000. G. S. Rider & Co., Century Building, Cleveland, are architects.

A vocational department will be installed in the three-story and basement senior high school, 200 x 300 ft., to be erected at Mansfield, Ohio, estimated to cost about \$800,000. Plans are being prepared by Althouse & Jones, Market House, West Fourth Street, architects.

The Board of Education, Canton, Ohio, is arranging for the installation of equipment in the vocational department at the new McKinley high school.

Indiana

INDIANAPOLIS JAN. 30

The Martin-Perry Co., Indianapolis, manufacturer of automobile bodies, with headquarters at York, Pa., has leased property at St. Louis, for the establishment of a new assembling and operating plant. The Indianapolis works will devote a large part of production to truck bodies for the Willys-Overland Co. Chapin Spahn is general manager.

The Evansville Structural Supply Co., Evansville, Ind., is planning the erection of a new one-story steel fabricating works 100 x 200 ft., to be operated in conjunction with its present iron and steel plant. It is estimated to cost about \$40,000.

The Indianapolis Light & Heat Co., 48 Monument Place, Indianapolis, will commence the immediate erection of a new one-story power house addition, 63 x 90 ft., estimated to cost about \$42,000.

A vocational department will be installed in the two-story and basement high school to be erected at Farmersburg, Ind., bids for which are being taken until Feb. 7. It will cost about \$50,000, exclusive of equipment. Johnson, Miller & Miller, 105 South Seventh Street, Terre Haute, Ind., are architects.

Fire, Jan. 23, destroyed the plant of the Keene Mfg. Co., Crothersville, Ind., manufacturer of toys, with loss estimated at about \$30,000. Tentative plans are under consideration for the erection of new works with increased capacity, estimated to cost \$100,000.

The Carbon Fire Brick & Coal Co., 345 Lemcke Annex

Building, Indianapolis, is considering preliminary plans for the erection of a new fire brick and refractory plant at Carbon, Ind., estimated to cost \$150,000, including equipment.

A vocational department will be installed in the two-story high school to be erected at North Manchester, Ind., 70 x 120 ft., and estimated to cost about \$150,000. Bids will be asked early in the spring. Plans are being prepared by Charles R. Weatherhogg, Citizens' Trust Building, Fort Wayne, Ind.

The Central South

ST. LOUIS, JAN. 30.

The Acme Brass & Machine Works, 1628 Oak Street, Kansas City, Mo., has completed plans for a two-story machine shop, 25 x 115 ft., at 609 East Seventeenth Street, and will commence work at once.

The Hall & Brown Woodworking Machinery Co., 1913 North Broadway, St. Louis, is completing plans and will call for bids in March for its proposed addition and improvements in the present works. The estimated cost is \$50,000. Preston J. Bradshaw, International Life Building, is architect.

A four-story automobile service and repair building, 100 x 160 ft., estimated to cost about \$300,000, will be erected on St. Charles Street, St. Louis, by the Scruggs, Vandervoort & Barney Dry Goods Co., Ninth and Olive streets, St. Louis, for company trucks and automobiles. Bids will be asked at once.

The American Asphalt Road Corporation, Kansas City, Mo., manufacturer of prepared roofing products, will make enlargements in its plant to cost about \$50,000.

Fire, Jan. 18, destroyed a portion of the oil refinery of the El Dorado Oil & Pipe Line Co., El Dorado, Ark., with loss estimated at \$30,000. The plant will be rebuilt.

The Appalachian Marble Co., Middlebrook Pike, Knoxville, Tenn., will build a one-story addition, 200 x 210 ft., to double the present capacity. New polishing, trimming and other machinery will be installed. The extension will cost about \$150,000, including equipment. T. J. Deane is secretary and treasurer.

The Joplin Zinc Products Co., Joplin, Mo., will soon take bids for a new plant to manufacture zinc shingles and kindred products. R. E. Love, 1531 East Seventh Street, is architect.

A vocational department will be installed in the new two-story and basement high school to be erected at Hoxie, Kan., 67 x 125 ft. S. S. Voigt, room 610, Fourth National Bank Building, Wichita, Kan., is architect.

The Kansas City Cold Storage & Warehouse Co., Kansas City, Mo., recently organized as a subsidiary of the United States Cold Storage Co., West Thirty-ninth Street and Hoyne Avenue, Chicago, has acquired over 140,000 sq. ft. for a new cold storage and refrigerating plant, estimated to cost about \$3,000,000 with machinery.

The Southland Motor & Body Corporation, Jacksonville, Tenn., recently formed with a capital of \$250,000, will operate a local plant to manufacture automobile bodies. It will approximate about 220,000 sq. ft., and equipment will be provided to develop a daily capacity of about 200 complete bodies. C. I. Williams is president and Joseph S. Boyd, secretary.

W. J. Barnhill & Co., Madisonville, Ky., will take bids during February for a two-story machine and repair shop, 60 x 160 ft., primarily for automobile work. John T. Waller, Hopkinsville, Ky., is architect.

A vocational department will be installed in the two-story and basement high school, 85 x 134 ft., to be erected at Jewell, Kan., estimated to cost about \$85,000. Plans are being drawn by Mann & Gerow, Rorabaugh-Willey Building, Hutchinson, Kan. H. A. Noble, room 411, Reliance Building, Kansas City, Mo., is structural engineer.

The Gray Knox Marble Co., Knoxville, Tenn., is considering plans for enlargements in its plant, to cost about \$200,000, including machinery.

The Ryan Motor Co., Tulsa, Okla., has leased a two-story and basement building, 150 x 300 ft., to be erected on South Main Street by Frank R. McCullough and associates, First National Bank Building, to cost about \$150,000. It will be equipped for a general automobile works, including repair and service departments. Stone, Walters & Deegan, 334 Kennedy Building, are architects.

The American Commercial Car Co., Gratiot and French streets, Detroit, manufacturer of automobiles, has acquired a building at Knoxville, Tenn., for a branch plant. It will be enlarged to approximate 10,000 sq. ft. of floor space. A complete body manufacturing works will be installed.

G. W. North and C. S. Cleaver, Deming, N. M., are organizing a company to build a plant to manufacture auto-

matic hay balers and other farm machinery. Employment will be given to more than 500.

The Board of Education, Muskogee, Okla., is planning the erection of a two-story addition to the manual training high school, estimated to cost about \$50,000. H. O. Valeur & Co., 705 Manhattan Building, are architects. E. D. Cave is clerk of the board.

The City Council, St. Charles, Mo., is perfecting plans for a bond issue of \$235,000 to build a municipal electric light and power plant. A site has been selected.

The University of Missouri, Columbia, Mo., will receive bids Feb. 24 on a power plant building, including smoke stack, tunnel, boilers and stokers, traveling crane, steam and water mains, piping, etc. Applications for plans and specifications may be made to Edward E. Brown, business manager, Columbia, Mo. Deposit required, \$10. Other buildings to be erected, plans now in preparation, are agricultural, chemistry, women's gymnasium, medical extension hospital and mechanic arts buildings at a total estimated cost of \$860,000.

Milwaukee

MILWAUKEE, JAN. 30

New business is beginning to summer through in slowly increasing volume, but trade is still decidedly spotty and spasmodic. Prospects for February are considered encouraging, judging by inquiries which developed the past 10 days. The automotive parts industry has been favored with some good orders the last week or two. Outside of placing an order here and there for one or two tools, the railroads have not yet come into the market to any large extent. Sentiment among manufacturers as well as dealers is that the next quarter should develop a moderate call for equipment from a wide range of industries. Makers of road construction and maintenance equipment have recently booked large municipal orders which will shortly be supplemented by orders from contractors.

The Bucyrus Co., South Milwaukee, Wis., manufacturer of steam shovels, drag-line excavators, cranes and dredges, has engaged Frank D. Chase, Inc., 654 North Michigan Avenue, Chicago, to design and erect a brick and steel foundry, 60 x 276 ft., estimated to cost \$125,000 complete. P. J. Nordstrom is general superintendent.

The Heating & Power Appliance Co., Milwaukee, has been incorporated with a capital stock of \$25,000 to manufacture heating and power devices and appliances. The incorporators are Edmund C. Rosenberg, 603 Caswell Block; Joseph Eder, 470 Tenth Street, and Frank L. Hutchinson, 425 East Water Street, a heating and power engineer.

The Forster Foundry Co., Menominee, Wis., recently incorporated with \$10,000 capital stock, has taken over the plant and business of the Aetna Engine Works, of the same city, which manufactures iron, brass and aluminum castings and coal chutes, sleigh shoes, sandscreening machines, fire escapes, etc., having also a welding and cutting department. The shops aggregate 20,000 sq. ft. of floor space. The ownership remains unchanged. H. H. Forster, one of the founders of the business in 1898, is president; Samuel H. Forster, vice-president, and George B. Forster, secretary and treasurer. Some improvements in the plant are contemplated, but for the present no additions will be made.

The Rautbrod Mfg. Co., Milwaukee, has been granted a charter to manufacture machinery, tools, dies and hardware specialties. The incorporators are Zebulon Rautbrod, 810 Galena Street; Louis O. Laverenz, 747 Buffum Street, and I. A. Uttecht. Mr. Rautbrod has conducted a small shop for several years which the incorporation expects to develop.

The Board of Education, Lancaster, Wis., has engaged Parkinson & Dockendorff, architects, LaCrosse, Wis., to prepare plans for a new high school to cost between \$175,000 and \$200,000, with provision for manual training. Bids probably will be taken about March 15 or April 1. F. J. Sanville is secretary of the board.

The Drophead Projector Co., Fond du Lac, Wis., manufacturer of portable motion picture projecting machines, has issued \$40,000 additional stock to finance enlargement of production. A small quantity of tools will be purchased. Charles Fitz is general superintendent.

The C. J. Atkinson Co., 214 Fourth Street, Milwaukee, has incorporated its business without change of style, with a capital stock of \$10,000. Cyril J. Atkinson, founder of the business, becomes president, treasurer and general manager. It does a general business in metallurgical engineering, chemical analysis, etc.

The Parelskin & Weinreis Co., Milwaukee, has been organized with a capital stock of \$15,000 to buy, sell and generally deal in used machinery and factory equipment. The incorporators are M. A. Weinreis, Arthur J. Nelson and Samuel N. Parelskin, 833 Twenty-ninth Street.

Seattle

SEATTLE, JAN. 24.

The Threshers Inserted Tooth Cylinder Co., Spokane, Wash., recently organized with a capital of \$100,000 to manufacture special threshing machines, is arranging for the early establishment of a local plant. The company is headed by I. O. Brock, New Madison Hotel, Spokane, and the inventor of the machine.

The Laurel Box Co., White Salmon, Wash., is planning to rebuild the portion of its plant recently destroyed by fire with loss estimated at about \$45,000.

The Idaho Power Co., Boise, Idaho, has arranged for an appropriation of \$200,000 for extensions and improvements in its electric power plant and system in the Boise and Mountain Home districts.

The Coy Valve Co., Chehalis, Wash., is perfecting plans for a new factory to manufacture valves and other steam specialties. Work will commence at an early date. W. Graham heads the company.

The Three Rivers Light & Power Co., Reedsport, Ore., recently organized, has taken over a local electric power plant and plans for extensions and the installation of new equipment. The company is headed by Stanley D. Chapin and J. R. Browne, Reedsport.

The Colby Compression Tube Co., Portland, Ore., has purchased property at East Third and Burnside streets, and has plans under way for a factory to manufacture inner tubes.

The Common Council, Nampa, Idaho, is arranging for the construction of a municipal electric light and power plant.

California

SAN FRANCISCO, JAN. 24.

The Santa Fe Railway Co., Los Angeles, will take bids at once for a one-story addition to the machine shop at San Bernardino, Cal., 65 x 510 ft. It will be equipped with a traveling crane. The shop with equipment will cost about \$300,000. The engineering department of the company, Kerkhoff Building, Los Angeles, is in charge.

The Ontario Power Co., Ontario, Cal., is contemplating the erection of a new power plant in the San Antonio Canyon section, to cost about \$50,000.

A vocational school will be established by the Board of Education, Reedley, Cal., in connection with a union high school. The project will cost about \$450,000. Plans are being prepared by Norman F. Marsh, 210 Broadway Central Building, Los Angeles, architect.

The Pacific Gas & Electric Co., 445 Sutter Street, San Francisco, will make extensions and improvements in its electric power plant and system in the vicinity of Turlock, Cal., to cost about \$110,000. It is also considering the erection of a new power house at Martinez, Cal., to cost approximately \$200,000.

The Union Ice Co., Napa, Cal., has completed arrangements for a new ice-manufacturing plant to cost about \$60,000.

The Pacific Meter Works, San Francisco, a branch of the American Meter Co., 105 West Fortieth Street, New York, has leased a two-story building at 1123 Harrison Street, San Francisco, to manufacture gas meters and parts. Production will be primarily for export trade. E. W. Hammond will be local manager.

The Pacific Autoplans Co., Figueroa Street, Los Angeles, manufacture of automobile parts, airplanes, etc., is arranging for the erection of a new plant to cost about \$35,000. W. J. Waters is chief engineer.

The Gulf States

BIRMINGHAM, JAN. 30.

The Department of Public Finance, New Orleans, R. M. Murphy, commissioner, will install an electric traveling crane and electrical generating equipment in connection with the new municipal inclinator plant, bids for which are being taken until Feb. 6. John Klorer is city engineer.

The City Council, Abbeville, La., has arranged for the immediate construction of a municipal electric light and power plant. Henry A. Ments, Magnolia, Miss., is consulting engineer. R. P. LeBlanc is mayor.

The Patton Cement Co., Rotan, Tex., recently organized, has completed plans for its proposed new works on a site about a mile from the city. Ground will be broken in February. It is estimated to cost about \$350,000, including machinery.

The Cisop & Northeastern Railroad Co., Cisop, Tex., has

arranged for a loan of \$300,000, the proceeds to be used for extensions and betterments, including the enlargement of car and locomotive shops, and the installation of additional equipment, etc. R. Q. Lee is president.

The Alexandria Welding Works, Alexandria, La., is planning for the establishment of a new factory at Sixth and Lee streets. W. D. Worthington is president.

The Common Council, Livingston, Tex., is considering plans for rebuilding the municipal electric light and power plant, destroyed by fire, Jan. 9. The plant is operated by the Livingston Mfg. Co.

The Water & Sewerage Board, 526 Carondelet Street, New Orleans, is taking bids until March 20 for electrical equipment, boilers, and electrically-operated centrifugal pumping machinery for the water-works department. A. G. Hoffat is secretary.

The Wichita Falls Foundry & Machine Co., Wichita Falls, Tex., has purchased property at Railroad and New York avenues, Fort Worth, Tex., for a new plant, to give employment to about 100. It will be used for the manufacture of brass castings and other metal products. The company proposes to remove its present works to the new location. Plans for the initial structure have been filed.

The Palm Beach County Board of Public Instruction, West Palm Beach, Fla., has awarded contract to E. H. Barco, West Palm Beach, for a new one-story vocational school. O. J. Williams, West Palm Beach, is architect.

The Shreveport Ice Co., Shreveport, La., will soon commence the construction of a new ice and refrigerating plant at Zwolle, La., to be ready for service during the spring.

Canada

TORONTO, Jan. 30.

Machine tool dealers in this section state that inquiries are coming forward in goodly number, but buying has not yet started to pick up to the extent some expected a month or two ago. Manufacturers of equipment now report more activity and several firms are fairly well supplied with orders. The Canadian Fairbanks-Morse Co., Montreal, states that the business closed in its small tool and machine shop supply departments has increased to a marked extent the past two weeks, the rural population purchasing very freely of late gas engines, pumps and many specialties for farm use. While the demand has improved from smaller buyers, large lists are absent from the market. Prospective buyers, however, are making their requirements known, and it is generally expected that the demand for most lines of equipment will be active by next spring. Small tools are moving well. During the week, high speed drills dropped 10 per cent in price, and it is expected that this decline will further stimulate business in the small tool market.

The Vulcan Co., 84 Fulton Street, London, Ont., maker of iron castings and equipment, is in the market for metal-working machinery, lathes, planers, shapers, welding equipment, riveters, and belting.

The Board of Waterworks, Essex, Ont., is in the market for oil engines.

The Mis-Can-Ada Mfg. Co., 12 Chamberlain Avenue, Ottawa, Ont., recently incorporated with a capital stock of \$65,000, does not intend to build a plant at present. It has obtained suitable quarters for manufacturing vacuum cleaners, and expects to be in the market from time to time for machinery and supplies.

The Utilities Board, Simcoe, Ont., will install additional equipment in the electric light plant to increase the capacity.

The Goderich Elevator Co., London, Ont., is asking for grain handling and unloading machinery, also two steel unloading towers for elevators at Goderich, Ont.

The Sarnia Paper Box Co., Sarnia, Ont., recently increased its capital stock to \$300,000, and will move its factory to London, Ont. It is in the market for equipment to manufacture fiber and corrugated containers.

The Sarnia Collegiate Institute and Technical School, Sarnia, Ont., is nearing completion and is now ready to purchase machinery and equipment for the several departments.

The Ford Motor Car Co. of Canada, has acquired the plant of the Bain Wagon Works, Woodstock, Ont., which will be used exclusively for the manufacture of Ford trucks.

The Wettlaufer Co., Mitchell, Ont., manufacturer of concrete machinery, etc., is arranging for the erection of a one-story addition, 75 x 80 ft., of concrete and steel. It will be used as an erecting shop, and will have a traveling crane running through the center.

The town of Peterborough, Ont., is having plans prepared for a pumping station to cost \$200,000. R. H. Parsons is engineer.

J. D. McArthur & Co., Prince George, B. C., will build a sawmill there to cost \$50,000.

Alphonse Boullane, treasurer, Cap de la Madeleine, Que., will receive bids until Feb. 13, for one 6-in. automatically balanced, three-stage, centrifugal pump with dual drive consisting of electric motor and gas engine to run alternately. The engine is for service in case the electric power fails. The unit to deliver 1200 gal. per min. against 300 ft. head, operating at 1200 r.p.m., 8-in. intake, 6-in. discharge. Also one Sterling gasoline engine; one automatic electric starter; one Venturi meter, and one pressure gauge register.

The city of Toronto, proposes to spend \$10,425,000 on municipal undertakings the present year. Included in the estimates just completed by Works Commissioner R. C. Harris is an item for additional pumps and extension of reservoirs to cost \$1,050,000.

The William Hamilton Co., Peterborough, Ont., has the contract for supplying the hydroturbines for the new power plant at Nassau, Ont., for the Canadian General Electric Co. It also has been awarded contract for the equipment for the power plant of the Red Arrow Tire Co., which has begun work on the erection of a plant at Peterborough, Ont.

James Whalen, president Port Arthur Shipbuilding Co., Port Arthur, Ont., states that his company has received contract from the Matthews Steamship Co., Toronto, for the construction of a 550 ft. lake freighter. The vessel will be built in Toronto and will give employment to about 700 men. About 400 men will be taken on at the Port Arthur plant for work on a contract for paper machinery required by the Provincial Paper Mills. The construction of the paper machines will require about two years.

The Utilities Board, Simcoe, Ont., proposes to install additional electrical equipment in its electric plant. Dr. A. T. Sihler is chairman.

The ratepayers of Trenton, Ont., passed a by-law authorizing the construction of a petroleum refinery for the Mona Petroleum Products Co., 120 Adelaide Street West, Toronto. Dr. G. Hertschka is manager.

The ratepayers of Port Arthur, Ont., passed a by-law granting concessions to the Provincial Paper Mills, Ltd., 56 University Avenue, Toronto, which will proceed with the erection of a mill to cost \$1,500,000.

Plans of New Companies

The Standard Foundry Products Co., 661 Lafayette Avenue East, Detroit, will manufacture brass, bronze and aluminum castings, rough or finished.

The Summit Stove Co., Morrison, Ill., will manufacture stoves, ranges and furnaces, continuing the business which has been conducted for some years by the Summit Stove Works.

The Western Instrument & Mfg. Co., 1001 Washington Boulevard, Chicago, recently incorporated with a capital of \$125,000, will manufacture medical, surgical, dental and veterinary instruments, and other precision equipment. It will maintain a punch press department and will specialize in light die work. The company expects to build special machinery and do manufacturing work by special contract.

The Arion Steel Co., 141 Milk Street, Boston, has been formed to deal in high grade steel of every description.

The Signal Truck Corporation, Detroit, has been formed to continue the manufacture and sale of the Signal truck formerly made by the Signal Motor Truck Company, dissolved. The stockholders of the new corporation purchased at public auction from the receivers the assets of the Signal Motor Truck Company, including the equipment the present organization consists of.

The Walker Machine Works, will operate a foundry at Charlottesville, Va., making very large castings up to 1500 lb. The machine shop is adapted for the building of special machines of a small and intricate nature. The owner of the plant is Charles M. Walker.

The Canadian Automatic Fire Alarm Co., Kansas City, Mo., expects to shop on the open market for contracts to manufacture its various products which are outlined in a booklet now being mailed.

The use of roller bearings for railroad freight and passenger cars has been under investigation for more than a year by the Michigan Central Railroad. The bearing is the invention of L. K. Stafford, Detroit.

Current Metal Prices

On Small Lots, Delivered from Merchants' Stocks, New York City

The following quotations are made by New York City warehouses.

As there are many consumers whose requirements are not sufficiently heavy to warrant their placing orders with manufacturers for shipment in carload lots from mills, these prices are given for their convenience.

On a number of articles the base price only is given, it being impossible to name every size.

The wholesale prices at which large lots are sold by manufacturers for direct shipment from mills are given in the market reports appearing in a preceding part of THE IRON AGE under the general heading of "Iron and Steel Markets" and "Non-ferrous Metals."

Iron and Soft Steel Bars and Shapes

Bars:	Per Lb.
Refined bars, base price	2.52c.
Swedish bars, base price.....	10.00c.
Soft steel bars, base price	2.53c.
Hoops, base price	3.38c.
Bands, base price	3.13c.
Beams and channels, angles and tees	
3 in. x 1/4 in. and larger, base.....	2.63c.
Channels, angles and tees under 3 in. x	
1/4 in., base	2.63c.

Merchant Steel

	Per Lb.
Tire, 1 1/2 x 1/2 in. and larger	2.50c.
(Smooth finish, 1 to 2 1/2 x 1/4 in. and larger) ..	2.70c.
Toe calk, 1/2 x 3/8 in. and larger....	3.20c.
Cold-rolled strip, soft and quarter hard..	6.25c. to 7.25c.
Open-hearth spring steel	3.55c. to 6c.
Shafting and Screw Stock:	
Rounds	3.45c.
Squares, flats and hex.	3.95c.
Standard cast steel, base price.....	12.00c.
Extra cast steel	17.00c.
Special cast steel	22.00c.

Tank Plates-Steel

1/2 in. and heavier	2.63c.
---------------------------	--------

Sheets

Blue Annealed

	Per Lb.
No. 10	3.28c. to 3.53c.
No. 12	3.33c. to 3.58c.
No. 14	3.38c. to 3.63c.
No. 16	3.48c. to 3.73c.

Box Annealed-Black

	Soft Steel	Eluted Stove
	C. R., One Pass	Pipe Sheet,
	Per Lb.	Per Lb.
Nos 18 to 20	3.55c. to 3.80c.	.....
Nos 22 and 24	3.60c. to 3.85c.	4.10c.
No. 26	3.65c. to 3.90c.	4.15c.
No. 28	3.75c. to 4.00c.	4.25c.
No. 30	4.00c. to 4.25c.	.....
No. 21 and lighter, 36 in. wide, 10c. higher.		

Galvanized

	Per Lb.
No. 14	3.85c. to 4.10c.
No. 16	4.00c. to 4.25c.
Nos. 18 and 20	4.15c. to 4.40c.
Nos. 22 and 24	4.30c. to 4.55c.
No. 26	4.45c. to 4.70c.
No. 27	4.60c. to 4.85c.
No. 28	4.75c. to 5.00c.
No. 30	5.25c. to 5.50c.
No. 28 and lighter, 36 in. wide, 20c. higher.	

Welded Pipe

Standard Steel

	Black	Galv.
1/2 in. Butt... ..	—56	—40
3/4 in. Butt... ..	—61	—47
1-3 in. Butt... ..	—63	—49
3 1/2-6 in. Lap... ..	—60	—46
7-8 in. Lap... ..	—56	—34
9-12 in. Lap... ..	—55	—33

Wrought Iron

	Black	Galv.
1/2 in. Butt... ..	—30	—13
1 1/2 in. Butt... ..	—32	—15
2 in. Lap... ..	—27	—10
2 1/2-6 in. Lap... ..	—30	—15
7-12 in. Lap... ..	—23	—7

Steel Wire

BASED PRICE* ON No. 8 GAGE AND COARSER

	Per Lb.
Bright basic	3.50c. to 3.75c.
Annealed soft	3.50c. to 3.75c.
Galvanized annealed	4.25c. to 4.50c.
Coppered basic	4.00c. to 4.25c.
Tinned soft Bessemer	5.50c. to 5.75c.

*Regular extras for lighter gage.

Brass Sheet, Rod, Tube and Wire

BASE PRICE

High brass sheet	17 1/4 c. to 17 1/2 c.
High brass wire	17 1/4 c. to 17 1/2 c.
Brass rod	14 1/4 c. to 15 c.
Brass tube, brazed	26 c. to 27 1/2 c.
Brass tube, seamless	18 1/2 c. to 19 c.
Copper tube, seamless	21 1/4 c.

Copper Sheets

Sheet copper, hot rolled, 24 oz., 21 1/2 c. per lb. base.	
Cold rolled, 14 oz. and heavier, 2c. per lb. advance over hot rolled.	

Tin Plates

Bright Tin	Grade	Grade	Coke—14-20	Primes	Wasters
	"AAA"	"A"			
	Charcoal	Charcoal			
	14x20	14x20			
IC..	\$10.00	\$8.50	80 lb....	\$6.05	\$5.80
IX..	11.25	10.00	90 lb....	6.15	5.90
IXX..	13.00	11.50	100 lb....	6.25	6.00
IXXX..	14.75	13.25	IC...	6.40	6.15
IXXXX..	16.25	15.00	IX...	7.40	7.15
			IXX...	8.40	8.15
			IXXX...	9.40	9.15
			IXXXX...	10.40	10.15

Terne Plates

8-lb. Coating 14 x 20

100 lb.	\$7.00
IC	7.25
IX	7.50
Fire door stock	10.00

Tin

Straits, pig	35c.
Bar	40c. to 45c.

Copper

Lake ingot	16 c.
Electrolytic	15 1/4 c.
Casting	15 1/4 c.

Spelter and Sheet Zinc

Western spelter	6 1/4 c. to 7c.
Sheet zinc, No. 9 base, casks	10 1/2 c. open 11c.

Lead and Solder*

American pig lead	5 1/4 c. to 6 1/4 c.
Bar lead	6 1/4 c. to 7 c.
Solder, 1/2 and 1/2 guaranteed	27c.
No. 1 solder	25c.
Refined solder	21c.

*Prices of solder indicated by private brand vary according to composition.

Babbitt Metal

Best grade, per lb.	80c.
Commercial grade, per lb.	40c.
Grade D, per lb.	35c.

Antimony

Asiatic	6 1/4 c. to 6 1/2 c.
---------------	----------------------

Aluminum

No. 1 aluminum (guaranteed over 99 per cent pure), in ingots for remelting, per lb.	26c. to 28c.
--	--------------

Old Metals

The market continues very sluggish and business is quiet. Dealers' buying prices are nominally as follows:

	Cents
	Per Lb.
Copper, heavy crucible.....	11.00
Copper, heavy wire.....	10.50
Copper, light and bottoms	8.25
Brass, heavy	5.50
Brass, light	4.75
Heavy machine composition.....	8.00
No. 1 yellow brass turnings	5.50
No. 1 red brass or composition turnings	7.25
Lead, heavy	3.75
Lead, tea	2.50
Zinc	2.50

THE IRON AGE

New York, February 9, 1922

ESTABLISHED 1855

VOL. 109, No. 6

Molding Machine Practice Is Successful

Even Without Castings Recurring in Large Numbers, the Method May Be Made to Pay—Details of Equipment and Its Use

BY PAUL R. RAMP*

IT is not the intention of the writer to describe anything new or startling in molding machine practice, nor to offer the best methods for machine molding. This is rather the description of a plan whereby an emergency can be met that will net the company profits, regardless of the fact that the number

means are not devised, as is nearly always possible, to make the molding machine a success on small lot production.

The molding machine, intelligently handled, is with very few exceptions a paying investment in any jobbing foundry producing as much as 8 or 10 tons per day. True, there are many cases where this has not been proved to the satisfaction of all concerned. But a careful investigation will often reveal the facts that the method of handling the work and a desire to hinder progress along this line, were responsible for the failure, rather than a poor field for the work.

Any foundryman can successfully introduce a molding machine, and get results, if the pattern equipment and flask equipment are in first class condition. All that then remains to be done is to start some man to operate it. In cases of this kind there are always large quantities to make from one pattern, and the operator will teach himself in a short time.

The proposition we have in mind requires work and study on the part of the foundryman. Realizing this, he is often tempted to frighten his employers out of

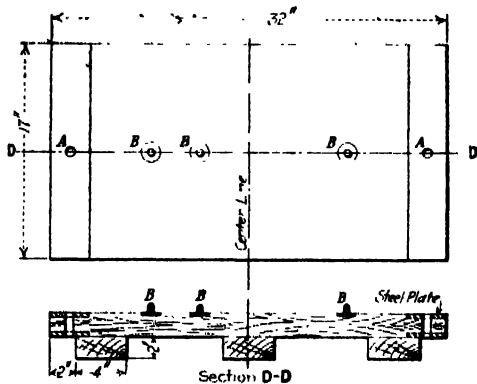


Fig. 1 Pattern Board for Molding Machine Use

of pieces to be molded is small, the patterns in poor condition and badly worn, while one pattern is used for several different parts, by minor changes, etc.

It is generally conceded that, unless there is a large number of one piece to make, the expense of fitting the patterns to molding machines will not pay. And to secure the best results from the use of molding machines, the patterns and equipment must be as nearly perfect as it is possible to make them. It is also the universal opinion of foundrymen that a foundry which is producing only a few parts from each pattern daily, on what might be termed a jobbing basis, can never be developed into a "production" shop.

In a large measure this is a mistake. While it may be true that the jobbing foundry cannot hope to get the same results as a well equipped production shop, there is no reason why the jobbing shop cannot work along the same lines, and secure a production equal to 60 per cent of that of the production foundry, rather than 25 per cent, as is usual.

We are too easily convinced that it will not pay to machine mold our castings, because the quantity ordered is small or the patterns are bad. This is our excuse for not installing machines, and while this saves the foundry executives a great deal of worry and work, the company must stand the loss, because ways and

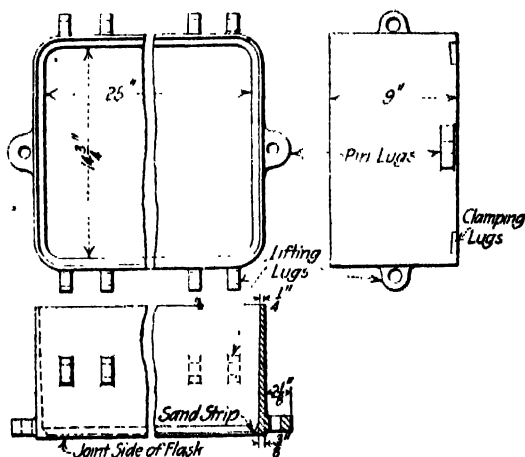


Fig. 2. Standard 16 x 24-In. Molding Flask for a Jolt Roll-Over Molding Machine

the inclination to purchase molding machines, by showing them the lack of possibilities in their shop. By comparing their work with the work that is being done in the production shop on machines, he is able to put up a very convincing argument.

Consider the company manufacturing a large number of different sizes and classes of machines, where

the orders come in small lots, often only one machine of a kind. This makes it necessary to have many different jobs moving through the shop at one time. The question of making a quantity of these different pieces and carrying them in stock cannot be considered, because the investment would be too great. And the plant is not large enough to keep up with the regular diversified demands, and at the same time to build stock machines.

To keep pace with the machine shop, the foundry must produce a few pieces from each pattern daily, and often only one. This cuts down the foundry production on each pattern to a few per day. Some of the so-called natural-born foundrymen will at once decide that the only way to handle this work is hand molding. The owner will proceed to fill his shop with men who have

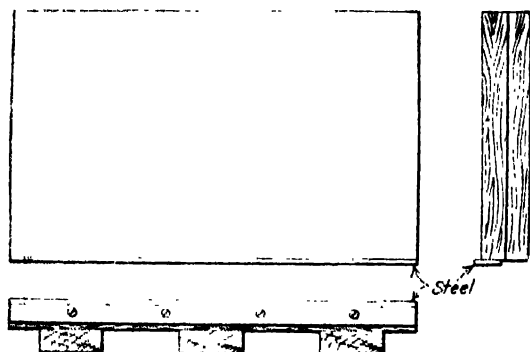


Fig. 3. Roll-Back Board

made this class of work for the last thirty years, and they will make it just as they did thirty years ago.

To meet this emergency with the molding machine, arrangements must be made to change patterns on the machines with the least possible delay. To do this several things must be considered—the size of flask to be used—the size of machine to assign to this size of flask—the number of patterns that will fit into these flasks; and last, a plan that will make it possible to switch from one pattern to another quickly, and to use poor patterns, some of which may belong in the scrap heap.

The plan we have to offer is to classify the work, not as to its character, but rather as to the size of the pieces that can be molded in a standard size flask. Each machine must be provided with the required number of flasks, all of those for one machine to be the same size and style.

For instance, a jolt roll machine will be assigned a flask that measures 16 x 24 in. inside, and all pieces that can be molded in these flasks will be produced on the machine where these flasks are used. A larger plain jolt machine may be provided with a set of flasks 42 x 48 in., enough in number to take care of a day's work.

The production on each machine will be measured by the number of flasks or molds produced. The machines using the 16 x 24 in. flasks should easily turn out 60 molds per day, of general jobbing work, with one operator, one finisher and one helper. This will be an increase of 100 per cent over hand molding, and in many cases more. The plain jolts can be worked in the same manner, and will show an equal increase in production.

In making the standard flasks for all machines, the bars for the copes must not be cast in, but, in the larger flasks, provisions should be made for putting in the bars quickly when needed, without the use of bolts. It has been proved that greater progress can be made on a large percentage of the work, with no bars in the cope or drags.

Only one standard board should be provided for each

machine, this pattern board to take care of all cope and drag patterns used throughout the day. Figure 1 is a standard pattern board for a jolt roll-over molding machine. Our plan does not include the drawing of the pattern by the machine. When this board is used, the machine rams the mold, and then rolls it over and deposits it on the receiving device.

This pattern board is a good substantial board, with both ends bound with steel plates for the pin holes, and to prevent excessive wear by the flasks. The board is provided with three dowel pins, marked *B B B*, which are used to locate each pattern. Corresponding pin hole plates are located in all patterns used on the machine. Providing the patterns with these dowel plates is all that is required to fit them for a molding machine job, and thus insure a decided increase in production.

A standard pattern board, that permits the use of many different patterns, is the foundation of the method here described. This makes it possible to use a large number of different patterns daily, regardless of their shape or condition. The only requisite is that they are within the limits of the standard flask used.

Greater economy could be effected by the use of patterns that are in good condition, but we are dealing with circumstances that prohibit pattern expense. And rather than resort to hand molding methods, in vogue 50 years ago, a saving is made in the cost of molding, which could not otherwise be accomplished. Putting dowel plates in one old steam cylinder pattern may amount to one hour's work. To fit the same job to a board, so that it could be drawn by the machine, would require several days, and probably a new pattern.

Figure 2 is the standard 16 x 24 in. flask for a jolt-roll molding machine. This flask is made as light as

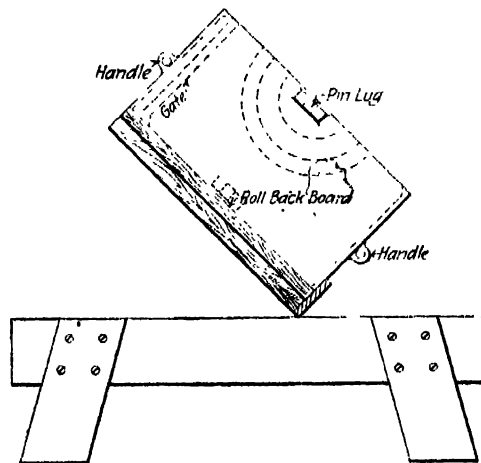


Fig. 4. Rolling Rammed Cope on Roll-Back Board Preparatory to Drawing Pattern, or to Closing the Mold after the Pattern is Drawn

possible, as it must be carried to the floor by two men. It would slow up production to handle this flask with a crane or air hoist. Steel flasks made after this design are lighter and stronger than those of cast iron.

Note the sand strip on the joint edge on the flask, also the slight taper that helps to hold the sand in. No bars are used, which avoids swells in the castings, caused by soft places under the bars. More speed is possible without the bars, and less breakage, as the molds are shaken out very easily on account of the taper.

As handles, when cast on the flask, occupy too much space, and are often broken off, lugs on the sides are used in connection with removable lifting handles. These flasks are not rapped when the molds are shaken out, but the cope is rolled off first, making it possible to lift the flask free from the sand without any rap-

ping. The drag is shaken out next, as it is in a position to release the sand very readily.

We have used a set of these flasks for eight months without one breakage, simply because this rule for shaking out was observed at all times. The round corner increases the life of a cast iron flask at least 50 per cent. The dove-tail lugs on the four corners are used to clamp the cope and drag together, when the weight used on the cope is not sufficient to hold it down for pouring.

When flasks without bars are used, the roll-back board is necessary, to prevent the molds from falling out backwards. But in cases where very large flasks without bars are used, that must be handled with a

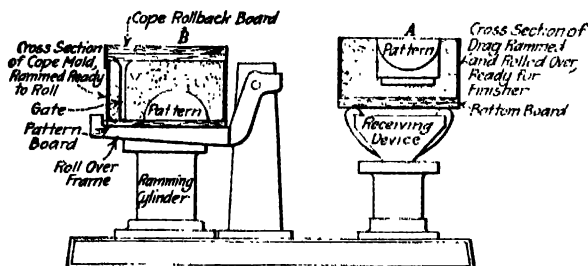


Fig. 5. Jolt Roll-Over Molding Machine Producing Work from Loose Patterns

crane, a plate is clamped over the top of the cope to hold the sand in, when the mold is rolled over. The roll-back board, Figure 3, consists of a smooth board, the same size as the standard pattern board, but without pin holes. A strip of flat steel, secured to one edge of the board, extends $\frac{1}{2}$ in. above the surface, to prevent the mold from slipping when it is rolled over.

On small flasks that must be handled by hand, too much time would be consumed in clamping on cope plates, and the plates would add to the weight that must be carried by two men. For this reason the roll-back board is an important item in connection with the production of castings in the barless flask.

To use the roll-back board, after the cope part of the mold has been rammed with the machine, the sand extending above the upper limits of the flask is struck off level with a straight edge. The gate and riser pins are then withdrawn, and a smooth funnel prepared for the down gate. A portion of loose sand is distributed over the surface, and the roll-back board is rubbed down to insure an even bearing between it and the top of the cope mold.

The mold is then clamped and rolled over, and deposited on the receiving device, when it is ready to be carried to the floor by the finisher and his helper, or two helpers, as the case may be. The cope molds remain on the roll-back board, while they are carried to the floor, where they are placed on horses located conveniently near the drag molds. At this time the finisher draws the patterns, and prepares the mold for closing.

Figure 4 shows a finished mold being rolled back after the patterns have been drawn and the mold finished. When the mold has reached a position that brings the flask at right angles with the horses, the board will be allowed to drop back, as the mold in this position will not fall out. As soon as the roll-back board has thus been removed, the loose sand is blown out of the gates and risers. The cope is now ready to place on the drag.

When the finisher goes to the machine after the next drag mold, he returns the roll-back board to the machine operator. But each operator is provided with two or more such boards, to prevent delay, should the finisher be prevented from releasing it promptly, due to trouble with a mold. And in using old worn-out pat-

terns, as is the case described here, very often the finisher is slowed up, and then must speed up when he receives the more simple pieces.

In reading the description of the use of the roll-back board the question comes to the reader's mind: "If the mold will fall out backward so easily, what is to prevent the molds from 'coping' when they are poured?" Weights must be used on the barless flasks used in this plan, the weights in many cases taking the place of clamps.

Figure 5 represents a jolt roll-over machine in operation producing work from loose patterns, at the rate of one or two from each, without the usual delay in changing pattern equipment. A indicates the drag part of the mold, that has been rammed, rolled over and deposited on the receiving device, ready for the finisher and his helper to carry to the proper place on the floor. There the pattern will be drawn by hand and the cores placed. B is the cope part of the mold, which is rammed, the roll-back board put in place, clamped and ready to roll over as soon as the drag mold is removed from the receiving device.

As the helper brings the drag patterns back to the machine operator, when he comes after the cope mold, this avoids any delay to the operator.

As soon as the jolt side of the machine is relieved of the cope mold, the operator blows off his pattern board, places the drag part of the next pattern on the standard pattern board, and proceeds to make another drag mold. In the meantime the finisher has prepared his drag, and takes the cope mold from the receiving device in time to allow the operator to roll over his new drag and deposit it on the receiving device.

These operations are continued all through the day, and good team work will secure a production that is often equal to the quantity of work made on a machine-drawn pattern. The finisher or his helper returns the cope patterns to the operator when he comes after the next drag mold, as well as any set of gates that may be in use. In cases where the operator changes his pattern, the helper places on the shelf the patterns used to make the previous mold, instead of delivering them to the operator.

(To be concluded)

Pump Standards Recommended

To encourage suitable standards of manufacture and engineering practice, to assist in the development of standard methods of manufacturing procedure and to develop co-operation with the customers of the pump industry, what is known as the Hydraulic Society has published a booklet, "Trade Standards in the Pump Industry." This explains trade definitions, customs of and terms used in the industry with listings of standard and extra equipment.

The society believes that the booklet will eventually be looked upon as giving standards similar to the standards established by the American Society of Mechanical Engineers. Copies of the publication may be obtained from the secretary of the society, C. H. Rohrbach, 50 Church Street, New York. F. J. Emeny, Deming Co., Salem, Ohio, is president of the society; E. B. Neal, Kinney Mfg. Co., Boston, vice-president; R. R. Hicks, American Steam Pump Co., Battle Creek, Mich., treasurer, and L. D. Albin, A. S. Cameron Steam Pump Works, New York, is chairman of the plan and scope committee.

At the annual meeting of the Falcon Bronze Co., Youngstown, Ohio, directors and officers were re-elected. The company's business is largely confined to the iron and steel industry. Production is now at the rate of 50 per cent, as compared with an average of 30 per cent throughout 1921. G. A. Doeright is president of the company; John Noll, vice-president; James L. Wick, secretary, and E. E. Miller, treasurer.

Papers for American Foundrymen's Convention

The papers committee of the American Foundrymen's Association reports that an interesting program is being arranged for the coming convention at Rochester, N. Y., June 5 to 9. Special sessions are planned for the various branches of the industry, besides an industrial relations session and a session which will be devoted to papers and committee reports on the subject of molding sand research. Some 40 papers have been promised, of which number the following have been received by the secretary of the papers committee:

"Rate of Formation and Geometric Form of Graphite and Temper Carbon," by E. J. P. Fisher, Atlas Die Casting Co., Worcester, Mass.

"Fitting Up Flask Equipment for Production Work," by Arnold Lenz, Saginaw Products Co., Saginaw, Mich.

"Technical Control of the McCook Field Foundry," by E. H. Dix, Jr., McCook Field, Dayton, Ohio.

"Aluminum and Aluminum Alloy Melting Furnaces," by R. J. Anderson, Bureau of Mines Station, Pittsburgh.

"Commercial Electric Steel Castings vs. Malleable Castings," by J. W. McKeon, West Michigan Steel Foundry, Muskegon, Mich.

"Design of Gourd Ladles," by A. W. Gregg, Whiting Corporation, Harvey, Ill.

"The Behavior of Fire Brick in Malleable Iron Furnace Bungs," by H. G. Schurecht, Ceramic Experiment Station, U. S. Bureau of Mines, Columbus, Ohio.

"Electric Cranes in Foundry Service," by A. H. McDougall, Whiting Corporation, Harvey, Ill.

Program for Boiler Makers' Meeting

An outline of the program of the meeting which the American Boiler Manufacturers Association will hold on Feb. 13 at Fort Pitt Hotel, Pittsburgh, has been announced by H. N. Covell, secretary-treasurer of the association, 191 Dikeman Street, Brooklyn. In brief it is as follows:

Walter Gordon Merritt, of the League for Industrial Rights, on "American Labor Policies."

Ralph M. Easley, chairman executive council National Civic Federation, on the purposes and accomplishments of that organization.

C. V. Kellogg will open a discussion on taxation.

W. A. Drake will open a discussion on "Limitation of the Field for the Use of Cast Iron Boilers."

E. R. Fish, chairman sub-committee of the boiler code committee of the American Society of Mechanical Engineers, will speak on "Welding as Applied to Boilers and Other Pressure Vessels."

Charles E. Gorton, chairman American Uniform Boiler Law Society, will give an account of the operations of that organization to date and will be prepared to answer questions in connection with the National Board of Boiler and Pressure Vessels Inspectors, particularly as applied to stamping and filling in the data sheets for boilers.

Answers to the recent questionnaire on wages have been received in sufficient number to warrant a tabulation.

British Institute of Metals

The annual meeting of the Institute of Metals will be held in London, England, March 8 and 9, when 10 important papers are to be presented for discussion. The annual dinner will be held at the Trocadero restaurant on Wednesday, March 8.

The annual May lecture will be delivered on May 3 by Sir Ernest Rutherford, F. R. S. on "The Relation of the Elements." The discourse should throw fresh light on the much debated subject of the possible transformation of one metal into another. The autumn meeting will be held—for the first time—at Swansea, Wales, Sept. 20 to 22. A large gathering is expected in this important metallurgical center.

In view of the attractive nature of the program for the ensuing year it is expected that the growth of the institute in 1922 will be even greater than it was last year, when the membership increased from 1298 to 1410—a record year's growth.

crease, occurring during a year of great trade depression, indicates that makers and users of non-ferrous metals and alloys are now more than ever on the alert to take advantage of the scientific information obtainable through association with the institute that exists to foster their interests.

The Institute of Metals has just issued a practical pamphlet of 32 pages given in summary form the results of over 10 year's research into the causes and prevention of corrosion in condenser tubes. The pamphlet, which is one that will appeal particularly to all engineers, can be obtained, price 2s. 8d. post free, from the Institute of Metals, 14 Members' Mansions, London, S. W. 1.

Steel Club Dinner

The Steel Club of Philadelphia held its mid-winter dinner at the Bellevue-Stratford Hotel Friday evening, Feb. 3. H. E. Resch, of the Whitehead & Hoag Co., Newark, N. J., delivered an address on "Shakespeare As a Salesman." Aldrich W. Stein, a hand writing expert, delivered a stereopticon lecture on "Forgeries and How the Hand Writing Expert Discovers Them." Several solos were sung by L. V. Geist of the Donner Steel Co.'s Philadelphia office.

National Metal Trades Convention

The program of the annual convention of the National Metal Trades Association to be held at Hotel Astor, New York, April 17 to April 20, inclusive, provides for the executive committee meeting, a meeting of local branch secretaries and a dinner of local branch secretaries will come on Monday; the administrative council meeting, a meeting of local branch secretaries, and the so-called alumni dinner on Tuesday, leaving for Wednesday and Thursday the convention proper. A buffet luncheon will be held as usual on Wednesday, with the banquet in the evening.

New England Foundrymen's Association

Edwin S. Carman, secretary and chief engineer of the Osborn Mfg. Co., Cleveland, gave an illustrated talk on "The Application of Molding Machines to Miscellaneous Castings Production" before the New England Foundrymen's Association, on Wednesday evening, Feb. 8, at the Exchange Club, Boston. While Mr. Carman discussed the application of the molding machines to miscellaneous production, he also showed the advantages gained by the use of the same machine in quantity production. At a dinner preceding the talk, E. H. Bailard, newly elected president of the association, presided.

February Meetings of Association of Iron and Steel Electrical Engineers

At Cleveland, Feb. 13, a paper will be read on "Gaseous Fuels and Their Use in Iron and Steel Plants."

At Pittsburgh, Feb. 18 there will be a paper on "Departmental Organization and Education."

At Birmingham, Feb. 25, the subject of "Operation of Frequency Changers" will be discussed.

Standardization Making Progress

WASHINGTON, Feb. 7.—Subcommittees of the National Screw Thread Commission have begun consideration of questions relating to the standardization of bolt heads, nuts, wrench and drill and tap sizes and hope to report at the next meeting of the commission about March 1. Provision for extending for five years the term of the commission was made in a bill which recently passed the House, and Senator La Follette having concluded to report favorably on it, there will be no hearings before a Senate committee.



Plant Makes Upset Forgings Exclusively

New Shop of Amforge Co. Is Unique Because of Its
Equipment, Layout and Methods of Stores
Keeping—Ventilation a Feature

RECENTLY completed at Chicago, the plant of the Amforge Co. is unique in that it is the only forge plant in the world devoted exclusively to the manufacture of upset forgings. This process of forging is practically in its infancy. Less than ten years ago, forging machines were principally used for flanging crankshafts and for preparing stock preliminary to work under hammers. During the last few years, however, the new method of forging has developed rapidly until it is estimated that 250 upset forging machines are now operating on commercial forgings, finished complete and ready for machining.

In conjunction with the use of upsetting machines, the Amforge Co. has introduced improved methods of die making and steel gathering, which enable it to produce transmission gear parts requiring the utmost strength, which, it is asserted, show far better physical properties than hammer forgings. The company's practice calls for round bar steel of forging quality, closely inspected for seamy stock. The bar is always forged horizontally, and forced into the dies by the headers in two or three operations. In the drawing is shown a stem pinion after the first and last operations. It will be noted that the grain of the steel in the finished pinion is such that teeth will be cut against it.

Drop hammer gears, on the other hand, are made from flats, billets and rounds—whichever is best adapted for the piece—and often little attention is given to controlling the grain of the steel, so that on some gears the teeth at one point are against the grain, while at another point they are with the grain. It is also claimed, as an advantage for the upsetting

method, that it does not tend to crystallize the steel, while drop forging often does produce that effect.

While the equipment of the Amforge plant includes two large Chambersburg steam hammers of 2000 lb.

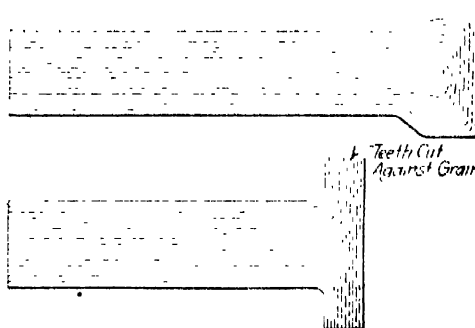
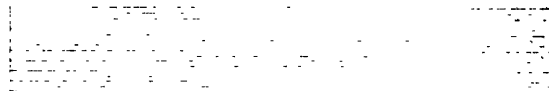
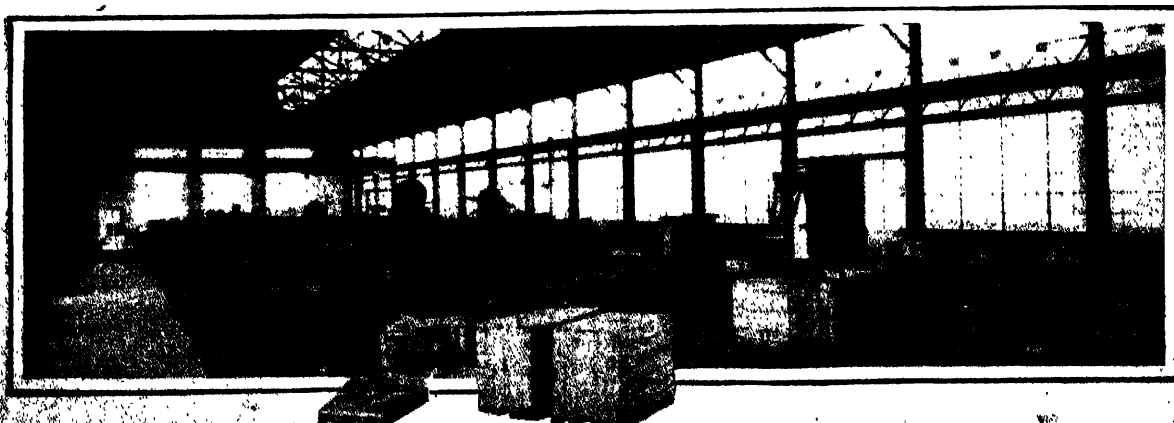


Diagram Showing How the Straight Grain of the Steel Bar Is So Changed in the Upsetting Process That Teeth May Be Cut Against It

and 3000 lb., respectively, these are utilized in connection with the manufacture of dies. All finished forgings are made in the upsetting machines, each driven by an individual motor. The arrangement of



the main shop in relation to incoming and outgoing materials, the character of the material handling equipment, the methods employed to keep track of stock throughout all stages of manufacture, the manner of storing and disposing of scrap—all bear the earmarks of a thorough survey of the many-sided problems encountered in working out a plan for maximum economy in production.

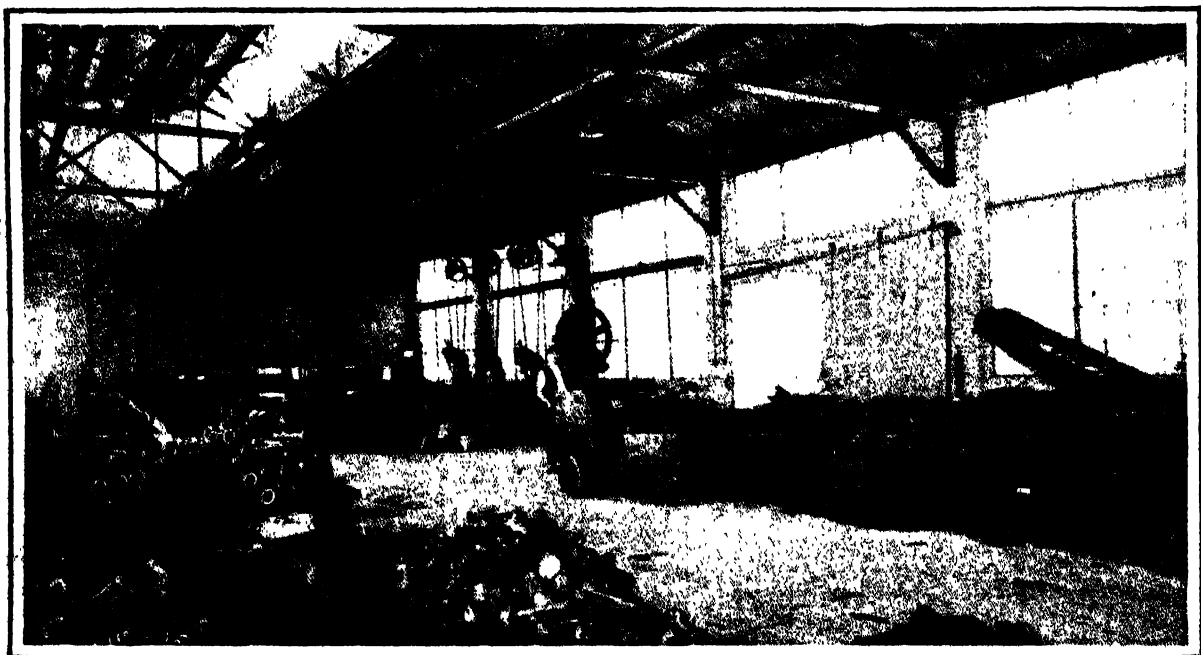
The main forge shop, 80 x 420 ft., is served by a Hiles 10-ton overhead traveling electric crane, operated from the floor. This crane is used chiefly for assembling and disassembling the heavy equipment. For handling material to and from the machines, storage battery elevating trucks are used, with a capacity of 4000 lb. each. These trucks, furnished by the Elwell Packer Electric Co., Cleveland, operate over concrete aisles provided throughout the shop.

The forge shop is divided into two units, one containing the larger and the other the smaller machines. Between the two departments, a 20-ft. concrete aisle leads directly to the shipping, inspection and heat treating rooms. Sixteen upsetting machines, staggered throughout the length of the shop, alternately face opposite sides of the building. Fifteen were built by the Ajax Mfg. Co., Cleveland, and the other by the National Machinery Co., Tiffin, Ohio; there are four 3-in., six 5-in. and six 7-in. machines. Each forging

is included in sales invoices to customers. Material bought for the repair or renewal of the physical property of the plant is classified as "repair merchandise," the symbol of which is "Rem." All material which passes through the stores department and which is eventually used through requisitions, but cannot be classified under sales or repair merchandise, is put into the "supply merchandise" account, the symbol for which is "Sum."

Corresponding to each store yard ticket is a storekeeper's record card, on which are registered not only the lot number, the steel analysis and the symbol of the account to which the material is charged, but also the name of the company from which the material was bought, the weight of the bundle, the number of bars it contains, and their size and length. Each bundle of steel retains its lot number until all of it has been disposed of. Requisitions against a bundle are recorded on the stores card, so that at all times the storekeeper has an accurate check on unused material in stock.

Careful record is kept of the weight of material used for specific orders. When the manufacturing department receives an order for a certain lot of forgings, and is ready to make out a material requisition on the stores department, it first figures out the cutting length of the stock required to make the finished forg-



Elevating Trucks Bring Forging Boxes Containing Finished Product into Inspection, Grinding and Shipping Room

machine is served by hot saw and burring machines for cutting off and smoothing forgings, and with oil forgings for heating the bar stock to working temperature. A General Electric motor-driven 75-hp. blower, delivering 6200 cu. ft. of free air per min. at 2 lb. per sq. in. pressure, furnishes the necessary air for fuel oil combustion.

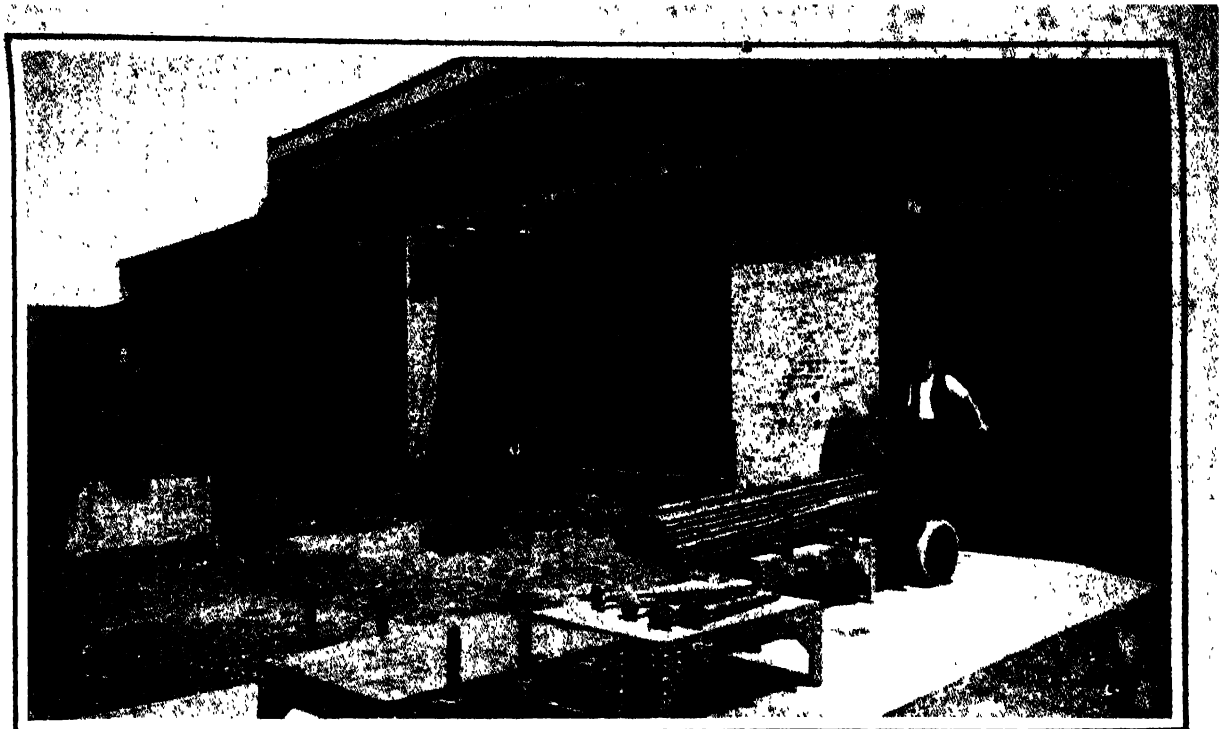
The receiving side of the building is served by a siding from the Chicago, Burlington & Quincy Railroad. Between the siding and the plant is a stock yard commanded by a 10-ton Milwaukee Electric Crane & Mfg. Co. crane, of semi-gantry type. One end of the crane is supported by a leg which runs on a rail laid on the ground, while the other end runs on an overhead runway attached to the side of the building.

To every bundle of incoming forging steel is attached a lot-number ticket, on which is recorded the asset account to which the material is charged, the lot number and the analysis of the steel. For example, a card carrying the designation "Sam Lot No. 54, 55/70 carbon" would indicate that the carbon ranged from 0.55 to 0.70 per cent, and that the material was charged to the Sales Merchandise account. The classification "sales merchandise" includes all material purchased for production purposes, which eventually

is included in sales invoices to customers. Material bought for the repair or renewal of the physical property of the plant is classified as "repair merchandise," the symbol of which is "Rem." All material which passes through the stores department and which is eventually used through requisitions, but cannot be classified under sales or repair merchandise, is put into the "supply merchandise" account, the symbol for which is "Sum."

ing, and then computes the standard bar length to use to obtain these cutting lengths with the least waste, the number of bars required from the stock yard to fill the order, and the theoretical weight thereof. All of this information is recorded on the requisition and, in addition, the purpose for which the material is to be used is specifically stated. Upon receiving the requisition, the storekeeper picks up from the yard the number of bars of the specified size, and weighs them on a Standard Scale & Supply Co. rolling mill scale, whereupon he enters the actual weight on the requisition, adjacent to the theoretical weight previously recorded. The weighing of material before it enters the manufacturing department, as well as before shipment in finished form, is rather unusual, but is an aid to accurate cost keeping.

Skid rails extend from the storage yard into the stock cutting room, which is a lean-to to the main forge shop. Here are located a No. 4 guillotine shear, made by the Hilles & Jones Co., Wilmington, Del., and a Higley cold saw furnished by the Vandyck Churchill Co., New York. The shear has a capacity for 4-in. rounds, and for angles up to 6-in. x 6-in. x 1/4-in. The Higley cold saw is used to cut steel used for headers, which may run as high as 0.50 or 0.60 per cent carbon, and cannot be handled on the guillotine shear.



Crane Sliding Stock Across Skid Rails into Shear Room. Elevating trucks move material steel and all, as shown

Steel is handled direct from stores to the shear room without reloading. No narrow gage or industrial tracks are used. After the material is weighed and placed on the skid rails, it leaves the hands of the storekeeper and passes under the authority of the manufacturing department.

Shipping, inspection and heat-treating departments are located in a building adjacent to the main forge shop, but separated from it by a 10-ft. areaway, so that air for ventilating purposes is provided on that side. In the heat-treating department are four double-end Tate-Jones & Co. annealing furnaces, served by two water quenching tanks, one at each end of the furnaces. The furnaces are of the car-type, and forgings are handled to and from the cars, and into and out of the quenching tanks, by a Yale & Towne one-ton electric hoist. The furnaces are equipped with a temperature recorder furnished by the Wilson-Maulen Co., New York.

In the adjacent grinding and shipping room are two W. W. Sly Mfg. Co. tumbling barrels, used to remove scale from carbon steel forgings. Flashings and all rough edges are taken off on grinding machines, there

being six double grinders, operated from a line shaft. For drilling automobile hub forgings and other similar work, three "Hole Hog" drills, furnished by the Moline Tool Co., Moline, Ill., are used. Other equipment includes a Toledo trimming press, and a cutting-off machine furnished by the Modern Machine Tool Co., Jackson, Mich. A 10,000-lb. Toledo springless scale weighs all material leaving the shipping department.

The forging boxes, in which finished material is brought into the shipping room by the elevating trucks, have bottoms constructed of open pipes. This permits dust and dirt to fall through to the floor, while the passage of air through the pipes serves to cool the forgings. The tare weight of the trucks is checked every morning and the box weights are also checked periodically; thus the shipping weight is obtained by subtracting the weight of the truck and box from the total weight. The shipping platform, of concrete, is served by a railroad siding. A loader manufactured by the Barber-Greene Co., Aurora, Ill., is used to transfer heavy forgings from the shipping platform to cars.

Adjoining one end of the main forge shop is the



Grinding Machines and Oil Furnaces Alternate at Right. In center are a hot saw and a burring machine, with smaller equipment in foreground

machine repair shop and die storage. The machine shop, used largely for maintenance work and for machining dies and headers, contains some large equipment, including a Niles-Bement elevating table horizontal boring mill, a 60-in. Bement drill press, a Cincinnati Planer Co. widened pattern 48-in. x 60-in. x 14-ft. planer with four heads and self-contained motor drive, a Niles-Bement-Pond 42-in. x 42-in. x 10-ft. planer with two heads and self-contained motor drive, a Fife-Wright 60-in. x 15-ft. triple-gear drive into face plate engine lathe, a 26-in. x 15-ft. Walcott engine lathe, a 26-in. x 24-ft. Walcott engine lathe, and a 25 in. x 10 ft. LeBlond heavy duty engine lathe, besides other miscellaneous machines. The shop is served by a Whiting 10-ton overhead hand-power crane.

All dies and headers are stored in the die department, arranged in numbered compartments by jobs, corresponding numbers being recorded in the storekeeper's records. The storing of the dies and headers not only enables the company to take care of repeat orders, but permits it to serve its entire trade more expeditiously and economically. When new orders are received, suitable dies and headers may often be found in stock, thereby obviating the necessity of having new ones made. The die storage is commanded by a 3-ton Whiting overhead hand-power crane.

An excellent system for taking care of scrap has been installed. Throughout the forge shop, the machine shop and the trimming room scrap buckets are placed to catch waste stock. The buckets, which were designed by the company, are lifted and carried to the steel storage yard by elevating truck. Here four chains joined together at one end in a permanent loop are fastened to four holes in the top of the bucket. For this purpose the last link in the free end of each chain is a U-link, through which a cotter pin is inserted after the chains are fastened to the bucket, by a hook from the overhead yard crane, inserted into the lifting loop, the bucket is conveyed to a scrap yard located adjacent to the railroad siding. Here the dif-

ferent kinds of scrap are dropped into separate bins, from which they may be loaded into cars for shipment.

Electricity is used for power throughout the plant, except for the steam hammers. Steam for the hammers and in cold weather for heating the oil storage tanks and the trenches carrying the oil pipes, is furnished by a coal-fired 200-hp. horizontal tubular boiler, built by the Brownell Co., Dayton, Ohio.

Fuel oil for the furnaces is supplied from three concrete storage tanks set in the ground between the steam hammer room and the heat-treating department. Tank cars, spotted on a track adjacent, are connected to an intake pipe through which the oil passes to the tanks. Three control valves permit passing the oil into any tank desired. Calibrated standpipe gages indicate the oil level in each tank.

The ventilating system used in the forge shop is unique. Instead of bricking up from the ground level to the window sash elevation, this space has been fitted with swinging doors. Thus all heat, smoke and heavy gases on the floor level, which often remain inert under other ventilating systems, are carried up to the roof and drawn out of a V-shaped monitor. Regulation of the monitor windows is handled in accordance with the direction of the wind. By opening windows on the "lee" side of the building, advantage is taken of the partial vacuum formed on that side, thereby insuring a draft which will exhaust the air rising from the floor of the shop.

Construction of the ground level doors is such as to insure the least possible interference with the circulating system. The doors are pivoted half way between the bottom and top and are swung with the top out. Hence any piles of material, adjacent to the doors outside the building, will not obstruct the inflow of air. It will be noted that the angle of the door, when opened, is upward in relation to the exterior of the building, and air can enter from higher elevations through the openings provided, both above and below the axis of the door.

FEWER IRON AND STEEL WORKERS

Gain in Employment Halted—General Industry Busier

WASHINGTON, Feb. 7.—The increase in employment in the iron and steel industry which set in last August gave away for the first time since then in January, when there was a decrease of 7130 workers, or 0.21 per cent under December, according to the January bulletin of the Employment Service of the Department of Labor. Employment by the 1428 firms reporting to the Service, however, showed an increase of 63,400 employees, or 4.2 per cent, over Dec. 31. Besides iron and steel, other industries showing decreases were textiles and their products, 949; railroad repair shops, 2387; tobacco manufactures, 803; stone, clay and glass products, 149, and lumber and its manufacture, 74. The total decrease in the six industries was 11,492. Increases in the remaining eight industries reporting were as follows: Vehicles for land transportation, 68,204; leather and its finished products, 2089; metals and metal products, 2254; paper and printing, 132; food and kindred products, 2319; miscellaneous, 4286; liquors and beverages, 10, and chemicals and allied products, 598, a total of 74,892. The firms reporting employed 1,493,107 workers on Dec. 31, as against 1,556,507 on Jan. 31.

Of the 65 cities from which reports were received, 40 showed employment increases in January. Detroit led with an increase of 89 per cent. Among iron and steel centers showing gains were Cleveland, 7 per cent; Chicago, 4 per cent; Toledo, Ohio, 3.7 per cent; Pittsburgh, 0.5 per cent and Youngstown, Ohio, 0.5 per cent. Among iron and steel centers of the 25 cities showing decreases were the following: Johnstown, Pa., 14.1 per cent; Philadelphia, 8 per cent; Buffalo, 6.7 per cent; Birmingham, Ala., 6.2 per cent; Columbus, Ohio,

3.3 per cent; Cincinnati, 2.9 per cent and New York, 1.8 per cent.

Commenting on employment conditions, Director Francis I. Jones of the Employment Service says:

"Employment conditions fail to give any indication of the substantial improvement in business activities predicted for January. The figures last month were obtained during inventory period, particularly those in the automotive industry. The slight change in the totals of all the groups shows a downward trend. Textiles and iron and steel, which have been on the upward swing for some months past, show a downward tendency in employment for the past thirty days. Railroad repair shops continue to decrease their forces. Increase in employment in metal products other than iron and steel, and in miscellaneous industries, is the encouraging feature of this month's survey.

"Reports from 231 of the principal centers show no general improvement in employment conditions. Industry is hardly holding the gains made during the past four months, and is, therefore, absorbing few, if any, of the workers released from seasonal activities and the unemployment caused by the usual climatic conditions of this season of the year. The feeling that there will be a decided change for the better by early spring is manifested by every section of the country, and seems to be based on real evidence of prosperity, and not mere optimism."

Electrical exports for the calendar year 1921 are reported by the Department of Commerce at \$97,935,597, compared with \$102,870,434 in 1920. Chief among the items recording losses were batteries, interior wiring and fixtures, magnetos and spark plugs and electric locomotives. Increases were made in motors, telephones and transformers. The entire loss took place in December, for eleven months showed \$89,089,464 in 1920 and \$92,728,321 in 1921.

Steel Pipe by the Centrifugal Process

Methods and Cost of the Cammen Process for Making Seamless Pipe at Low Cost—Competition with Welded Pipe

BY L. CAMMEN

THE publication of some data on the Cammen process of centrifugal casting of steel pipe has brought in so many inquiries, particularly as to the cost and patent status, as to make the following statement desirable.

First, as to patents: Centrifugal casting is quite old, and all the basic patents relating to casting in a chill, sand or clay mold expired many years ago. There are a number of patents on minor details such as pouring spouts of various construction, mold supports, etc., and it would be advisable for anyone who intends to go into this line to make sure that he does not involuntarily infringe on one of these patents. The fundamental features of the process are, however, free to all, and there is no reason why any good engineer familiar with the art should not be able to build a workable unit without getting into legal trouble. This does not apply, however, to processes using the hot mold.

Why a Hot Mold Must Be Used

When an ordinary steel casting is made, be it from a pattern or in an ingot mold, provision is made for the escape of gases to the top of the casting by means of a head or riser. In fact, in casting ingots special precautions are taken, such as dozzling, to keep the top of the ingot hot long enough to take up the gases and feed the contraction cavities. In a centrifugal casting there is no head or riser and the entire metal freezes uniformly throughout its length.

When the metal is poured into a cold mold, that part of it which comes into contact with the cold walls freezes at once. Theoretically in centrifugal casting, all slag and material containing dissolved gases should be thrown to the inside but, because of the high viscosity of molten steel, this takes an appreciable amount of time so that, unless the metal freezes very slowly indeed, the gas and slag particles are trapped in the cast pipe, which is then worthless.

The controlling question is therefore the time that it takes the metal to chill, which is the reason why, for example, good centrifugal castings in a cold mold have been produced in sizes of 12 in. diameter and $\frac{1}{2}$ to $3\frac{1}{2}$ in. wall, but all attempts to make good smaller casting, say of 6 in. diameter and with 0.280 in. wall, have failed; there was not enough metal in the latter case to keep the heat long enough.

In the Cammen process an extremely hot mold, as high as 2000 deg. Fahr., is used. Metal cast against a mold of such temperature cools so slowly as to give time to throw all slag and gases to the inside, and perfect castings have been obtained in sizes as small as 3 in. outside diameter, with a $\frac{1}{8}$ -in. wall not only in steel but in such a difficult metal to handle as Monel. The use of the hot mold is covered by broad claims in patents either issued or allowed.

Manufacturing Methods

One of the important features of the centrifugal process of casting is the great output per unit of spinning bench. Thus, the final designs have shown that a pipe, 16 ft. long, can be cast every 5 to 6 min. At the same time, however, such a pipe weighs only, in standard 6-in. size, about 300 lb. It is, therefore, a production involving a comparatively small amount

of metal at short intervals, and as such is admirably adapted to the employment of the small (6-ton) Bessemer converter, in batteries of two to three, feeding to sets of spinning benches handling various sizes of pipe.

The equipment of a plant consists, therefore, of the following: First, a furnace to heat the molds to the proper temperature. This does not differ materially from the furnaces now used in seamless tube mills for heating billets preparatory to piercing, with the only difference that better facilities for handling the molds have to be provided, as a mold weighing anywhere from 3 to 6 tons has to be rapidly shoved from the furnace into the spinning bench, and as the mold has to be carried in a cradle so as not to be distorted in handling and not lose heat too fast. These details have been fully worked out, however.

From the furnace the molds go to the spinning benches, which are simply rotating barrels with means to hold the molds centrally. They have to be built very substantial, but their cost is quite moderate. Thus, a unit to make 6-in. pipe, 16 ft. long, costs less than \$10,000. After spinning, the pipe is shaken from the mold and, while still hot, is sent through one pass of a hot rolling mill to make the surfaces perfectly smooth. As a matter of fact, if the metal is fairly clean, both the outside and the inside surfaces of centrifugally cast pipe are fairly smooth; as the amount of metal poured cannot be controlled to within very close limits in commercial operation, centrifugally cast pipe can be sold only by the outside diameter.

When alloy steel is made, the pipe has to be subjected to proper heat treatment. Instead of a regular rolling mill, a sizing machine may be used; at the same time, however, pipe made for many purposes may go out just as cast.

Cost of Centrifugally Cast Steel Pipe

Costs of this process differ, of course, with the production schedule, but the following estimate applies to a mill making each day not more than four sizes, with a total output of not less than 40 tons per hour. This schedule applies to standard pipe; extra strong is about 15 per cent cheaper, and double extra strong about 20 per cent cheaper. All costs are per ton of 2000 lb.

Metal	\$15.00
Mold (deterioration and treatment)	5.00
Heating the mold and handling	4.00
Labor (not including converters)	2.00
Inspection and supervision	1.00
Sizing	5.00
Varia	3.00
Royalty	5.00

Total cost per net ton at mill door. \$40.00

The costs of alloy steel pipe are naturally a good deal higher because of the higher cost of the metal, and the additional handling, such as heat treatment, straightening, etc.

Seamless pipe is, however, not only cheaper than welded, but has certain advantages over this latter which are so obvious as not to need discussion.

Centrifugally Cast Pipe and Oil Country Trade

To-day, the vast region known as the West and South is supplied with pipe from the Pittsburgh-

Youngstown-Chicago territory, because the cost of a pipe mill is such that it does not pay to set it up except for a large and steady output. But a plant for centrifugal pipe casting costs comparatively little, and even though a small plant cannot yet (the art is, however, young, and economies may be developed) make pipe at the above price, even at \$50 a ton as a "production price in Oklahoma," Pittsburgh and Chicago mills will have severe competition, especially considering present freight rates.

Corporation and Merger Compared

This throws, by the way, an interesting light on some facts connected with the proposed merger of independent steel mills. As matters stand to-day, steel pipe is one of the most active products in the industry, and promises to remain so for some time. Of the country's capacity, roughly 3,400,000 tons, the National Tube companies control 1,350,000 tons, and the proposed merger 1,115,000 tons. As the two have an ingot capacity respectively of 22,000,000 and 6,500,000 tons, it appears that they convert into pipe respectively 7 and 18 per cent and, in dollars and cents, pipe business means to the Steel Corporation roughly 10 per cent, and to the merger 25 per cent.

Though never formally stated, it is plain that the merger if formed will be primarily for purposes of competition with the Steel Corporation. As far as pipe is concerned, the merger will have the slight advantage of location as far as Southern and Western trade is concerned, but the corporation can cut prices deeper than the merger, partly because of its stronger financial position generally, and partly because, as seen

from the above figures, it is less vitally interested in the pipe business.

Furthermore, the corporation has a more fully rounded out line of products, as it makes seamless tubing which the merger does not. And yet, with 25 per cent of its business in tubular goods, the merger has to make good in this line or it will have a difficult time in holding its own in other lines.

From this point of view, it is quite likely that the development of a radically new process of pipe manufacture, capable of delivering seamless steel pipe at something like \$40 per ton would in itself be a powerfully disturbing element. If to this be added the fact that the cost of the plant is such that it would pay to install units all through the country and thus take advantage of the present high freight rates, it will be no exaggeration to say that we may look forward to lively times in the steel pipe business.

At the same time, it must be clearly realized that a material cut in price of pipe at the present time would be highly beneficial by increasing the demand for it, and thus helping the steel industry generally. Also, availability of alloy steel pipe, in particular nickel and chrome-nickel steel pipe, will be of considerable advantage to the oil industry and in hydraulic installation work, which in its turn may create an increased demand for pipe.

To what extent welded pipe may continue to find a market in the face of a competition of seamless pipe at a maker's cost of \$40, and possibly less, per ton, remains to be seen. A big industry is not, however, wiped out at a moment's notice by the appearance of a new process or article.

ORE SHIPMENTS

Superior Total Falls Short of 23,000,000 Tons— Light Movement By Water and Rail

Statistics collected by the *Iron Trade Review* show that the total of iron ore shipped from the Lake Superior district in 1921 was 22,799,077 gross tons, or 43,859,389 tons less than the total, 66,658,466 tons, shipped in 1916. The record of these two years in the ore trade represents the two extremes in the effect of the war and its aftermath. The total in 1916 was the largest ever attained in the Lake Superior district. That of 1921 was the smallest in 17 years.

Four-fifths of all the iron ore that has been shipped from the Lake Superior district has been forwarded to the blast furnaces since 1901. In this period the average yearly shipment has been 40,870,843 tons. The tonnage of 1921 was 44 per cent below this yearly average.

Including the mine at Mayville, Wis., operated by the Steel & Tube Co. of America, and which produced 52,709 tons of ore in 1921, the total number of mines in the Lake Superior district from which ore was shipped in 1921 was 149. In 1920 the number was 237; in 1919, 240 and in 1918, 284. In 1916, the year of the maximum shipment, the number was 233.

The Oliver Iron Mining Co., subsidiary of the United States Steel Corporation, shipped 14,056,759 tons of ore from the Lake Superior district in 1921, as compared with 24,936,073 tons in 1920. The total in 1921 was 61.65 per cent of all the ore shipped, while the general average for the preceding 12 years was about 46.50 per cent. The company's proportion of the total last year was the largest it ever attained; while the amount of ore it shipped receded to practically the same figure as of 1908—14,123,957 tons. Only one new mine was opened in the lakes district in 1921, and this, on the Geyuna range. The Maroco, of the Marquette Ore Co., developed into a shipper of washed concen-

trates, forwarding 6596 tons during the season, the bulk all-rail to St. Louis.

Shipments by Port and All Rail, Gross Tons

	1921	1920	1919	1918	1917
Escanaba	1,806,656	7,361,070	4,963,358	6,774,969	7,156,854
Marquette	786,946	3,415,108	2,132,935	3,457,054	3,207,146
Ashland	2,264,705	8,180,852	5,915,383	7,565,608	7,597,841
Two Harbors	3,286,338	9,278,464	6,424,545	8,723,472	9,990,901
Superior	4,991,278	14,812,398	10,919,965	14,068,341	13,978,746
Duluth	9,164,803	15,479,334	16,821,209	20,567,288	20,576,419
Total by lake	22,300,726	58,527,226	47,177,395	61,156,732	62,498,901
Total by rail	498,351	1,884,346	1,369,256	1,679,440	1,938,102
Total	22,799,077	60,411,572	48,546,651	62,836,172	64,437,003

Shipment by Ranges, Gross Tons

	1921	1920	1919	1918	1917
Mesabi	16,350,696	37,149,277	31,997,699	40,396,711	41,445,211
Marquette	1,116,900	4,608,323	2,992,212	4,354,297	4,874,150
Menominee	1,584,404	6,562,106	4,442,868	6,378,698	6,045,750
Gogebic	2,336,493	8,763,332	6,230,839	7,936,701	7,981,684
Vermillion	869,313	1,007,435	929,049	1,192,908	1,530,692
Guyuna	488,562	1,191,528	1,861,165	2,478,800	2,422,884
Mayville	52,709	129,571	92,819	98,057	136,632
Total	22,799,077	60,411,572	48,546,651	62,836,172	64,437,003

Bessemer Limestone & Cement Co.

Joseph G. Butler, Jr., was re-elected chairman of the board of directors of the Bessemer Limestone & Cement Co., Youngstown, Ohio, at the yearly meeting. John Tod, a director of the Brier Hill Steel Co., Youngstown, was elected president. Directors are Joseph G. Butler, Jr., John Tod, R. C. Steese, Fred R. Kanengeiser, John Stambaugh, Fred Tod, Henry A. Butler, John R. Rowland, I. M. Scott and G. G. Treat.

The company shipped 750,000 bbl. of cement last year and operations indicated that its annual production could be increased to 1,100,000 bbl. annually. Its fluxstone business in 1921 was unsatisfactory, however, due to the low state of blast furnace operations.

The 1922 convention of the American Iron, Steel and Heavy Hardware Association has been fixed for May 23 to 25 at Washington. Arrangements have been made with the Hotel Washington for accommodations. The hotel is at Fourteenth Street and Pennsylvania Avenue, one block from the White House.

Association of Employers and Employees

Unique Institution in Cleveland in Which Better Understanding Is Brought About—Educational and Other Features

A UNIQUE institution is flourishing in Cleveland, of interest to men and managements of the iron and steel industries, because of what it already has accomplished in units of this industry located in the Fifth City, as well as for its potentialities for development in other cities.

"An alliance of employers and employees, with club rooms where men all may get together to study and to discuss problems of mutual interest, to meet on equal terms, to get acquainted with one another and to join for constructive thinking," is the avowed purpose of the organization, which has now been worked out with a sincerity and honesty that are no small factor in the success of the plan.

Primarily an educational institution, because its organizers hold firmly to the belief that only through mutual understanding and constructive thinking by all groups of men in industry will the problems of industry be solved, the Cleveland Industrial Association has worked out its educational features in unusual ways, bringing together employers and employees with a common interest.

For illustration, this winter the association, which by the way has employer and employee members "half and half" on its executive board and committees, has offered its members an unusual business training course. Sixteen of Cleveland's leading business men were prevailed upon to give one lecture each in a course which covered the elements of business building and constituted a comprehensive survey of modern business organization methods. Every lecture is followed by an open forum discussion of points brought out by the lecturer.

Tuesday Night Lectures

Included in the membership fee is a series of Tuesday night lectures when men of national repute bring information worth while alike to employer and employee members of the association.

The keymen of the association—the member-representatives of the organization in the various factories of the city, are co-operating with the Better Business Commission of the Cleveland Advertising Club through the association, to distribute information and literature to protect the small investor from "Fly-by-night" stock salesmen who make their way through the larger plants—illustrating how far-reaching is the conception of the association in the extent of the educational service which it can render its members.

Specialized groups meet to discuss their particular problems; there is the 50-50 Club of salesman members, the Faneuil Club for those who need to become effective public speakers, and the Efficiency Club, a title which speaks for itself.

Women as well as men are found on the large list of members of the association, which includes several thousands of names from the men in the shops to the president of the Chamber of Commerce.

In addition to the classes, courses, lectures and clubs which are the activities in the club rooms during each week, opportunity for chess, checkers, cards, pool games and magazines, Saturday night dances and daily luncheons with occasional special entertainment features which bring all the members together in a social way in pleasant surroundings, fill a long-felt need.

Illustrative of the way the association's service worked out in the various plants in the city, we quote, for example, the fact that at the Van Dorn Electric Tool Co. and several other plants from which good-sized groups attend the Tuesday lectures, each weekly meeting at the association is followed by a plant meeting where the association lecture is discussed and applied to the work to be done in the industrial unit.

Another striking instance of the result of constructive thinking which fosters no special propaganda has come to the attention of the association's business manager, L. F. Mead. In one plant a rather active radical who became a member of the association and "got the idea" of men working together for the good of all, carried back to his organization ideas about bonus systems which he gathered from various fellow members and in furthering his new idea with the new point of view, became a constructive thinker in his organization.

One employer member became interested in the problem of a foreign worker, a member of the association, whose wife was being held at Ellis Island. Through the greater knowledge of the employer of the conditions governing the situation, the matter was adjusted to the satisfaction of all and the feeling of humanness established between employer and employee, who would not have otherwise gotten on a common footing except through the atmosphere of truce in the club rooms of the association.

According to Herbert Hoover, "a definite and continuous organized relationship must be created between the employer and the employee; by the organization of this relationship, conflict in industry can be greatly mitigated, misunderstandings can be eliminated and that spirit of co-operation can be established that will advance the condition of labor and secure increased productivity."

H. B. Bole, first vice-president Hydraulic Steel Co., and president this year of the Industrial Association, bases the success of the organization in Cleveland on "a sincerity of purpose which makes itself actually felt, added to the fact that the organization is based on the sound principle of mutual understanding."

President Welborn's Address

In a recent address at a meeting of employees' representatives and representatives of the company, President Welborn, Colorado Fuel and Iron Co., reviewed the year 1921, speaking in some detail of the labor troubles in which outsiders persuaded many of the men in the coal mines to strike. Mr. Welborn said in part:

In all of our negotiations we have found, and it is a pleasure to report the fact that while opinions differ, as they always do among men on any important matter, we have been able, after open frank discussion, to reach practically unanimous conclusion. The lower wage scales established at the Steel Works, with the reduced scale at coal mines and the reductions that have been made in freight rates on raw material, have made possible the resumption of operations at the steel plant on the moderate basis laid out to begin next week.

The officials will continue, as heretofore, to give you the facts about business conditions and the best information possible as to outlook. We will continue to negotiate with you any changes in wages and working conditions, in accordance with the provisions of the joint representation of employees and management under which we are working. We will, therefore, naturally resist in every legitimate way all efforts to prevent the carrying out of agreements entered into between employees and management—such agreements to always be proper and lawful.

Engineering standards issued in 1921 by foreign national standardizing bodies have been compiled by the American Engineering Standards Committee and copies can be furnished at a nominal cost or they may be consulted at the offices of the committee, 29 West Thirty-ninth Street, New York. Included among these standards are 13 British standards, 2 each from Canada, Austria and Belgium, 12 from Holland, 11 from Switzerland, and 62 from Germany.

Steel Corporation Pension Disbursements

A total of \$947,879.15 in pensions was paid to retired employees of the United States Steel Corporation and its subsidiary companies during 1921, according to the eleventh annual report of the United States Steel and Carnegie Pension Fund just made public. This is \$168,112.55 more than was disbursed in 1920, and is the largest amount paid out in any year since the establishment of the fund in 1911. There were 3677 participants, 2969 being on the list at the beginning of 1921 while 708 were added during the year. There were 240 discontinuances because of death or other causes, leaving 3437 active participants as of Jan. 1, 1922.

The total amount disbursed since the establishment of the fund is \$6,828,160.75. The average age of the pension participants for the past 10 years has been 66.10 years, the average term of service 30.95 years and the average monthly pension \$24.10. The beneficiaries make no contribution to the fund. The money is derived from a trust fund of \$12,000,000 established by Andrew Carnegie and the Steel Corporation.

Retired employees of the Carnegie Steel Co. in 1921 received \$204,470.70; those of the American Steel & Wire Co., \$185,201.45; of the American Sheet & Tin Plate Co., \$125,404.20; of the National Tube Co., \$106,205.47; of the H. C. Frick Coke Co., \$80,485.99, and of the American Bridge Co., \$75,194.33.

Men retired from general office staffs, including the Steel Corporation general office in New York, received \$17,962.85, and former employees of sales departments were paid \$7,469.

Lead and Zinc in 1921

The mine and smelter output of lead in the United States in 1921 each fell off about 20 per cent and the mine and smelter output of zinc each declined nearly 60 per cent, according to C. E. Siebenthal and A. Stoll, of the U. S. Geological Survey, compiled from reports and estimates by producers and others. Data for the Western States are taken from the advance statements issued by the Geological Survey's western offices. Statistics of imports and exports are taken from the records of the Bureau of Foreign and Domestic Commerce for 11 months, and an estimate is made for December.

The output of soft lead by mines of the Mississippi Valley was about 231,000 short tons, and that of argentiferous lead by mines of the Western States was about 170,000 tons, a total of 401,000 tons. The corresponding figures for 1920 are 251,816 tons from the Mississippi Valley (including the small output of the Eastern States) and 259,070 tons from the Western States, a total of 512,865 tons. The recoverable zinc content of ore mined in 1921 was about 250,000 tons, as compared with 584,772 tons in 1920 and 549,242 tons in 1919.

The output of primary domestic desilverized lead in 1921 was about 190,000 net tons, of soft lead about 145,000 tons, and of desilverized soft lead about 55,000 tons, making a total output from domestic ores of about 390,000 tons of refined lead, as compared with 476,849 tons in 1920, which was made up of 220,327 tons of desilverized lead, 189,854 tons of soft lead, and 66,668 tons of desilverized soft lead. The output of lead smelted and refined from foreign ore and bullion was about 50,000 tons, as compared with 52,808 tons in 1920. The total lead smelted and refined in the United States was thus about 440,000 tons, as compared with 529,657 tons in 1920. The output of antimonial lead was about 8,000 tons, as against 12,535 tons in 1920.

The output of primary metallic zinc from domestic ores in 1921 was about 194,000 tons and from foreign ores about 2,500 tons, a total of 196,500 tons, as compared with 450,045 tons from domestic ores and 13,332 tons from foreign ores, a total of 463,377 tons in 1920. In addition to primary zinc there was an output of about 17,000 tons of redistilled secondary zinc, as compared with 21,371 tons in 1920, making a total supply of distilled zinc and electrolytic zinc in 1921 of 213,500 tons, of which 31,500 tons was high grade and intermediate, 32,000 tons select and brass special, and

150,000 tons prime western. The output of the corresponding grades in 1920 was 114,606, 59,811, and 310,331 tons, respectively, a total of 484,748 tons.

The exports of zinc made from foreign ores were about 1260 tons and those of zinc made from domestic ores were about 3200 tons, as compared with exports of 28,368 and 85,898 tons, respectively, in 1920.

The two largest zinc rolling mills have added zinc shingle machinery to their equipment. This use of sheet zinc is one of the most promising now being developed.

Kentucky Troops Again Sent to Newport

Governor Morrow of Kentucky has ordered 350 National Guardsmen to Newport, Ky., where a strike is in progress at the plant of the Newport Rolling Mill Co. The troops had been stationed in Newport for five weeks, but were withdrawn on Jan. 28 on receipt of intimations that the civic authorities were able to handle the situation. Since the troops were taken away, a reign of terror has existed and on Wednesday night it is estimated that 3000 shots were fired in the vicinity of the mill. The situation became so tense that a tank company from Covington, Ky., was called out at midnight to maintain order. In connection with this strike Governor Morrow issued two statements, one to the press and another proclamation addressed to the people of Newport. These statements are interesting as showing conditions existing in that city at the present time and also as to what conditions officials of the rolling mill company are forced to contend with in trying to operate their plant. As a result of the lawlessness which has existed in Newport for some time, several large manufacturing plants have about decided to remove their plants from that city across the river to Ohio.

Governor Morrow's proclamation upon sending troops to Newport is as follows:

To the People of Newport:

Law, order and security do not exist in Newport. For the past week a reign of terror has existed. Men have been shot down in the open streets. Citizens have been assaulted and beaten. Women have been abused and insulted. Men have been threatened and intimidated. Homes have been fired into and the torch has been applied. Lawlessness—brazen, open and defiant—has been supreme. Your peace officers advise me they are powerless.

I am sending the National Guard troops of the commonwealth of Kentucky to put an end to this condition. Any one who fires upon, strikes or insults a State trooper fires upon, strikes and insults Kentucky, and will be treated accordingly.

The manhood and conscience of Newport must assert itself. I call upon every power of the city which stands for supremacy of law to co-operate with the troops. I call upon every law-abiding citizen of Newport to stand up and be counted for the law of the land. Violence and terror have existed. They must cease to exist. Lives have been threatened and endangered. They must be made safe and secure. Newport has been disgraced and dishonored. The cause of this disgrace and dishonor must cease.

EDWIN P. MORROW,

Governor of the Commonwealth of Kentucky.

Feb. 2, 1922.

Great Bridge Proposed

The Mackinac Development Co. has been organized to investigate the feasibility of building a bridge across the Straits of Mackinac, or a tunnel under the straits. Engineers believe that the most feasible route for a bridge would be between Cheboygan, Mich., and St. Ignace, Mich., utilizing several islands in the straits. Charles Evan Fowler, consulting engineer of New York, has been retained to do the investigation work. The board of advisors on the project includes Prof. H. E. Riggs, University of Michigan; Prof. M. E. Cooley, dean of engineers, University of Michigan; George H. Pegram, chief engineer of the Interborough Rapid Transit Co. and Prof. William H. Burr, consulting engineer of New York.

The Wheeling Steel Corporation this week will ship down the Ohio River to Memphis, Tenn., two large loads of steel pipe, the shipment aggregating 1700 tons.

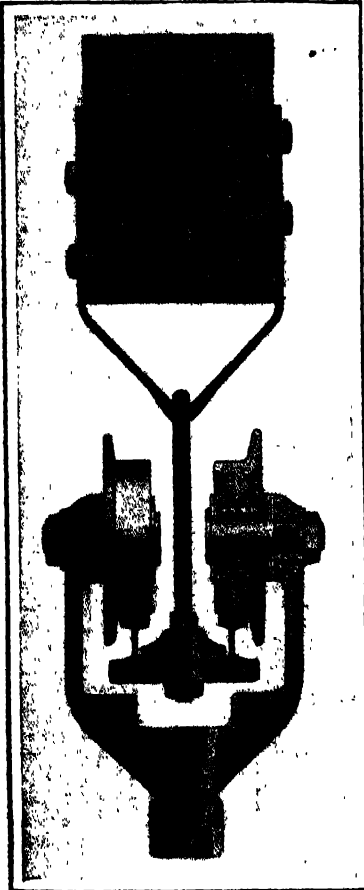
Double-Rail Overhead Conveying System

Safeguards Against Track-Jumping—Trolleys Have
Two, Four or Eight Wheels—Can Carry
Load of 3000 lb.

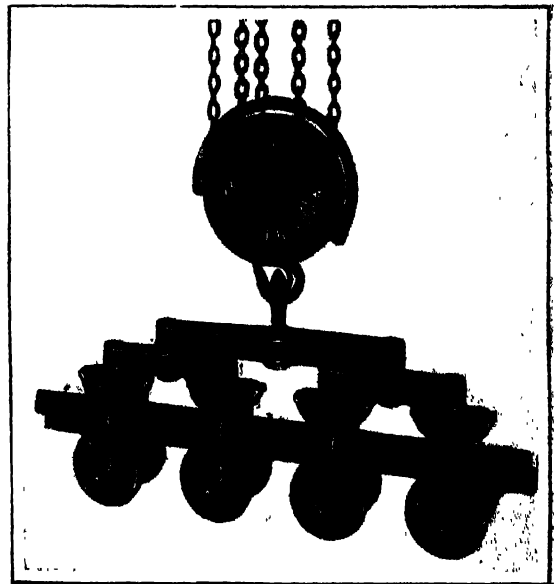
BY G. L. LACHER

THE Dreis & Krump Mfg. Co., 2909-23 South Halsted Street, Chicago, has put on the market the "Atlas Carryall" overhead conveying system, designed to meet the demand for simple, safe, reliable and relatively inexpensive equipment for moving material in plants where the usual load does not exceed 3000 lb.

of an inch. The track consists of two parallel rails, double rail construction having been adopted in preference to the usual monorail type to minimize the possibility of the trolley jumping the track. The rails are laid on a plate to which the U-bolt hangers are bolted, the supporting nuts being on the bottom of the plate. Thus the rails are supported from the bottom instead



Double Rail Construction Was Adopted for This Overhead Conveying System Because That Design Was Regarded as the Best Insurance Against Trolley Jumping. The rails are supported by a plate suspended by U-bolt from overhead brackets and are held in place by a cast-iron wedge through which the U-bolt passes. That side of the base of the rail under the wedge is wider than the outer side, hence the center of gravity of each rail is thrown inside of the web, thereby minimizing the possibility of the rails becoming dislodged and turning outward



An Eight-Wheel Trolley Is Made Up of Two Four-Wheel or Four Two-Wheel Trolleys. A four-wheel trolley is made up of two sets of two-wheel trolleys, joined together by a connecting bar, and two four-wheel trolleys similarly connected form an eight-wheel trolley. The latter will handle a load up to 3000 lb.

The construction is such as to make it unnecessary in many plants to erect a superstructure from which to suspend the system. In buildings in which wooden joists project from the ceiling, supporting brackets may be fastened directly to the joists. Brackets suitable for fastening to steel roof trusses have also been provided, while for reinforced concrete ceilings special inserts have been devised.

Hanging from the brackets are U-bolts which support a track on which the material handling trolleys operate. Both legs of the U-bolt are threaded so that the position of the track is adjustable within a fraction

of the top, this design having been selected to eliminate the danger of the rails becoming dislodged and dropping to the floor. To further insure the stability of the track, the company uses a special rail section, the base of which is wider on one side than on the other. When the rails are placed on the supporting plate the wider bases face each other and upon them is superimposed a wedge through which the legs of the U-bolt pass. The wedge holds the wide bases of the rails in place. By throwing the center of gravity of each rail toward the middle of the track, the possibility of the rails being forced out of position and turning outward is reduced.

Throughout the design of the Atlas Carryall system principles of safety and stability were given heed. Thus the clearance between the track supporting plate and the trolley frame was made as small as possible as an additional safeguard against trolley jumping. In other words, in such a rare case where the trolley might jump, the frame would strike the supporting track

Switches Are of the Movable Tongue Type. Separate right and left-hand two-way switches are unnecessary with this system, the one switch, shown in the illustration, sufficing for both types of turns

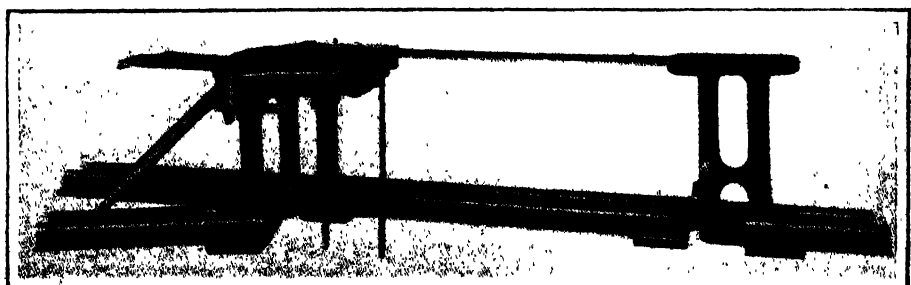


plate before the trolley wheels could leave the rails. Any tendency of one wheel to leave the rail upon which it operates is overcome by the contact of the flange of the opposite wheel against the head of the other rail.

The trolley wheels are of cast iron, which material is strong in compression. The wheels rotate on Hyatt roller bearings, all turned and bored to limits of plus or minus 0.002 in. The bearings are spiral and alternately left-hand and right-hand, throwing oil in opposite directions and drawing dirt and dust into their hollow centers, thereby leaving the surface smooth. The bearings are incased in a hardened steel sleeve pressed into the bore of the wheel, with dust-proof washers at each end, outside of which are thrust washers. The bearings revolve around a hardened steel pin with a Brinell test of 200 to 225.

The trolley frame is made entirely of steel castings, and all surfaces in contact are machined. The smallest trolley made has two wheels. A four wheel trolley is made up of two sets of two wheel trolleys, joined together by a connecting bar which is supported by pins having unusually large bearing surfaces. The four wheel trolley will handle a load up to 1500 lb. The eight-wheel trolley, which consists of two four-wheel trolleys joined together, takes a burden up to 3000 lb. The pins and the hooks are drop forged. Bumpers are integral with each pair of trolley wheels, so that two or more trolleys can be pushed along together without the wheels bumping each other.

Switches are of the movable tongue type, instead of the sliding type. The hinged end of the movable tongue is of such construction that there are no ill-fitting joints for the trolley wheels to jump over. Although a connecting pin has been inserted at the hinge as a safety precaution, the tongue actually rotates in a semi-circular lapped joint, so that practically a continuous and uninterrupted surface is provided for the trolley wheels to pass over at the junction of the track and the tongue. The switches are so guarded that a trolley cannot run off the end of the track, either when it is open or when the tongue is being moved from one position to another. Except when the switch is exactly connected, a guard, which rests on the track, bars the progress of the trolley. Both two-way and three-way switches are supplied. Separate right- and left-hand two-way switches are unnecessary with this system, the one switch sufficing for both types of turns.

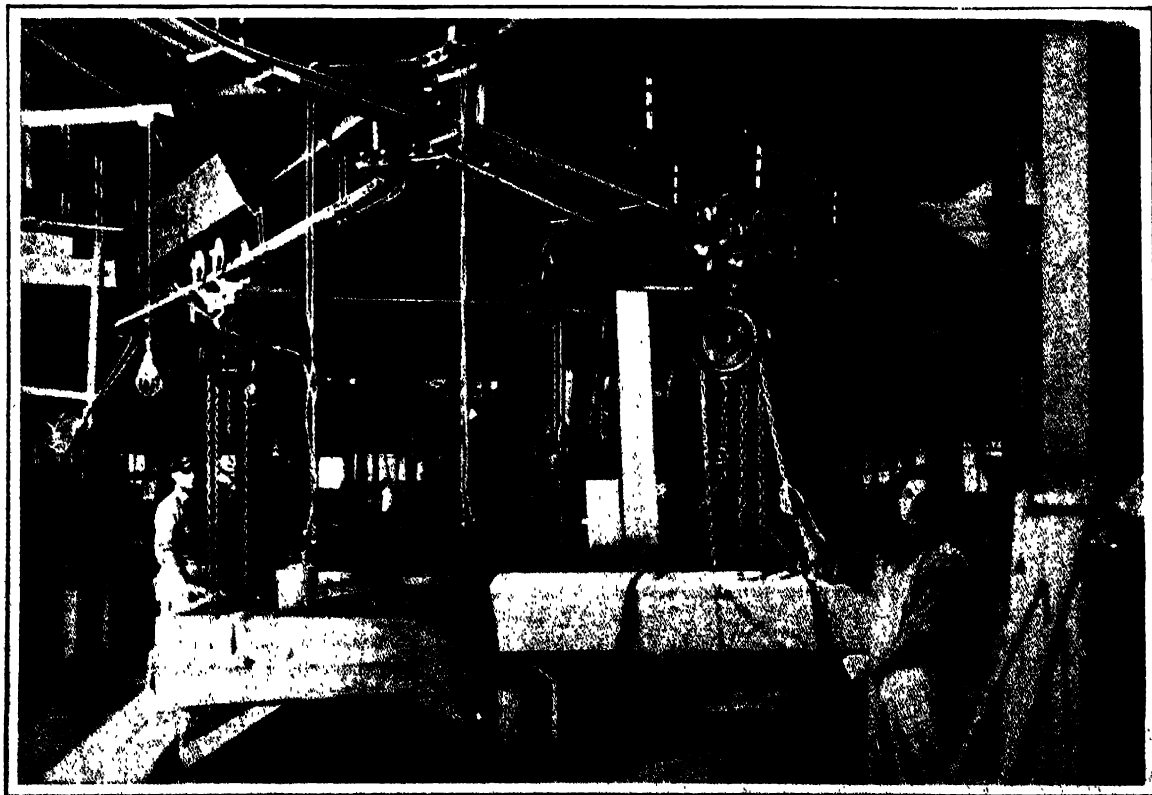
It is claimed that the Atlas carry-all system may be installed by any mechanic. The rails, which are 2½-lb. sections made from new billet stock, may be bent at the place of installation to suit the requirements of the job. For this purpose the Dreis & Krump Mfg. Co. has supplied a special bending iron. This is a steel casting, which may be fastened to a column and in which the rails may be bent by hand to any degree of curvature



Special Bending Irons Have Been Provided So That the Rails May Be Bent at the Place of Installation to Any Degree of Curvature Desired

desired. In fact, rails have been bent down to a 10-in. radius without interfering with the operation of the trolleys thereon.

The American Society of Mechanical Engineers, the American Institute of Mining and Metallurgical Engineers, American Institute of Electrical Engineers, American Society of Civil Engineers, Illuminating Engineering Society, New England Water Works Association, and the American Society of Heating and Ventilating Engineers were well represented at the thirteenth annual engineers' dinner held Tuesday evening, Feb. 7, at the City Club, Boston. President Lowell, Harvard University, spoke on the Armament Conference in Washington, and Philip Cabot on the engineer's opportunity.



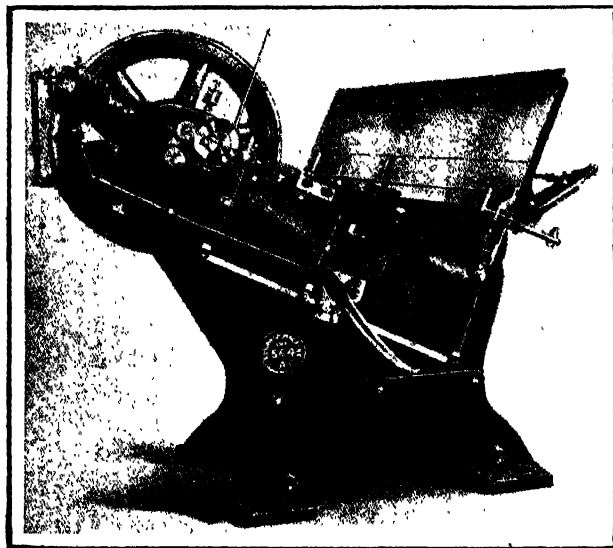
The Four-Wheel Trolley Shown Is Carrying a Concrete Stair Tread Weighing 1200 Lb. The photograph was taken in the plant of the National Mosaic Tile Co., Chicago, where an Atlas system has been installed.

New Automatic Stagger-Feed Press

An automatic stagger-feed press for the economical production of jar closures, can tops and bottoms, small shells and similar work has been developed recently by the Adriance Machine Works, Inc., 80 Richards Street, Brooklyn, N. Y.

The staggered arrangement affords a saving in metal, blanks being punched with but a thread of metal between them. The simplicity of construction is a feature, the press having fewer parts than the usual design. It is claimed that over 100 blanks a minute from 1 to 4 in. in diameter can be accurately punched out, the quantity decreasing or increasing according to the size of the work.

The press, which is designated the No. 564 A, is shown in the accompanying illustration. An outstand-



Automatic Stagger-Feed Press for Production of Jar Closures, Can Tops and Bottoms and Similar Work

ing feature is the continuous action of the punch while the sheet carrier travels in either direction. It is not necessary for the carrier to return to the starting point after punching a row, for the moment the end of a row is reached the action is reversed automatically and the next row punched out as the carrier returns to the starting point.

When the last blank is punched from the sheet the carrier is automatically stopped and stands ready to receive another sheet. This arrangement is said to enable the operator to run several presses and to turn out over 100,000 blanks per day. There is only one die. Scrap is ejected automatically and cut into skeleton frames. The design provides for the safety of the operator, as at no time are his fingers near the die while the press is running.

To Investigate Waste in Industry Report

The report on elimination of waste in industry made under the direction of the Federated American Engineering Societies is now under study by members of the National Industrial Conference Board. The members have been urged to consider the report in detail in order that they may corroborate and further emphasize statements in the report or conclusively prove the fallacy of statements of the report. It appears that some of the members of the National Industrial Conference Board are of the opinion that parts of the report reflect the truth but that others are contrary to fact, and while the true ones should be strongly supported, the incorrect statements should be refuted. As the analyses are received, it is the plan of the board to prepare a statement for general publication. The investigating movement is a commentary on the interest developed in the report, and also a commentary on the authority which the report is believed to possess through the fact that the committee was appointed by Herbert Hoover, while president of the federation.

THREE COMPANY MERGER

Negotiations of Steel Companies in Trying to Get Together Still Pending

CHICAGO, Feb. 7.—Notwithstanding reports to the contrary, negotiations are still under way toward the three-company consolidation of independent steel mills. Conferences of the interested parties were held in Chicago and New York last week and another meeting will take place in New York Feb. 13.

As yet the three companies have not come to an agreement on the valuation of their properties. Another difficulty lies in the fact that one of the parties to the negotiations has exceptionally heavy raw material holdings which are largely covered by bonds, the interest on which is rather a heavy burden under present conditions. It is intimated, however, that progress is being made toward a solution of these problems.

Youngstown Company May Build at Chicago

YOUNGSTOWN, Feb. 7.—In case the proposed independent steel merger involving the Youngstown Sheet & Tube Co., Inland Steel Co. and the Steel & Tube Co. of America, the latter two interests of Chicago, fails to materialize, it is understood the local interest will establish a Chicago district pipe connection. In fact, construction of a tube mill plant in the West has been considered by the Sheet & Tube company for some time, and it is reported in some quarters that land for a new plant has already been optioned.

That the proposed consolidation has struck a snag in the demands of Inland Steel, which may prove insurmountable, is current comment. Consequently the possibility of developments, should the combine fall through, is being extensively discussed.

It is currently reported that not only has Inland Steel failed to adequately mark down its holdings to meet the idea of the other companies, but is demanding a substantial sum for its position in the Chicago district.

On the other hand, it is felt that difficulties encountered in connection with the high bonded indebtedness of the Steel & Tube Co. and its appraised value may be reconciled.

On account of the attitude of the Inland Steel Co. there was considerably less optimism in well informed circles in Youngstown this week as to the ultimate success of the plan.

In fact, there were hints in some quarters that the inability of the conferees to come to an agreement might be openly recognized and admitted within a short time. Efforts might still be put forth, it is explained, toward effecting an amalgamation even though such admission were made.

It is claimed that the investigations and compilations have developed the fact that the Sheet & Tube company is on a low cost basis with respect to pipe production as compared with Chicago district makers. On the other hand, the latter enjoy an advantage in freight rates on shipments to the West and Southwest, through their location.

The possibilities of a merger with the Jones & Laughlin Steel Co., Pittsburgh, which is to establish a Western plant, have been thoroughly canvassed, it is understood, but the latter interest has refused to entertain any consolidation proposal.

Miners' Time Lost Through Strikes

WASHINGTON, Feb. 7.—Supplementing the statistics of man-days lost on account of strikes, the United States Geological Survey this week presents data as to the man-days lost through other causes. In the 20-year period, 1900-1919, the operators reported a total loss of 124,747,199 man-days through strikes, but the loss attributable to other causes was 1,053,576,000 man-days, or eight and a half times as great as the strike loss. To put it another way, in two decades American coal miners lost 10.5 per cent ascribable to strikes and 89.5 per cent to other causes, chief of which are no market, coal shortage, and mine disability.

New Line of Pneumatic Riveters

A line of pneumatic riveters of the type shown in the accompanying illustration and in various capacities from 10 to 150 tons has been placed on the market by the Southwark Foundry & Machine Co., Philadelphia.

The machine is of the compression yoke type using a toggle action to give movement to the die, which advances rapidly to the rivet, decreasing in speed and increasing in pressure as it travels. The die travels a sufficient distance at practically uniform speed and rated pressure to assure satisfactorily driving tight rivets, drawing the plates together and following up



The Die Is Set for a Run of Work So That the Rivet Is Headed When Piston Has Made Three-Quarters of the Stroke

the shrink of the rivet with full pressure until it takes its set. It is not necessary to drive the rivet at the end of the die travel or piston stroke. The die is set for a run of work so that the rivet is headed when the piston has moved through $\frac{3}{4}$ of the stroke, thus allowing sufficient die travel at full pressure on either side of this position to take care of variations in length of rivets, thickness of plates, dimensions of holes, etc. This obviates the necessity of further adjustment of the die screw.

The operating valve is of the plain slide type, requiring but one simple wick packing on the stem end and having a removable valve seat for ready regrinding. It is further provided with means for using line pressure in the pull back. Two separate pressures on the rivet die can be obtained by turning a plug cock in the valve plate, admitting air at full pressure in the pull back area. This reduces the pressure to the next lower tonnage rating, that is, a standard 50-ton machine is arranged to develop both 50 and 30 tons on the die. Special equipment such as pressure regulating valves, auxiliary storage tanks, etc., are eliminated in this design.

The riveter frames are steel castings of I-beam section. All portable machines are provided with suspension, and above 36-in. reach, with feet for stationary position. The reach of the smallest machine is 4 in. the gap 10 in., the same dimensions for the large machine being 21 ft. 6 in. and 18 and 24 in. gap. cylinder diameters are 7 1/2 to 20 1/2 in.

High Carbon in Weldless Steel Tubing

An account of experiments conducted with high and low carbon steels was presented at a joint meeting of the Institution of Automobile Engineers and the Birmingham Metallurgical Society, Birmingham, England, by W. W. Hackett.

Experiments on aeroplane tubing during the war showed that excellent results could be obtained by using 0.5 per cent carbon steel tubing giving in the bright or blue state a yield of 40 to 45 tons per sq. in., and an ultimate stress of 45 to 50 tons per sq. in. In the motor trade there was a disinclination to use these high carbon steel tubes, which it was thought would necessarily be brittle. No extra care had been used in heat treatment, but the result of hundreds of tests carried out showed that 0.3 per cent carbon was always better than 0.15 per cent, and 0.5 invariably superior to 0.3 per cent.

Details were given of a number of these tests. In one series 20-gage tubing made of 0.54 per cent carbon steel had practically as long a life under the same weight and shocks as 17-gage tubing manufactured of 0.338 per cent carbon steel. Figures were given showing the greater strength of high carbon than of medium and low carbon steels. One experiment showed that a 20-gage high carbon steel was practically as strong as a 15-gage low carbon steel, though only half as thick. This was attributed to the fact that after undergoing the brazing process the elastic limit of a 0.5 per cent carbon steel was about twice as high as that of a 0.15 per cent carbon steel at the brazed joint, and consequently the high carbon steel was able to stand much more stress than the low carbon. It was also concluded that the high carbon quality had twice the life of a low carbon when subjected to the same fatigue.

In a discussion which followed, A. E. Tucker called attention to the fact that silicon had a great effect upon the mechanical properties because of its influence on carbon, and it should always be taken into account in connection with the carbon content.

Explosion at a Frick Mine

UNIONTOWN, PA., Feb. 6.—Investigations into the fatal disaster at the Gates plant of the H. C. Frick Coke Co. in which 25 men were killed got under way to-day with the arrival of Seward E. Button, head of the State Department of Mines. Coroner S. H. Baum held a preliminary conference with Frick and State officials to-day and will meet with them again on Monday. Cause of the blast has not been determined.

Damage to the Gates mine was comparatively small, the disaster being confined to one section, known as the Ross section. The disaster was the first serious Frick accident since 1891 when approximately 100 men lost their lives in an explosion at the Mammoth plant.

Shipping Steel by River

PITTSBURGH, Feb. 6.—Preparations are being made by the Jones & Laughlin Steel Co. to make up and send down the rivers early in March one of the largest tows of steel products ever shipped by water. It is anticipated it will exceed any previous barge movement by several thousand tons. Up to the present, this company has delivered more than 500 freight carloads of its products in its steel barges to consumers in the Ohio and Mississippi Valleys. Delivery by barge is said to be a couple of dollars a ton cheaper on the average than delivery by rail.

Ford Blast Furnace Breaks Its Record

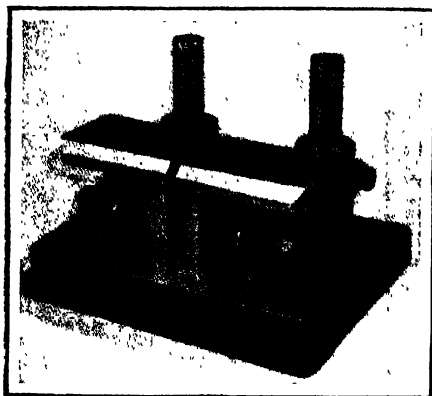
All previous records for production and for coke consumed per ton of iron of the Ford Motor Co.'s A furnace were broken in January. The record was as follows: 18,278 tons of pig iron. Average per day 604 tons. 1791 lb. of coke per ton of pig iron. Of this iron 1157 tons was foundry iron averaging 3.50 per cent silicon. The rest was malleable iron, the silicon ranging from 1.00 to 1.87 per cent. The best day's run was 761 tons.

Universal Drill Fixture

A universal drill fixture intended to save time by providing a quick and accurate means of holding parts of any shape for drilling, is being offered by the Hartmann Mfg. Co., Hartford. It is primarily for use in tool rooms and in shops doing job work.

As shown in the illustration, the fixture consists of a base ground for a layout table, with two angle irons swinging on horizontal arms which can be raised or lowered. The angle irons are ground on one side to 45 deg., making a V-block with its mate, the other side having a groove to hold the work in place. The angle irons are interchangeable in any position.

The entire fixture is 10 by 12 in. with a working



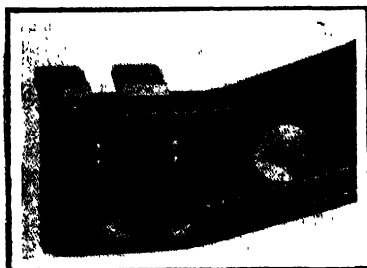
The Fixture Is Strapped to a Drill Press Table. It is intended to save time on work requiring use of parallels, angle irons or V blocks.

height of 8 in. from the face of the table. The surface of the base is ground for a layout table 5½ by 12 in. The construction is rigid, the fixture being designed so that a ⅝-in. drill will produce a plus or minus deflection of not more than 0.002 when the drill is on the extreme edge of the angle iron at the extreme height. The angle iron can be locked solidly in any position on the studs, which are of steel, hardened and ground.

The device is said to do everything that can be done with parallels up to 8-in. in height, V-blocks up to 9 in., or angle irons of this size, and variety of work in addition. Thin flat stock can be held and drilled in the grooves of the angle irons. Triangular and V-shaped pieces are held easily and accurately in place, and round tapered parts are said to give no trouble. Work requiring blocking can be placed on one angle iron and the other angle iron adjusted to the right height and locked in a few seconds.

Square Anvils for Trus-Form Gages

Trus-Form gages offered by the Pratt & Whitney Co., Hartford, and described in THE IRON AGE, June 30, 1921, may now be obtained with large square-head anvils as shown in the illustration. The adjustment



Square Anvils Permit Working to a Shoulder. This type is interchangeable with round-head type.

and locking device is the same as that previously described, two opposed headless set screws working in the frame pulling against each other. Square anvils permit working up to a shoulder and give a larger wearing surface. This type of anvil is interchangeable with the round-head type and new anvils may be substituted at any time.

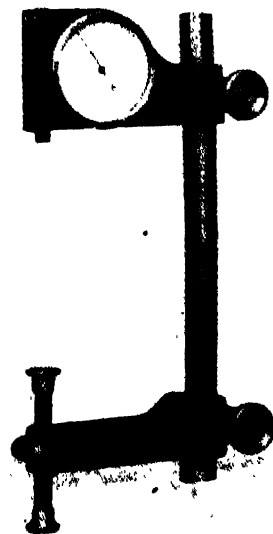
The Favorite Stove & Range Co., Piqua, Ohio, has resumed operations in its foundry which has been closed down since late in December.

Extension-Beam Indicating Caliper

The indicating caliper shown in the illustration, has been placed on the market recently by the H. W. Horstmann Co., Irvington, N. J. It is designated as the No. 20 and is intended for work beyond the capacity of the company's regular instrument. It is adaptable for use on the planer for duplicating widths on flat work and on the lathe for chuck work, especially in gaging across large diameters. It shows visually either the amount of stock still to be removed or how much the work is undersize at any stage of its making.

The caliper is set by placing a sample of the desired length between the plunger and the adjusting screw. The latter is then advanced until the indicator registers zero, and then locked. The dial is graduated to show the movement of the plunger in thousandths of an inch and variation in the lengths of pieces placed between the plunger and the adjusting screw is shown by the distance the indicator moves from zero.

The rear surface of each arm is finished flat. To bring the plunger and the adjusting screw in alignment it is only necessary to lay the instrument face upward on a flat surface. Tightening the clamping screws rigidly locks the arms on the beam. The beam is regularly 6 in. long and of ½ in. round cold rolled steel, a size of stock usually found in any shop and therefore any length of beam can be conveniently made up. By reversing the position of the arms on



Wear Will Not Affect Accuracy, as Zero, the Only Important Point on the Dial Is Always Fixed by Adjustment.

the beam, the instrument becomes an inside indicating caliper for large diameters, the minimum diameter that can be measured under these conditions being 4¼ in.

Jones & Laughlin Steel Co. Plans

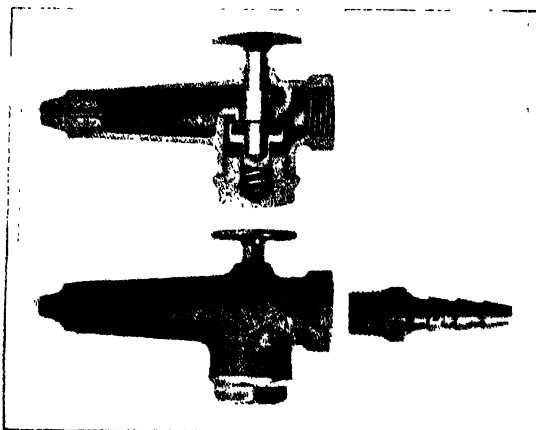
The second step in the development of the Jones & Laughlin Steel Co. project at Hammond, Ind., was taken when articles of incorporation were filed by the Adelaide Land Co., which was organized to purchase the 900-acre site for the plant to be constructed by the steel company. The incorporators of the land company are members of the organization of the Fletcher Savings & Trust Co., Indianapolis, which represented the Jones & Laughlin Steel Co. in the negotiations for the land. Transfer of the land to be bought by the land company to the steel company will be made shortly, it is said.

Hausman & Wimmer Co., First National Bank Building, Pittsburgh, has purchased the old South Street bridge, Philadelphia, which is being razed to make way for a new structure. There are about 1000 tons of wrought iron in the old bridge, which the buyers will scrap.

Air Gun for General Dusting

The accompanying illustration shows an air gun recently placed on the market by Jenkins Bros., 80 White St., New York.

The features emphasized are that it holds tight under pressure, when closed, thereby eliminating leakage and consequent air waste; and that it quickly responds to the press of the button, freely emitting the air. A renewable disk of special design is intended to form perfect contact on the seat and take up the



An Gun for Foundry and Machine Shop Use

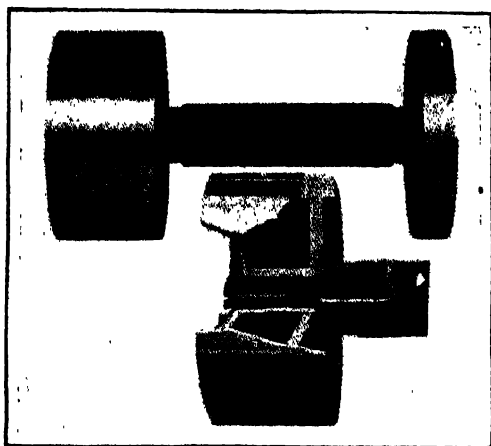
wear caused by hard usage. Each valve is cast of steam bronze. By the use of different hose nipples the gun is adaptable to $\frac{1}{8}$, $\frac{1}{4}$, $\frac{3}{8}$ and $\frac{1}{2}$ in. hose pipe.

In foundries the gun can be used in blowing off cores, cleaning core boxes, flasks, patterns and for general dusting, in place of hand bellows or brushes. In the machine shop it can be used for blowing out chips, cleaning tools, benches, etc. It can be used in forges for tempering tools, and in many other places where air is used for cleaning or drying purposes.

Large Sizes of Trilock Plug Gages

The Trilock plug gages manufactured by the Pratt & Whitney Co., Hartford, and described in THE IRON AGE of Sept. 1, 1921, are now offered in sizes of $2\frac{1}{2}$ in. and larger diameter.

The large gages are made hollow for lightness, the construction being shown in the accompanying illustration.



The Go Plug Is Lightened by Web and Flange Construction

tions. The hollow construction applies to the "go" plug being lightened by a web-and-flange construction. The two disks shown are forced into the ring on a taper before grinding and grip the central tube, holding the parts securely. The reversible feature is intended to provide double the usual wearing surface.

grooves in the bushing, providing a three point self centering tripod support without rock or slide. The washer at one end and the handle at the other bear on both the stay-tube and the disks, binding the assembled gagehead to the handle.

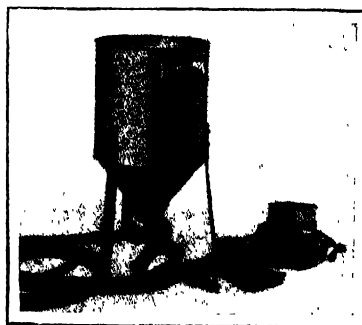
Reversible and renewable-end Trilock gages can now be had single and double end, threaded in all sizes above $\frac{1}{2}$ in., and plain cylindrical in all sizes $\frac{5}{16}$ in. and above.

Small Hose Sand Blast

A small hose machine sand blast, a recent addition to the line of the Pangborn Corporation, Hagerstown, Md., is shown in the accompanying illustration. Although small enough to be picked up and carried, it is said to be a practical design and to do the work of any sand blast.

The hose machine consists of a suction-type gun with the blast action controlled by a trigger in the handle. Compressed air passing through the air jet creates a vacuum by which the sand or metallic abrasive is brought from the hopper to the gun body. The gun body forms a mixing chamber for the air and abrasive, which is given a swirling action, similar to that produced by the rifling of a gun barrel. This design, it is claimed, produces a most effective blast stream.

It operates at pressures from 5 to 100 lb. Interchangeable nozzles are provided, adapting the apparatus to plants having a small volume of compressed air or a small amount of work. There is a small cabinet which sets over the hopper. This provides an



The Gun Is of Suction Type with Blast Action Controlled by Trigger in the Handle. A small cabinet sets over the hopper

economical means of cleaning small parts, furnishing a complete, self-contained, continuous cabinet sand blast.

Demand from Poland for Machine Tools

WASHINGTON, Feb. 7.—Increased demand for machine tools, railroad equipment, etc., in Poland is likely, says Trade Commissioner Smith, in consequence of the acquisition of territory in Upper Silesia, where there are large industrial establishments which formerly received their supplies chiefly from Germany. The report says the Germans are likely to be strong competitors with the United States for supplying machinery and equipment. Hitherto the German Government has actively discouraged the export of German goods to Poland, but under the decision of the League of Nations dividing Upper Silesia, Germany is required to permit free exportation into that part of Silesia which has been assigned to Poland and in any case German commercial and industrial interests are putting pressure on the Government to relax any restrictions against sales into Poland and the German Government as a result is said to have issued instructions that no obstacles should be placed in the way of export to Poland of machinery, construction materials and locomotives. The report says American manufacturers would do well to take prompt measures for securing trade in these classes of goods in Poland and that in particular there might be immediate prospect for the sale of railroad cars to the Polish State railroads.

The Donner Furnace of the Donner Steel Co., Buffalo, banked several weeks ago, started Feb. 1. The

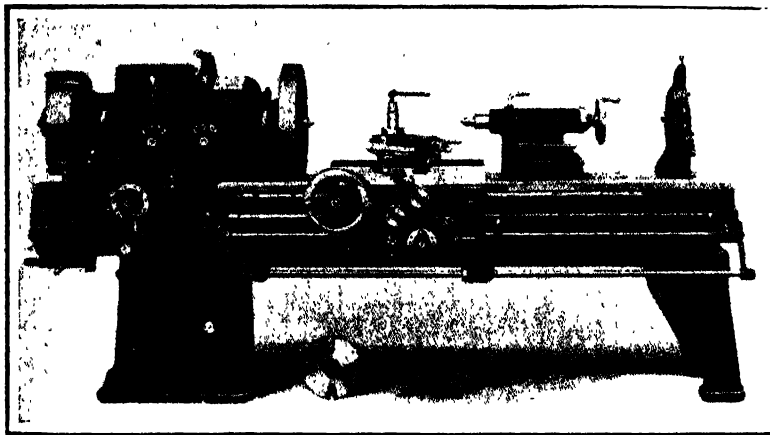
New 18-In. Coneless Engine Lathe

The accompanying illustrations show the new 18-in. coneless engine lathe which is being placed on the market by the Boye & Emmes Machine Tool Co., Cincinnati.

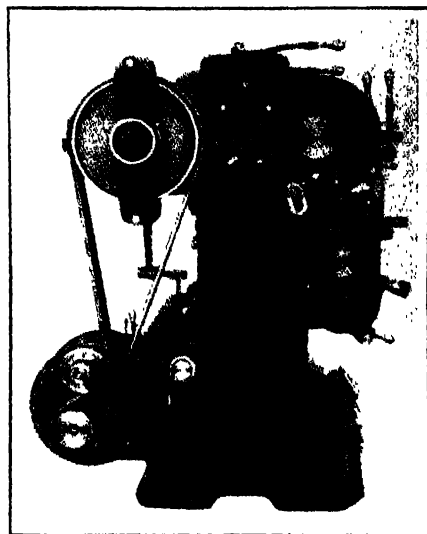
The separate view of the headstock with cover removed shows the arrangement of shafts, clutches, gears and levers for speed changing. All levers are either drop forgings or steel castings and the main spindle bearings can be adjusted, without removing the top cover. The top cover is provided with a removable plug for filling the headstock with oil, and a glass oil tube

The mounting of the motor is shown in the end view illustration. The cabinet leg has two planing strips, the top strip having a slot planed the entire length and being jig drilled and tapped. The motor-base plate is jig drilled to match the cabinet leg, the plate carrying an idler pulley running on S K F ball bearings, to provide proper belt tension. Any standard make of constant speed motor can be used, the size recommended being from 3 to 5 hp.

The swing over the bed is 19½ in., over the carriage 13¼ in., over the compound rest 11½ in., and over the taper attachment 10¾ in. The front journal is 3¼ in.



Coneless Engine Lathe Twelve main spindle speeds are provided, which are selective. End view to right shows mounting of the motor



on the headstock shows the level of the oil, which should be normally about half full.

The main spindle is a chrome-nickel steel hammered forging, heat-treated. All spindles have large collars forged integral with them, affording a large diameter for seating face and chuck plates. All shafts in the headstock, back-gear shafts, initial driving shaft and intermediate shaft are of alloy steel, heat-treated and the keys or feathers required are milled integral with the shaft. All bearings, including the main spindle bearings, are of phosphor bronze.

Twelve main spindle speeds are provided, and are selective. Thirteen gears are used. Clutches and

in diameter, 5½ in. long; and the rear journal 2¼ by 37/16 in. The spindle nose is 3 in. in diameter and has 6 threads per in. The hole in the spindle is 1½ in. The tailstock spindle is 2½/16 in. in diameter and has a travel of 9 in.

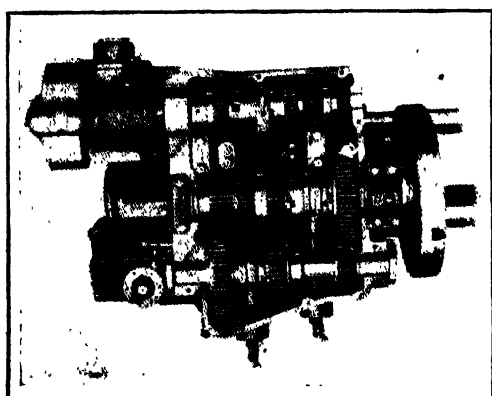
The lathe cuts 2 to 56 threads per in. and the feeds per in. are ¼ to 224. The lead screw threads are four per in. and the distance between centers on a coneless lathe with 8 ft. bed is 4 ft. 2 in. The floor space occupied is 10 ft. by 3 ft., and 10 ft. by 3 ft. 7 in. for the motor driven lathe. The weight of coneless lathe with 8 ft. bed is 4269 lb.

Will Rehabilitate Seaboard Equipment

The Seaboard Bay Line Co. has been organized by the Seaboard Air Line Railway Co. and the Baltimore Steam Packet Co., to purchase, rebuild, or otherwise provide for the reconstruction of their cars and equipment. The company will have \$1,500,000 capital to pay in. S. Davies Warfield, president of the Seaboard Air Line, said that 5000 freight cars, or over 30 per cent of the road's rolling stock, were returned from Federal control unfit for service, with the result that the road's actual payment of daily charges for the use of the cars of other roads rose to \$1,500,000. He said that the company's locomotives when returned needed repairs costing \$500,000.

"The Seaboard Air Lines will issue and has arranged to place \$4,600,000 6 per cent 15 year equipment trust certificates at par," said Mr. Warfield. "The proceeds, with other resources of the new company, will pay for 3000 of the 5000 damaged or bad-order freight cars to be immediately reconstructed by the Chickasaw Car & Shipbuilding Co., Birmingham, Ala.; also 1750 new steel underframe freight cars, 25 Mikado locomotives nearing completion by the American Locomotive Co., and two twin-screw steel, combination passenger and freight steamers ordered from Pusey & Jones Co., Wilmington, Del., for use between Baltimore, Md., and Norfolk Va.

The Southbridge Foundry Co., Worcester St., Southbridge, Mass., is operating its new one-story, 100 x 50 ft. plant. Frank S. Mills is president and general manager, and Alfred A. Allard, treasurer.



Headstock with Cover Removed Showing Arrangement of Shafts, Clutches, Gears and Levers for Speed Changing

clutch gears are hardened and oil tempered and gears always in mesh run in a bath of oil. Positive clutches are provided for speed changing, which is effected instantly and without an interference device. Conflicting gear ratios cannot be engaged. The driving pulley is 13 in. x 4 in., for a 3-½ in. double belt and is designed to run at 350 r.p.m. giving spindle speeds of 350 r.p.m. to 9 r.p.m., maximum and minimum. The lever for starting, stopping and reversing the lathe spindle is located at the right-hand end of the apron an auxiliary lever for this purpose being located on the headstock.

Oslund Continuous Wire Drawing Machine

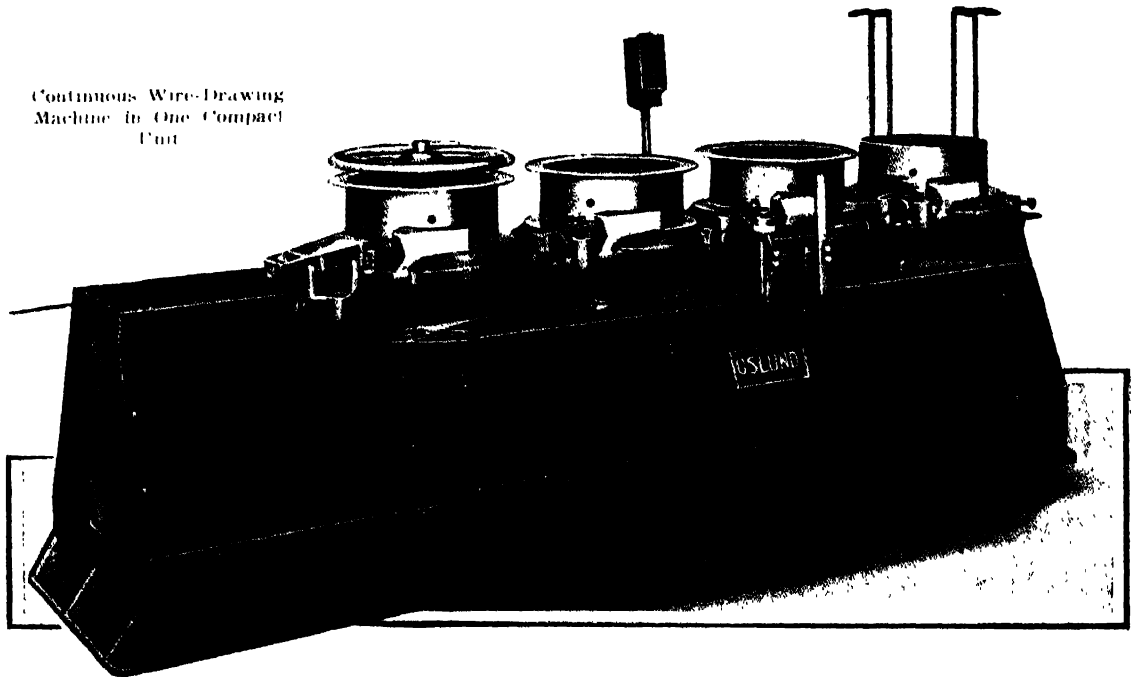
Design Embodies Unique Arrangement of Differential Gearing to Maintain Wire Automatically Taut—Novel Pointing Device and Slow Starting Features

A MACHINE for continuous wire drawing has been brought out by the O. & J. Machine Co., Worcester, Mass. Several new features have been incorporated which differentiate it from previous attempts to effect the continuous process. The machine has four blocks, operating as a continuous unit and permitting the drawing of wire, in the one machine, down to one-half its entering diameter. An electric resistance pointing device provides a smooth conoidal point on the wire, in a fraction of the time usually consumed in pointing. Any one of the four blocks may be slowed down when, for any reason, this is desirable—as, for instance, when starting the wire upon the block. A spring

to one, makes it easy for one man to lift off the coil, swing it around, and deposit it on a truck, or on skids.

In the photograph of the assembled machine, the driving motor is in the closed compartment at the left, the gearing in the long closed compartment at the right. All four blocks and the motor are mounted upon the same cast-iron base plate, thus preserving alinement throughout. The pointing device, located just above the name plate, is convenient to all four blocks. But it usually suffices to point the wire twice, for, with care, the same pointing may be used twice. The hand wheel shown on the first (left) block permits such control of the speed, under power, that the beginning of the draw

Continuous Wire-Drawing Machine in One Compact Unit



shock absorber on each die holder takes care of the jerks due to unevenness of the entering wire or rod. The machine was designed by Charles H. Oslund, president of the O. & J. Company.

Three sizes of the machine are built, one being a rod machine, drawing down from No. 5 wire rod (0.207 in. in diameter) to 0.080 in. diameter, on four blocks. This may be considered as a roughing unit, its product being delivered, after annealing, to either one of the two finishing machines. The machine illustrated, with four drums, will draw 0.080 in. wire down to 0.041 in. The six-drum machine will draw 0.080 in. wire down to 0.034 in., or other desired size.

While the machine shown has four blocks, the design is not confined to that number—two, three, five or six may be used, according to necessity. But the point here is that the process is a continuous one. And the machine may be used with any one or any group of the blocks at work, thus providing a maximum of flexibility.

This continuous operation saves much labor. Instead of having to handle each coil of wire twice for each block, as in the usual practice, it is now handled twice for each machine—each four blocks, in the general run of operation—thus requiring only one-fourth the manual lifting of other practice. For the big machine, using 220-lb. coils, a special lifting device on

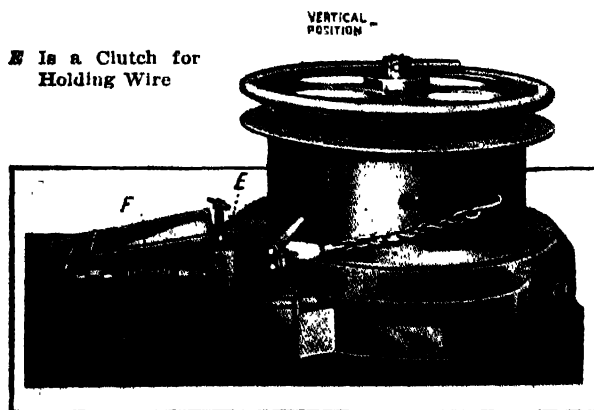
may be made slowly, thus saving the wire from undue stresses and the mill from many broken wires and much delay.

Driving is by electric motor, individual to each machine. This permits the operator to run each machine (one operator can handle four of these machines) at the speed best suited to the wire being drawn. Ventilation of the motor is provided by the screened "windows" shown at the end of the casing. For the smaller machine, drawing wire of 0.080 to 0.099 in. diameter down to 0.040 in. or so, a 5-hp. motor suffices. This may be compared with the estimate of 10 hp. for single blocks of previous types, and with perhaps 30-hp. average for four blocks. Thus the saving in power bills corresponds to that in labor of handling the coils. This low power consumption is due, it is explained, to the bearings and gearing used.

Differential drive gearing leading from the main driving shaft (geared down from the motor speed) is unique in design, and forms a novel arrangement for this purpose. It leads to the bevel gears which, finally, drive the individual blocks. The differential feature automatically compensates for the varying elongation as the wire is drawn through the successive dies, and at the same time automatically allows for the gradual wearing of the dies themselves. This is the outstanding feature of the entire design.

The differential gears, of steel, hardened and heat treated, are of standard automobile design. In place of the usual long sleeve bearings, ball bearings are fitted throughout, not only on the main driving shaft from the motor, but on the jack shaft, the differential shafts and the ultimate spindles of the drums themselves. All bearings, gears and differentials run in an oil bath under dust-proof covers.

For providing a point to enter the die, the entering end of the wire, 8 or 9 in. long, is inserted tightly in

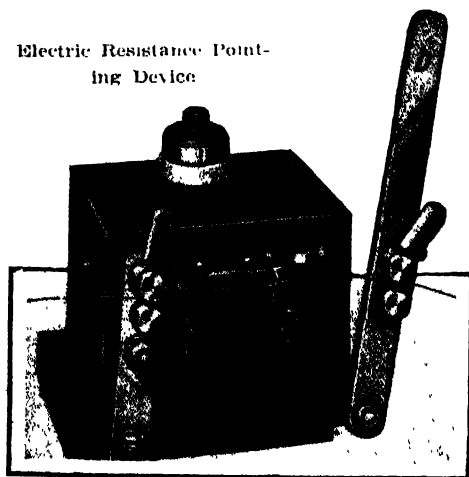


After Pointing, Wire Is Started on the Drum by the Chain Clutch, as Shown. The Die Block Has Spring Shock Absorber, F

the two contact terminals (A and B) on the pointing device, and held by tightening the clamp C, at left. Turning on the current heats the wire cherry red, when a steady pull on clamp D, at right, stretches it and breaks it with a conoidal point, as shown. This point is so smooth and free from burrs that insertion in the die is easy.

To enter the wire upon the first drum, it is caught by a grip as shown in the detail view, and carried slowly around the drum by power, the speed being under rigid control from the operator's hand on the wheel above. After seven or eight turns have been made, the machine is stopped and the leading end of the wire caught in the clip E, leaving enough free end

Electric Resistance Pointing Device



to start on the next drum. This next drum, in pulling the wire taut, pulls it from clip E, and the wire thus passes from the one drum directly to the next. This process is repeated, with intermediate re-pointing as necessary, until all four drums are operating, when the power is allowed to carry the work on continuously.

In the same detail view will be seen the spring shock absorber F, which saves the wire from danger of breaking and saves the dies from the jerks due to unevenness in the entering stock. This eliminates all spotty and cuppy wire. In operation, this take-up

motion is in "almost continual and very rapid action."

As the drums are of 16-in. diameter (50 in. or more circumference) and the fourth drum rotates at about 135 r.p.m., the speed of wire through the fourth die is about 550 ft. per min. This is a great increase over the usual finishing speed, and makes for heavy production per machine.

Effect of Sulphur in Rivet Steel

Tests to determine the effect of sulphur on rivet steel made at Watertown Arsenal and the U. S. Naval Experiment Station under the direction of the joint committee on investigation of effect of phosphorus and sulphur in steel of the American Society for Testing Materials have been entirely completed. Bars, flats and finished rivets from fourteen heats of open-hearth steel, carbon 0.09-0.16 per cent, varying in sulphur from 0.03 to 0.08 per cent, with one heat as high as 0.18, were tested in the natural condition "as received," in annealed condition and in quenched conditions. Publication of complete test data will be made through a technologic paper of the U. S. Bureau of Standards. In the meantime an abstract report of the tests will be released for publication by the society about March 1.

Information on Reclamation of Steel Sand

J. C. Davis, fourth vice-president American Steel Foundries, has generously placed at the disposal of the committee on molding sand research of the American Foundrymen's Association the information which has been collected by this company through years of investigation on the subject of cleaning and reclamation of molding sand. Because of the great amount of silica sand used and the scarcity of sand of the best properties, this company has been very active in developing equipment to clean the old sand accumulating in its steel foundries.

Reduction in Rates on Scrap Iron from Texas

The rates on scrap iron from Texas common points and Dallas group have been reduced 20 per cent to interstate destinations. The new rates, per 100 lb., are as follows:

To St. Louis territory
Chicago territory
Kansas City territory
Milwaukee territory
Memphis territory

The request for reduction in rates from Texas was presented to the carriers by the Association of Waste Material Dealers, Inc., early in 1921 and was disapproved. It was again docketed by the carriers last September, and the carriers reversed their previous position.

Sharp Reduction on Tractors

CHICAGO, Feb. 3.—The International Harvester Co. to-day announced price reductions of \$230 on two-plow tractors and \$200 on three-plow tractors, effective immediately. Until May 1, next, the company will present to every farmer purchasing one of these tractors a two-furrow or three-furrow plow or a tractor disk harrow. President Harold F. McCormick said: "This reduction is not justified by any present or prospective reduction of manufacturing costs. It is made chiefly to meet competition and enable our dealers to retain their position in the tractor trade. The burden of this reduction and the cost of the plows or harrows presented to purchasers will be borne entirely by the company."

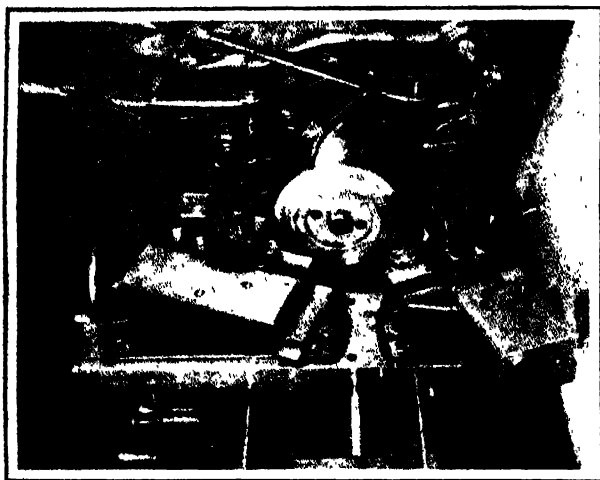
Consolidation of Chicago Jobbing Foundries

Negotiations are under way which may lead to the consolidation of six or eight Chicago jobbing foundries. Although the parties interested failed to come to an agreement on one merger plan submitted to them, negotiations were resumed with the probability that the consolidation will either be consummated or dropped within the next month.

Bevel Gear Attachment for Turret Lathe

The rapid reduction of forged bevel gear blanks has been a troublesome matter to the automotive industry because of the special steels used in this part of the automotive mechanisms. After considerable preliminary work the Warner & Swasey Co., Cleveland, has brought out an attachment on which a patent has been applied for, for use on its No. 3-A universal hollow hexagon turret lathe which, it is claimed, will materially reduce bevel gear costs. The attachment interchanges with the top slide of the regular carriage so that the machine may be used part time on other work or all the time on bevel gears alone.

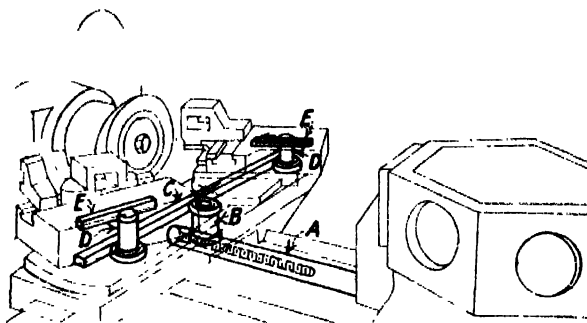
The attachment is shown in the accompanying illustration. It is heavily and rigidly constructed to enable maximum cuts to be taken to the capacity of the cutter strength. It is universal for all standard angles



regular laborers from 8500 to 9000 cash per month, and the helpers 200 cash a day. The total cost in direct labor is from 0.8 to 1.4 per cent of the cost of iron production.

German Foreign Trade Recovering

WASHINGTON, Feb. 7.—Whether or not expansion of German foreign trade is to continue without interruption is to be determined by the future, but that it is making a recovery is evidenced from a report received by the Department of Commerce from Commercial Adviser Herring, Berlin, who points out that German foreign trade figures for December showed the first favorable balance recorded for 1921. In November a decrease was noted in the prevailing adverse balance, imports being valued at 12,278,000,000 paper marks and exports at 11,912,000,000, but December



Attachment in Use on a Turret Lathe Is Shown at Left. Phantom view above shows component parts

up to its maximum work capacity of 14 in. diameter. The operation of the attachment is as follows: Two tool slides are operated by the hexagon turret and saddle. Rack A, which is mounted to the hexagon turret, engages double pinion B. When the turret is moved toward the head of the machine, rack A revolves pinion B in the direction shown. Pinion B engages rack C and transmits to it a sliding motion toward the rear of the machine and rotates two double pinions D which engage with racks E, fastened to the tool slides. The front slide operates on one side of the gear, the rear slide on the other, and both operate at the same time.

The makers believe that many automotive shops, gear manufacturers and others can operate a No. 3-A universal hollow hexagon turret lathe with this attachment either part or full time very profitably.

Cost of Producing Chinese Pig Iron in 1919

The Hanyang Iron and Steel Works, Hanyang, China, draw their iron ore from their own mines at Tayeh. The cost of production at Tayeh in 1919 according to the London *Ironmonger* was below \$2.80 per ton, but the transportation to Hanyang cost \$0.85, which, together with other expenses, brought the cost up to about \$4 per ton at the furnaces. This cost has since been lowered by smelting the ore at Tayeh but an allowance must be made for the coke which has to be taken to Tayeh. As nearly equal quantities of coke and of ore are used in the furnaces, the saving effected in transportation is not of much significance. Limestone also comes mainly from Tayeh. The cost per ton at the Hanyang furnaces varied in 1919 between \$2.32 and \$3.81. These figures include all transportation and overhead charges. Manganese comes from the company's mines at Changlai and Yangshin. These two items amounted in 1919 to 3 or 4 per cent of the total cost. The laborers are divided into foremen, mechanics, regular laborers, and helpers who are paid by the day. The wages of some foremen are as high as \$100 a month, the mechanics receive about \$20, the

showed an actual favorable balance in paper marks of 900,000,000. The December imports amounted to 2,090,000 metric tons, valued at 13,700,000,000 paper marks, and exports amounted to 1,930,000 metric tons, valued at 14,600,000,000 paper marks. Although the trade balance by volume is slightly unfavorable, the values show the favorable balance indicated.

Compromise with Molders

The Cincinnati local of the International Molders' Union, in conference with the union foundry employers of Cincinnati, reached a compromise in the matter of wages to be paid in the future. The employers had recently reduced the pay of the union workmen to \$5 a day, whereupon the molders quit work. They had been receiving \$6 for eight hours work and in the compromise a wage of \$5.50 will be the scale in the future. A plan to prevent strikes in the foundry industry is now being worked out and is expected to be in operation within the next 30 days. Union shops are taking on a few men, but general conditions are such that only about 200 molders are now employed in the city. As a result of the strike, two large union shops have now declared for the open shop and will in the future be run on that basis.

Radio Telephones Popular

SEATTLE, Feb. 1.—The Pacific Northwest has become infatuated with the radio telephone idea, and with one of the daily newspapers equipped with a sending apparatus of five watts, 5000 receiving instruments have been brought within reach of the nightly concerts and news bulletins, and the number is increasing rapidly. The demand for the magavox, vacuum tubes, copper wire and other essentials has kept the radio companies stripped, and during the past 60 days fully 50 per cent of these units have been out of stock. There are many amateur sets, but equipment running up to \$250 and \$300 is being installed in many public places and homes.

Secretary Hoover Speaks for the Public

Addresses the Interstate Commerce Commission, Favoring Reduction of Freight Rates on Raw Materials— Shows Progress of Deflation

BY L. W. MOFFETT

WASHINGTON, Feb. 7.—Reduction in freight rates on coal, metals, wood, and agricultural and other producer's goods to the bottom before less-than-carload and class rates are touched, was advocated by Secretary of Commerce Herbert Hoover, when he appeared before the Interstate Commerce Commission last Friday afternoon, for the Chamber of Commerce of the United States, as a witness for the public. The Secretary of Commerce expressed opposition to a general reduction in rates and declared that an economic analysis of the country's industry will show that less-than-carload and class rates are far too low compared to rates on primary commodities. His suggestion, if adopted, would mean a great relief to the iron and steel industry.

"With the gradual return of the traffic to normal, with decreased operating costs, relief in rates will be available, and it would be an economic crime to apply such relief by horizontal reductions to all rates thus giving relief to higher priced goods and travel, when the vital parts of our economic life, our agriculture and fuel and metals, are choked," Mr. Hoover declared.

In approaching the question of readjustment of railroad rates, Secretary Hoover submitted a table in which he compared present prices of commodities and wages paid in various industries in 1913, which were given the index number of 100. This table showed a marked deflation in iron and steel and non-ferrous and agricultural lines and the maintenance of inflated prices in other lines, particularly in the retail trade. Some of the price index numbers were as follows: Steel billets, Pittsburgh, 113; copper 68, the lowest of all; zinc, 90; pig iron, Pittsburgh, 128; bituminous coal at mine, 160; bituminous coal retailer, 198-220; retail clothing, the highest of all, 213; farm crops at the farm, 98, and all animals at the farm, 92.

Approximates of wage scale index numbers included steel industries, 150; metal trades, 218, the highest in the list; building trades, 190; railroads, 200; coal mining scales, 183 and farm labor, 135.

Inequalities Shown

This table was cited to demonstrate the inequality in prices and wages between different groups of commodities, the great increase in spread between "producer's and consumer's goods and the lag in wage scales." It was pointed out that as the population engaged in the "deflated" producer's goods—agriculture, and metals, wood, etc.—comprises one-half the total in number of the nation, their power to buy the same ratio of consumers goods has been reduced to less than 70 per cent of pre-war, and is the consequent cause of a large part of the industrial and commercial unemployment and stagnation in our cities and our transportation.

It was declared by Secretary Hoover that the violence of the country's readjustment is without parallel and that it is necessary to predicate all plans for the future on the ultimate return of the American people to a normal economic activity with annual progress in the expansion of production of plant and equipment, of skill and efficiency. He insisted that there can be no question that this return will take place, and that no responsible body will approach the problems on any other basis.

"The greatest impulse that can be given to recovery from any source whatever is a reduction of rates on primary commodities combined with the immediate resumption of railway construction and equipment," Mr. Hoover said. "The first depends upon reduction of

operating costs, the second upon restoration of credits for our railways."

Mr. Hoover continued:

One thing is absolute. Our transportation facilities are below the needs of our country and unless we have a quick resumption of construction, the whole community—agricultural, commercial and industrial will be gasping from a strangulation caused by insufficient transportation the moment that our business activities resume. For the past five years, we have had no consequential expansion to our railway transportation machine. With but one interval of 9 months in 1918 and 1919 we had a car shortage throughout the whole of the years 1916-17-18-19 and 20. This shortage rose to as high as 160,000 cars with a corresponding shortage of motive power. We paid tremendous sums in commercial losses and unemployment in consequence. We had it onto the war. We should lay it onto our lack of foresight and antagonism to railroads.

Needs of Railroads

Mr. Hoover said that experience of the 20 years before the war has shown that it is necessary to build an extension of lines, including terminal facilities, additional sidings, etc., every year equal to the construction of a new railroad from New York to San Francisco. He said it will be necessary to add at least 120,000 cars and 2500 locomotives annually to equipment, and that since the United States entered the war in 1917, the country has constructed at least 10,000 miles of railways less than the increasing population and economic development called for and that the nation is behind in rolling stock by about 4000 locomotives and 200,000 cars. He emphasized the fact that unless there is an immediate resumption of construction and equipment, the community will pay treble the cost of the whole of them in their losses of a single season.

The Secretary of Commerce said that there is nothing so irrecoverable a loss to the United States as idle shops and idle men, both of which, it was stated, exist to-day. At the same time, he asserted that there is nothing that will so quickly start the springs of business and employment as an immediate resumption of construction and equipment of the railroads.

When Business Resumes

"When business does resume," the Secretary pointed out, "we shall need all of our capacity for the production of consumable goods. We shall not only find it strangled for lack of transportation, but we shall find ourselves plunging into the manufacture of this very railway equipment and construction in competition with consumable goods for materials and labor. Herein lies the basic cause of destructive price inflation and booms, with all their waste and over-expansion. In times of depression we should prepare for the future and by doing so we can cure the depression itself."

Turning to the fundamental reason for failure to resume equipment, the Secretary assigned the cause to the loss of confidence in railroads as an investment, and the competition of tax-free securities. In this connection, he urged government guarantee of equipment trust certificates of the railroads, accompanied by "a courageous program of broad-visioned betterment." Mr. Hoover said this program would not cost the taxpayers a cent or result in loss to the Government. He maintained that by providing the carriers with a means of obtaining money to prepare adequate transportation facilities large savings would result in the end.

The Present Situation

Dealing with the present rate situation, Secretary Hoover said that the last five years of changing administration, irregular traffic and widely fluctuating wages and prices of materials give but little reliable historical criteria upon which to base the future. He said

that the country is in the midst of violent economic readjustments, of a profound industrial depression, and that the Commission, therefore, will need to temporize with the situation for some time. Its conclusions, he asserted, may well fall into three periods: first, the immediate present; second, during the early period of decreasing costs and increasing efficiency and slowly recovering traffics; and, third, normal operations.

Discussing the immediate present, the Secretary pointed out the financial condition of different groups of railroads and said that he believes there are cases where earnings could be increased by lowering rates and asserted that no one can review the testimony given before the commission during the past few weeks without concluding that the rates in special instances are stifling business. These directions are perhaps not important in the whole problem of rates, the Secretary said, but that he was convinced that lower rates would recover lost traffic, such as export coal, substitutions in building materials, gains in water competition, etc.

Taking up the second period during 1922, Secretary Hoover said that he had the feeling that the railroads will agree that all these savings should be instantly devoted to relief in the rates on primary commodities in order to expedite the recovery that can only come through a decreased spread between producer's and consumer's goods. He said that he recognized that the uncertainty and slow reduction of rates in this fashion will itself delay business recovery because of the un-

certainty of business as to its future costs. It was declared that if the railroads were in position to stand the temporary shock it would be infinitely better to drop the rates on primary commodities to-morrow, and that business recovery would come faster. He added, however, that "we cannot ask the impossible."

Looking to Normal Times

As to the third question, Secretary Hoover said that looking further to normal times, a rough calculation that present wages and costs at, say 50 per cent above pre-war, would show that the railways can earn somewhere around \$1,500,000,000 in excess of the 6 per cent minimum upon tentative valuation.

"As I have stated," said Mr. Hoover, "relief is first most critically needed in the rates on primary commodities."

"Some estimates given to me," continued the Secretary, "indicate that approximately 35 to 40 per cent of revenues are involved in the groups more urgently needing relief. I think it will also bear calculation that in the income assumed above that primary commodities can eventually be reduced to prewar rates, and still place earnings upon a basis that will inspire such confidence in investors as will secure free flow of investment capital into construction. It is not to be expected that capital for these purposes will be available at the rate that does not exceed the tax-free securities at least 2 per cent to 3 per cent."

CENSUS FACTS NEEDED

House Committee Refuses to Make Appropriation for Publication

WASHINGTON, Feb. 7.—While for probably the first time in the history of the Bureau of the Census blanks for the census of 1921 have been prepared in almost the exact form desired by the various industries of the country to produce the facts wanted, their purpose largely will be defeated, it is maintained, unless the House Committee of Appropriations is persuaded to change its course. The committee has refused to make an appropriation to tabulate the returns and publish the results. The consequence would be that the facts would be unavailable to the industries.

By reason of this situation, the National Association of Manufacturers has addressed a letter to secretaries of trade associations urging them to get behind a movement to see that the necessary appropriation, amounting to only \$986,440, is made. The subcommittee of the House Committee on Appropriations having the matter in charge is composed of Representatives Milton W. Shreve, Pennsylvania (chairman); Elijah C. Hutchinson, New Jersey; Charles F. Ogden, Kentucky; William B. Oliver, Alabama, and Anthony J. Griffin, New Jersey.

The letter from the National Association of Manufacturers points out that under the act of March 3, 1919, provision was made for taking the census of manufactures for the years 1921, 1923, 1925 and 1927, and every tenth year after each year named, instead of every five years, as heretofore, and after stating that blanks prepared are in accordance with wishes of industries of the country, tells of the action of the House Committee on Appropriations in refusing to appropriate the necessary money to make the facts available.

"It is well known that the census of manufactures for the year 1919, taken in the year 1920, was under inflated conditions and this census of 1921 is doubly necessary in order that industry may be accurately informed," says the letter. "It is vitally necessary to the industries of the country that production statistics, currently gathered, may be promptly available. In these times the business man who does not have all the available facts is in the position of the farmer with a thermometer but no calendar or almanac."

President Edgerton's Letter

Interest of industries of the country in the Department of Commerce, particularly the Bureaus of Stand-

ards, Census and Foreign and Domestic Commerce, and the desire that they be supplied with adequate funds, is pointed out by President John E. Edgerton of the National Association of Manufacturers in a letter to Secretary Hoover. Mr. Edgerton states that the manufacturers, "while strong for all proper provisions of economy in governmental expenditures, are extremely desirous that most careful consideration be given to constructive proposals which may tend to repair the damage done to our economic and industrial structure by the serious years through which we have lately passed," and declares that the Secretary's estimates of necessary expenditures for the Department of Commerce for 1923 "appear to be most modest and have our hearty support. I observe with distinct appreciation that you are directing the activities of your department to those lines of work most essential. I am astonished at the fact that the proposed appropriation for your department is only one-half of 1 per cent of the total amount requested by all executive departments for 1922-1923." The Secretary's estimate was approximately \$23,000,000 and this was cut down about 16 per cent or to about \$19,400,000 by the Bureau of the Budget.

"This is all the more striking," says Mr. Edgerton in commenting on the relatively small estimates of Mr. Hoover, "when it is remembered that the manufacturing industries of the country, in 1918, paid 67 per cent of all of the income and profits taxes collected by the Federal Government and that they paid into the Federal treasury approximately 45 per cent of their total net receipts."

Speaking especially of the work of the three bureaus mentioned, Mr. Edgerton says the service done to industry by the Bureau of Standards could not be duplicated and that if its work could be figured in dollars and cents, the benefits to the community from its service would run into many millions. With regard to the Bureau of Census, Mr. Edgerton says its work in the past interested him only slightly, "but is now headed in a new direction and is beginning to compile statistical information that is not only interesting to the general public but extremely useful to the business community. Someone should have thought of this use of census machinery before."

The statement in THE IRON AGE, Jan. 12, that the electric furnace of the electro-metals type in Ireland's first electric steel foundry was the same type as the Greaves-Etchells in the United States was an error. The two types are distinct and the latter is an active competitor with the former in Great Britain.

Pittsburgh Base Called Controlling Factor

Hearing Before Federal Trade Commission Continues at Milwaukee, Manufacturers Claiming Adding of Freight Is Unjust

MILWAUKEE, Feb. 6.—Samuel H. Squier, president Milwaukee Electric Crane & Mfg. Co., testifying Monday at the resumption of the hearing on the Pittsburgh basing point practice before the Federal Trade Commission, expressed the belief that price difference brought about by this practice is a controlling factor in the rolled steel business now and in more normal times is an important factor. He said the practice created conditions of unequal competition when his shop bid for work against shops located nearer Pittsburgh, inasmuch as his concern had to pay a freight rate of 41.5c. per 100 lb. from Pittsburgh to Milwaukee, placing it at a disadvantage over competitors paying lesser freight charges due to advantageous geographical location. Citing the case of a competitor located in Alliance, Ohio, to which point the freight rate is 12.5c. from Pittsburgh, Mr. Squier said that, assuming both bought steel for the same price and paid freight from Pittsburgh, the Alliance shop could lay down its product almost anywhere in the United States at a price advantage excepting only in Milwaukee, where the Alliance concern would be at a disadvantage of 10c. per 100 lb. In Chicago the Alliance concern, Mr. Squier testified, would have a price advantage of 14c. per 100 lb., other conditions being equal. At St. Louis the Alliance shop would have an advantage of 22c., Duluth 14.5c., Minneapolis 9.5c., Seattle and San Francisco 12.5c., Kansas City 0.5c. per 100 lb. Mr. Squier said a typical crane made by his concern sold for \$6,500, representing an average profit of 15 to 20 per cent, but about \$125 of otherwise legitimate profit usually had to be sacrificed because of unearned freight charges imposed by the Pittsburgh basing point.

Mr. Dieckelman Testifies

R. P. Dieckelman, secretary Pressed Steel Tank Co., West Allis, the only other witness called Monday, did not complete his testimony owing to lack of time. He testified that his concern consumes 18,000 tons of sheets and plates annually in manufacturing standard and patented steel tanks, drums, barrels, etc. Business in the standard line was restricted principally to Western territory because of disadvantages imposed by the Pittsburgh basing point in competing in territory East of Chicago. On patented articles, however, the disadvantage obviously was not so great, he said, because selling prices were not controlled so closely as on standard products, which are in open competition. Mr. Dieckelman said that, assuming his concern's competitors at Sharon, Warren or Niles bought material at Pittsburgh plus as he did, and all other conditions were equal, the fact that these shops pay a freight rate of only 10.5c. per 100 lb. from Pittsburgh, provided them with an obvious advantage in selling standard articles in competition with the Milwaukee shop paying 41.5c., Pittsburgh to Milwaukee, plus the freight on the finished goods, when back routed.

Cross examined by counsel for the Steel Corporation, Mr. Dieckelman said that, roughly speaking, his company's business was divided into 60 per cent patented and 40 per cent standard products over a five year period just past. In a previous five year period, patented articles represented 75 per cent and standard 25 per cent of the total sales. War requirements, he testified, had an important bearing on the change in the nature of production, more standard articles having been made in the more recent five-year period. In the Eastern territory, he said, only the patented articles were sold in competition with Eastern manufac-

ture patented products was being done in territory East of Chicago.

Progress Made Slowly

At the close of the first week's sessions of the hearing conducted at Milwaukee by the Federal Trade Commission on its complaint seeking the abolition of the Pittsburgh basing point practice at the instance of Western rolled steel consumers, only a small percentage of witnesses offered by the consumers had been heard. Progress of the hearing has been slow due to the desire of both parties to the action to delve as deeply as possible into fundamentals, which process involved many instances of intimate inquiry respecting volume of materials consumed, prices paid, profits or losses established, and similar details.

The general tendency on the part of witnesses to indulge in speculative statements regarding the alleged discriminatory effect of buying steel f.o.b. Pittsburgh, regardless of the point from which the material was actually shipped, was sharply opposed by counsel for the respondents, the United States Steel Corporation and subsidiary companies. Efforts of counsel for the Federal Trade Commission to induce witnesses to tell of discriminatory effect when based on facts and figures generally were permitted.

At one time, when Frank R. Nansawen, service manager of the Heil Co., Milwaukee, was on the stand and contended that the abolition of the Pittsburgh basing point would enable manufacturers in Milwaukee to compete on equal terms with Eastern fabricators, while under existing conditions the adverse effect is sufficient to keep Western manufacturers from competing in territory more geographically favored, counsel for the respondent engaged in a legal controversy with counsel for the commission which was settled when Commissioner Houston Thompson, presiding at the hearing, questioned the witness: "If it were not for the alleged additional price necessary through the operation of the Pittsburgh basing point plan, could you compete in the Pittsburgh market?" The witness answered, "Yes." A motion that all of Mr. Nansawen's testimony be stricken from the record was denied by Commissioner Thompson.

How the Cost Is Increased

A. G. Henricks, vice president and general manager Pawling & Harnischfeger Co., Milwaukee, in his testimony asserted that the additional cost of material due to payment of freight rates from Pittsburgh to Milwaukee which were not actually paid by the manufacturers, caused the cost of the finished product to be increased, making Milwaukee fabricators unable to compete in Eastern markets with Eastern concerns excepting at a sacrifice of profits. He said that on Oct. 26 the Pawling & Harnischfeger Co. bid on a job for the National Radiator Co., making a price of \$3950. The Cleveland Crane & Engineering Co. entered a bid of \$3,900. Mr. Henricks asserted that his company was required to pay approximately \$60 in freight charges from Pittsburgh to Milwaukee on the material entering into the product, although the material was derived from the Gary or Milwaukee mills of the Illinois Steel Co. This requirement enabled the competitor to underbid.

Julius P. Heil, vice president of the Heil Co., who was recalled to analyze invoices and contracts introduced in evidence during his original appearance on the stand, testified that while these showed that material was purchased f.o.b. Milwaukee, all prices represented a base price f.o.b. Pittsburgh, with freight from Pittsburgh to Milwaukee added. Most of the invoices

while in several instances the material was hauled from the Milwaukee mill of the Illinois Steel Co. by the Heil Co.'s own trucks to the Heil plant in Milwaukee.

Invoices Presented

C. J. Heil, purchasing agent of the Heil Co., presented invoices covering purchases of rolled steel from so-called independent producers located in Chicago, Cleveland, Indiana Harbor and Buffalo, all of which were based on Pittsburgh plus. Counsel for the Steel Corporation objected to admitting this evidence into the record because the concerns involved are not named in the present case. Commissioner Thompson, however, overruled the objection after K. E. Steinhauer, counsel for the commission, explained that he proposed to show that the Pittsburgh plus system was a general practice which tended to lessen competition.

H. C. Banks, of the Interstate Drop Forge Co., Milwaukee, testified that, assuming the labor and overhead costs of a Pittsburgh competitor are the same, his company can only compete with such competitor

for business in Milwaukee by sacrificing part of its profits. He said steel was purchased on a Pittsburgh basing point and there is from 50 to 60 per cent wastage in fabrication. Since the freight rate from Pittsburgh to Milwaukee is the same on finished products as on raw material, a Pittsburgh competitor is able to deliver his products in Milwaukee at a lower price than this Milwaukee concern.

Carl F. Garry, purchasing agent E. R. Wagner Mfg. Co., North Milwaukee, steel stampings and hardware specialties, testified that in the instance, of a certain line of automobile parts his company was compelled to reduce its profit 7 to 8 per cent in order to meet Eastern competition in territory east of Chicago. Counsel for respondent asked if this item was not selected for illustration because it showed a small percentage of profit, which was denied by the witness. Extension of questions into the rate of dividends paid by the Wagner company over a period of years met with the refusal of the witness to answer on the point of personal privilege.

FIGURING BAR STEEL WEIGHTS

Handy Rules for Quick Calculations of Hexagons, Rounds, Squares and Flats

BY W. F. SCHAPHORST, M.E.

When engineers and other users of steel rods and bars want to know the weight of bars of given diameter and length, they want to know quickly. Tables are not always available, and accurate formulas are used with too much difficulty. Here are some quick and surprisingly accurate rules based upon Hyman Levine's formulas:

Rule 1—Hexagon bars: Square the distance (in inches) across flats; divide by 4. The answer is the weight per inch of length.

Rule 2—Round bars: Square the diameter in inches; multiply by 2; divide by 10; add 10 per cent. The answer is the weight per inch of length.

Rule 3—Square bars: Square the distance (in inches) across flats; multiply by 3; divide by 10; subtract 1/20, or 5 per cent. The answer is the weight per inch of length.

Examples

Example 1—Hexagon bar, 100 in. long.
Distance across flats, 2 in.

Applying Rule 1:

$$2 \times 2 = 4$$

$$4 \div 4 = 1 \text{ lb. per inch of length.}$$

$$1 \times 100 = 100 \text{ lb., the weight of the hexagon bar.}$$

Example 2—Round bar, 100 in. long.
Diameter, 3 in.

Applying Rule 2:

$$3 \times 3 = 9$$

$$2 \times 9 = 18$$

$$18 \div 10 = 1.8$$

Adding 10 per cent,

$$1.8$$

$$0.18$$

$$1.98 \text{ lb. per inch of length.}$$

$$1.98 \times 100 = 198 \text{ lb., the weight of the round bar.}$$

Example 3—Square bar, 100 in. long.
Distance across flats, 1.5 in.

Applying Rule 3:

$$1.5 \times 1.5 = 2.25$$

$$2.25 \times 3 = 6.75$$

$$6.75 \div 10 = 0.675$$

$$1/20 \text{ of } 0.675 = 0.03375$$

Subtracting

$$0.675$$

$$0.03375$$

$$0.64125 \text{ lb. per inch of length.}$$

$$0.64125 \times 100 = 64.125 \text{ lb., the weight of the square bar.}$$

It will be noticed that each of the above operations is very simple—so simple that most of them can be performed mentally—such as multiplying by 2, dividing by 10, dividing by 20, squaring, etc. Also, they are easily remembered. A rule of thumb is not much good, unless it is simple and can be remembered.

In case one should forget the above rules, here is an excellent one by Professor Merriman, which the writer has carried around in his head for 16 years: "A bar of steel 1 in. square and 1 yd. long weighs 10 lb." This rule is good because it is easily remembered, and it is easily remembered because it is so simple. Professor Merriman's rule becomes useful at any time as a basis on which to figure round, hexagon or any other kind of steel rod.

Editor's Note: For a flat bar of rectangular cross section, Rule 3 will apply, with this modification: Multiply width by thickness, instead of squaring distance across flats.

Example 4—Flat bar, 100 in. long.

Section $3 \times \frac{1}{2}$ in.

Applying Rule 3:

$$3 \times \frac{1}{2} = 1.5$$

$$1.5 \times 3 = 4.5$$

$$4.5 \div 10 = 0.45$$

$$1/20 \text{ of } 0.45 = 0.0225$$

Difference 0.4275 lb. per inch of length.

$$0.4275 \times 100 = 42.75 \text{ lb., the weight of the flat bar.}$$

For more exact results, it may be noted that Rule 1 gives an answer about 2 per cent too high; Rule 2, about 1 per cent too low; Rule 3, about 0.6 per cent too high. Anyone desiring this greater degree of exactness may obtain it by decreasing Rule 1 answers by 2 per cent; increasing Rule 2 answers by 1 per cent; decreasing Rule 3 answers by 0.6 per cent.

Arousing the Farmers

Opposition to Pittsburgh "plus" was urged by James Nicols, president of the State Farm Bureau of Michigan, in a recent address before the beet growers of that State at Saginaw, Mich. The speaker directed the attention of his audience to the hearings on the Pittsburgh basic point practice before the Federal Trade Commission in Milwaukee. For two years the American Farm Bureau Federation has been active in opposition to the Pittsburgh plus practice, on the grounds that it increases the prices which farmers must pay for farm machinery, wire fence, etc.

The Ohio Structural Steel Co., Newton Falls, Ohio, was recently referred to in THE IRON AGE as having established a plant to handle structural steel work of a not too complicated nature. This was incorrect, as the company is fully equipped to handle all kinds of structural steel and has been fabricating bridges, buildings and steel oil derricks for the past three years.

CONTENTS

February 9, 1922

Molding Machine Practice Is Successful..... 397

The Method May Be Made to Pay Even Without Castings Recurring in Large Number.—Details of Use

Plant Makes Upset Forgings Exclusively..... 401

New Shop of Amforge Co. Unique Because of Its Equipment, Layout and Methods of Store Keeping—Ventilation a Feature

Steel Pipe by the Centrifugal Process..... 405

Methods and Cost of the Cammen Process for Making Seamless Pipe—Competition with Welded Pipe

Association of Employers and Employees..... 407

Institution in Cleveland in Which Better Understanding Is Brought About—Educational and Other Features

Double-Rail Overhead Conveying System..... 409

Safeguards Against Track-Jumping—Trolleys Have Two, Four or Eight Wheels—Can Carry Load of 3000 Lb.

Oslund Continuous Wire Drawing Machine..... 416

Design Embodies Unique Arrangement of Differential Gearing, Novel Pointing Device and Slow-Starting Features

Secretary Hoover Speaks for the Public..... 419

Addresser Interstate Commerce Commission—Favors Reduction of Freight Rates on Raw Materials

Pittsburgh Ban Declared Controlling Factor..... 421

Hearing Before Federal Trade Commission Continues Manufacturers Claim Adding of Freight Is Unjust

Pig Iron Production in January..... 428

Daily Output 335 Tons a Day Less Than in December—Increase in Steel Furnace Activity Offset by Decrease in Merchant Production

Pump Standards Recommended.....	399	Large Sizes of Trilock Plug Gages.....	414
Papers for American Foundrymen's Con- vention.....	400	Small Hose Sand Blast.....	414
Program for Boiler Makers' Meeting.....	400	Demand from Poland for Machine Tools..	414
British Institute of Metals.....	400	New 18-in. Coneless Engine Lathe.....	415
Steel Club Dinner.....	400	Rehabilitation of Seaboard Equipment....	415
National Metal Trades Convention.....	400	Rates on Scrap Iron From Texas Reduced..	417
New England Foundrymen's Meeting.....	400	Sharp Reduction on Tractors.....	417
Iron and Steel Electrical Engineers.....	400	Possible Foundry Merger in Chicago.....	417
Standardization of Bolt Heads and Nuts..	400	Effect of Sulphur on Rivet Steel.....	417
Lake Superior Ore Shipments Fall Short..	406	Bevel Gear Attachment for Turret Lathe	418
Lead and Zinc Output in 1921.....	408	Pig Iron Production Costs in China.....	418
Production of Coal Under Strike Conditions	408	Popularity of Radio Telephones.....	418
Steel Corporation Pension Disbursements..	408	Census Facts Needed.....	420
New Automatic Stagger-Feed Press.....	411	Figuring Bar Steel Weights.....	422
Time Lost by Miners Through Strikes....	411	Editorials.....	424
New Line of Pneumatic Riveters.....	412	Variegating the Mills Product—Coal	
High Carbon in Weldless Steel Tubing....	412	Labor Conditions—Secretary Hoover's	
Steel to Be Shipped by River.....	412	Address Progress in Centrifugal Cast- ing—Aluminum's Advancing Position	
Ford Blast Furnace Breaks Its Record....	412	Steel Ingot Output Increases.....	427
Universal Drill Fixture.....	413	Coming Meetings.....	427
Square Anvils for Trus-Form Gages.....	413	Foreign Trade Conditions.....	443
Extension-Beam Indicating Caliper.....	413	Office Changes.....	456
Air Gun for General Dusting.....	414	Industrial Finance.....	457

Iron and Steel Markets.....	430
Comparison of Prices.....	431
Non-Ferrous Metal Market.....	441
Prices Finished Iron and Steel f. o. b. Pittsburgh.....	445
Personal Notes.....	446
Obituary Notes.....	447
Machinery Markets and News of the Works.....	448
New York Jobbers' Prices.....	458

ESTABLISHED 1855

THE IRON AGE

EDITORS:

A. L. FINDLEY

WILLIAM W. MACON

GEORGE SMART

CHARLES S. FAUR, Advertising Manager

Member of the Audit Bureau of Circulations and of
Associated Business Papers, Inc.

Published every Thursday by the IRON AGE PUBLISHING CO., 239 West 39th Street, New York

E. J. Frank, President

PRINTED IN U. S. A.

George H. Griffiths, Secretary

Owned by the United Publishers Corporation, 239 West 39th
Street, New York, H. M. Swetland, Pres.; Charles G. Phillips,
Vice Pres.; A. C. Pearson, Treas.; E. J. Frank, Secy.

BRANCH OFFICES: Chicago: Ochs Building; Pittsburgh:
Park Building; Boston: The City Building; Philadelphia:
1429 1422 Walnut Building; Cleveland: Guardian Building.

Detroit: 317 West Fort St.; Cincinnati: Mercantile Library
Bldg.; Washington: 816 Fifteenth St., N. W.; San Fran-
cisco: 320 Market St.; London, Eng.: 11 Haymarket, S.W. 1.
Subscription Price: United States and Possessions, Mexico,
Cuba, Shanghai, \$6.00; Canada, \$8.50; Foreign, \$12.00 per
year. Single copy 50 cents.

Entered as second class matter June 18, 1879, at the Post Office at New York, New York, under the Act
of March 3, 1879.

Variegating the Mills Product

In the years of heavy new construction in the steel industry before the war, a strong tendency was exhibited for the steel mills to variegate their output. The large independent steel companies seemed dissatisfied unless they could feel that they were making progress toward the position of producing a "full line" of steel products. America being a country, and that being an age of specialization, a definite defense for such a policy was needed, and the defense was furnished partly by the plea that sales offices had to be maintained and might as well have a wider variety of goods to sell, and partly on the ground that the relative demand for different products varies from year to year, so that a steadier total volume of business could be maintained by its being possible to put steel into one product or into another.

While there is no particular satisfaction in being engaged in the manufacture of any description of steel these days, it is plain that activity is better distributed among the different steel producers now than would be the case if they had not variegated their output. Rails, shapes, plates and bars have been and are in especially poor demand, but tin plate, pipe, sheets and wire products have been in good demand, relatively speaking. Only two of the really large independent steel companies, however, produce tin plate. Perhaps there are some who regret that, in their desire for "tonnage" products, they overlooked tin plate.

There has always been more or less debate as to the relative merits of the highly specialized mills on the one hand and the more general purpose mills on the other, and thus the question of variegating output has come up in connection with individual mills or trains of rolls. For the highly specialized mill it has been argued that it can make long runs on a size, with correspondingly lower cost, while for the general purpose mill it has been argued that there is more chance for the salesman. A highly specialized case of the general problem is now presented, for there are no orders going these days that furnish long runs. Buyers are ordering material in the hand-to-mouth style, and specifications even for single carload orders usually involve quite a mixture. At the same time the need for pro-

ducing at very low cost is particularly pressing.

An interesting question arises whether, in these days of strenuous search for outlets for steel in finished products, mills will be more disposed than formerly to carry their rolled products into manufactured articles. Already one steel producer or another makes freight cars, cold finished steel bars, well drilling rigs, railroad spikes and forgings, but in general the mills have preferred to let their customers make these things. The great objection to extensions of this description at the present time is that it is difficult to build up trade when there are not enough orders to satisfy the sellers already in the field. There is left to the mill the chance of developing some entirely new product which with its organization it can push to advantage.

Coal Labor Conditions

The general opinion is that there will be a suspension of mining at the union bituminous coal mines April 1, when the present wage agreement expires, and that the chief point at issue will be the check-off. The event may prove otherwise, but this is the common expectation in the trade at present.

Attention is naturally focused on the Pittsburgh district, which in the past has been the pivotal region in bituminous wage matters. A fortnight ago the Pittsburgh operators announced a wage scale which they intend to post at their mines rather than present to the national officials of the United Mine workers. Study of the rates named has led to the conclusion that the miners cannot seriously object on that score. On the basis of the pick mining rate for thin-vein mines, the scale is 31 per cent below the existing scale, which is a very high one, and has lost the union mines most of their trade; it is equal to the scale of April 16, 1917, 19 per cent above the scale obtaining April 1, 1912, to April 1, 1916, and somewhat more than double the rates paid in 1896.

From the present appraisal by the trade, the chief matter in controversy will be the check-off rather than the wage rates. The situation as to the check-off cannot be understood without a review of

the history of this institution, unique as concerns the United States, since it prevails nowhere but in coal mining. The check-off may be said to represent automatic unionism, for when a man becomes an employee of a coal operator who has signed the scale, he becomes thereby a member of the union, since his dues and fines and initiation fee, if any, are deducted from his pay and remitted by the operator to the district organization of the United Mine Workers.

A quarter century ago, the coal industry was full of strife. There were union mines and non-union mines, and in the Pittsburgh district they were almost side by side. The competition was very keen, the non-union mines paying rates which on paper were much below union rates, while the union operators endeavored to save themselves by the profits of their "company stores." The latter were unable to rid themselves of the union or to compete successfully with the non-union operators. From this, apparently, arose the check-off. If there had to be a union, it seemed better that the conditions be the same for all operators.

After more than 20 years of the check-off, however, the bituminous coal industry as a whole is found to be about two-thirds union and one-third non-union, and in the past twelvemonth the non-union mines have been producing the bulk of the coal the country has called for. For more than a year, a number of coal operators have been under indictment for being in a conspiracy with the United Mine Workers, the chief basis of the charge being the payment of the check-off by the operators and the use, at non-union mines, the United Mine Workers are charged with having made of the money thus obtained.

Considering the history of the check-off and the conditions now existing, it seems entirely probable that the operators will be absolutely firm in their stand against continuing the system. While the officials of the United Mine Workers are irreconcilable to any other method of financing their union, the miners themselves are understood to be lukewarm, with not a few definitely opposed to the check-off. As the operators are placing the scale, with its conditions, directly before their employees, it may be that the attitude of the men will prove more important than the attitude of the officials of the union.

Mechanical charging of electric steel furnaces, particularly those of moderate to large capacity, is especially necessary if the electric process is to compete with the open-hearth on any large scale. The description in THE IRON AGE last week of a special 7-ton furnace adapted to mechanical charging reveals the trend in this direction. Most types of electric furnaces, large and small, are not charged mechanically with cold metal, unless by removing the roof, which is rare. While the furnace referred to was made for a special use, the change has long been contemplated and may be said to connote the really large electric steel furnace of 80 to 100 tons capacity. Hot metal charging would, of course, commonly obtain, but in many installations mechanical charging of cold metal would be the only practice. The engineering problems of the large

electric furnace appear to fall under solution fully as fast as the economic or commercial place of the furnace is established.

Secretary Hoover's Address

The first point to be noted in connection with the address of the Secretary of Commerce Hoover before the Interstate Commerce Commission last Friday was that an advocate of the public, regardless of any special interest, was invited to appear before the commission and accepted the invitation. Reams of testimony have been taken in the railroad rate investigation in behalf of the shippers and the railroads. Secretary Hoover spoke for the people in general in not asking any special consideration, but wishing to promote the public welfare and restore prosperity as soon as possible.

After showing the great need for new equipment, including 120,000 cars and 2500 locomotives annually to make up the shortage, Secretary Hoover more than hinted that it might be well for the Government to guarantee equipment trusts, which, he said, was not a proposition to take money from the taxpayer, but to save him from paying treble the amount of his guarantee in profiteering and losses.

The Secretary evidently has little patience with the proposal to give credits to foreign countries; he prefers to give it at home, and one of his most significant sentences was that in which he declared: "I wish to say with all responsibility for the statement, that a billion dollars spent upon American railroads will give more employment to our people, more advance to our industry, more assistance to our farmers, than twice that sum expended outside the frontiers of the United States—and there will be greater security for the investor."

The description of the "veritable witches' cauldron being fed constantly with hates distilled from the misdeeds of railroad promoters in the past, from the conflicts between the railroads and the farmers, between the railroads and their workmen," was most impressive and all will agree with the Secretary that it is time to "call off the witches." Surely nothing is to be gained by raking up the scandals of the past, by criticizing those who managed or mismanaged railroads during the war when such tremendous demands were made.

As to the method of readjusting rates, the Secretary advises the policy of caution. He shows how the tendency, as in the case of the raw products used in the manufacture of pig iron, is to force industries to move toward the raw materials and shows how this tendency is deplorable, but also indicates that there must not be sudden changes. It may even be necessary in some cases to advance rates on less than carload lots of some finished products while the rates on coal, metals, wood, agricultural and other producers' goods should be promptly reduced. The Secretary indicates that in considering the situation, the fact that the present earnings are very close to bond obligations must not be overlooked, and readjustment must now be made with regard

to the immediate present. An early period of decreasing costs and increasing efficiency and slowly recovering volume of traffic will bring us later in 1922 to normal operations. The Secretary points out that great social and economic problems find their solutions slowly and by process of trial and error. This country has committed errors enough and should now be able to act wisely. Certainly, as has been pointed out in these columns and also by Secretary Hoover in his address, prosperity cannot be restored by a horizontal reduction of railroad rates.

At this critical time the people of the country are fortunate in having as able an advocate as the Secretary of Commerce. His address should be of real assistance in solving the rate problem in such a way as to bring the greatest relief.

Progress in Centrifugal Casting

The centrifugal casting of metals and alloys has been making rapid strides. It has now covered the handling of steel, one of the most difficult metals to cast centrifugally. The secret of the solution of the steel problem, discussed elsewhere in this issue, is the use of a very hot revolving mold. This appears to have made easy the production of steel tubing of any thickness. If the expectations of the process are commercially realized, a new product of special properties may be expected.

Besides the centrifugal casting of steel and the notable DeLavaud cast iron pipe process, which reached commercial proportions in Canada, South America and Europe some time ago, and which has recently been adopted by a leading American pipe maker, there have been other important developments. The casting of brass and copper bands by a centrifugal process was described in these columns last May and the production of cast iron piston rings by a like method is familiar. The centrifugal casting of light and miscellaneous alloys has been in progress for some time, and successful results from the centrifugal casting of Monel metal and semi-steel have been recorded. A Sandusky inventor has also cast steel by this process. The recent announcement of the production of cast iron car wheels centrifugally in England recalls the American process of making cast steel wheels with a manganese rim by applying the centrifugal principle to a revolving mold.

The successful operation of any process of this nature insures a product, no matter of what composition, which is of a high grade. It is a realization of quality production in quantity, for rapid output is a marked characteristic. There is also the advantage of the elimination of sand and dirt. A minimum of machining is also required. The condition of casting and cooling tends to produce a dense casting and one whose microstructure is different from the sand-cast products. Centrifugal force is substituted for sink heads as an insurance against unsoundness.

There are still many problems connected with the development of this process in general. Among these are the proper casting temperatures and the rate of revolution of the mold or apparatus. Much valuable work has already been done on these two problems. There has also been trouble with molds.

one or two cases. In view of the progress thus far made in the art, it is probable that the centrifugal casting of metals and alloys is assured a prominent place in industry.

Aluminum's Advancing Position

A statement of the expansion in world production of aluminum, great as it has been, scarcely gives an adequate idea of the magnitude of the industry. In 10 years, or from 1911 to 1920 inclusive, the world output increased from 45,000 metric tons to 160,800 tons. The latter figure means much as to volume with a metal so light. The peak in output was 179,900 tons in 1918, when war demand was greatest. The United States still holds the commanding place it took in the early days, having been credited with over 54 per cent of the 1920 total. Twenty-five years ago, the industry was in its infancy and the metal almost a curiosity.

More and more active has been its competition with several of the older metals. A glance at the hardware dealer's shelves tells how it is vying with copper and steel enameled ware. In alloys, new and familiar, it has a large place in competition with other non-ferrous alloys and with alloy steel itself. In the building of airplanes it is a necessary raw material, and in automobile construction aluminum sheets are widely used. In the castings industry it has long been conspicuous.

Parallel to the interesting advances in uses of aluminum is the competition from Europe in the marketing of the metal. In 1920 over 38 per cent of the world's total was made by Germany, Switzerland, France, Norway, Sweden, etc. To-day imported aluminum is a factor in the American raw material market—so much so that it is a matter of concern to American smelters. Even in finished material, the market is full of German and other wares.

The interesting history of aluminum is perhaps prophetic of that of other metals, now less plentiful commercially. When aluminum was developed by an American metallurgist, it was looked upon as a curiosity, of little commercial value because of its cost. To-day magnesium, while somewhat more advanced commercially, may in the future play a role, singly or alloyed with aluminum, as commanding as that of the older metal.

Liquidation of labor in the British iron and steel industry has been rapid in the past year. Returns from 103 firms, employing 90,305 persons in October last year, show that the average weekly wages per person in that month was £3 8s. 2d. This compares with £5 8s. 0d. in September, 1920, and with £4 18s. 8d. in October of the same year. For the first eleven months of 1921, the net reduction in the weekly wages of the 239,500 employees affected by wage changes was £431,690 or £1 16s. 1d. per person. This is heavier than in any other of the seven industries compared except mining. After a severe struggle over many months, British labor is accepting the inevitable situation; the coal strike was probably an object lesson contributing to this result. The results are being reflected in rapidly increased production and exports of steel and

January Steel Ingot Output Increases Over the December Rate

The Steel ingot statistics of the American Iron and Steel Institute show that 30 companies which in 1920 produced 84.20 per cent of the total, had an output in January of 1,593,482 gross tons as compared with 1,427,093 tons in December and with 1,660,001 tons in November. The increase in January over December was 166,389 tons or 11.6 per cent. The decrease in December from November was 232,908 tons or 14.03 per cent. Estimating the production of other companies on the basis of the 30 companies (though it is probable the small companies did not equal the rate of the larger ones), the total output of ingots in January was 1,892,496 tons or 75,700 tons per day, counting 25 working days for January.

In the table below, the output of Bessemer and open-hearth works is separated and the figures for 1920 by months are included:

Monthly Production of Steel Ingots, by 30 Companies, Which Produced About 84.20 Per Cent of Total in 1920. Gross Tons

	Open Hearth	Bessemer	All Other	Total
January, 1920	2,242,758	714,657	10,687	2,968,102
February	2,152,106	700,151	12,867	2,865,124
March	2,487,245	795,161	16,610	3,299,019
April	2,056,336	568,952	13,011	2,638,305
May	2,251,511	615,932	15,688	2,883,161
June	2,287,273	675,951	17,162	2,980,690
July	2,135,633	653,888	13,297	2,802,818
August	2,299,645	695,003	7,781	3,000,432
September	2,300,417	693,586	5,548	2,999,551
October	2,335,863	676,631	7,185	3,015,682
November	1,961,861	673,215	3,591	2,638,670
December	1,687,162	619,617	3,586	2,310,365
Total, 1920	26,197,812	8,112,754	121,676	34,432,242
January, 1921	1,591,281	608,276	3,629	2,203,186
February	1,295,863	450,818	2,796	1,749,477
March	1,175,591	392,983	2,401	1,570,978
April	1,000,053	211,757	2,150	1,213,960
May	1,047,810	216,197	1,513	1,265,520
June	808,286	193,611	1,176	1,003,073
July	689,489	113,312	575	803,376
August	915,324	221,116	1,621	1,138,071
September	908,585	255,152	1,207	1,174,944
October	1,260,041	345,837	1,028	1,616,816
November	1,294,371	363,912	1,718	1,660,001
December	1,129,174	296,380	1,539	1,427,093
Total, 1921	13,125,578	3,679,682	21,686	16,826,946
January, 1922	1,260,809	331,551	822	1,593,182

The January ingot production was at a yearly rate of 23,542,500 tons, counting 311 operating days to the year. This compares with a rate in November of 23,581,886 tons and with 11,857,186 tons in July, the low point for 1921.

The increase of 166,389 tons in the ingot output of all companies reporting in January contrasts with a decrease of 10,389 tons in the January pig iron output from that of December.

Volume of Business Not Satisfactory in the Youngstown District

YOUNGSTOWN, Feb. 7.—With primary steel interests, the current situation with respect to volume of business on the books is far from satisfactory. Predictions voiced earlier in the year of a turn for the better around Feb. 1 are failing to materialize. While all interests are hopeful of betterment in February, some are frankly skeptical. Some uncertainty in regard to prices is proving a retarding influence. Sheet mill capacity in the Mahoning Valley was scheduled to the extent of 39 per cent this week, as compared with 35 per cent the previous week.

The Youngstown Sheet & Tube Co. has commenced the installation of electric drives for its sheet mill units, replacing steam and necessitating partial suspension of production for the time being. The installation now under way will provide electric driving power for eight mills. Whereas all 15 units of this interest were idle last week, seven are now rolling.

New business lacks a sustaining influence in many cases. One of the major interests, operating 10 of 12 open hearth furnaces this week, has orders for 10 days' production at the current rate. It is largely restricted in active finishing capacity, and must base future schedules upon the volume of tonnage which develops in the

In the aggregate considerable strip, sheet and light plate tonnage is moving to pressed and stamped metal interests for conversion into automobile parts. For instance, the Powell Pressed Steel Co., in Hubbard, Trumbull County, is operating its plant 22-hr. per day, principally on orders for the Durant and Rickenbacher motor cars, and in a smaller way for other motor builders. Durant production, it is stated, has attained a monthly rate of 4500 cars and is keeping a number of pressed steel interests fairly well engaged.

Sheet Prices Hold

It may be said with authority that sheet prices are holding taut, especially on black sheets, quoted at 3c. for No. 28 gage, and galvanized at 4c., base gage. New business is coming forward only in a moderate way, and is confined to small lots. A moderate buyer who has been placing carload lots with regularity states that he has done considerable shopping in an endeavor to uncover a concession on black sheets, but has been unsuccessful.

Some shipments are evidently going forward at prices below the current market, but in all cases this business is under contract negotiated before the first of the year and evidently extended. Most of such tonnage, however, it is felt, has been worked off, and the sheet market is firm at prevailing levels. Doubt is expressed in some manufacturing circles as to whether a large tonnage would develop much of a concession, if any.

Interests catering to the automobile trade continue in the best position, with respect to future commitments, though there is much to be desired in this respect. One of the smaller non integrated producers is booked approximately eight weeks ahead, but this interest is an exception.

An idea of the current situation in the sheet market may be realized from the fact that the Brier Hill Steel Co. is operating 10 of its 28 sheet mills, starting Wednesday; the Republic Iron & Steel Co. has four of 18 engaged, while Trumbull Steel Co.'s sheet output is proportionately small.

COMING MEETINGS

February

Ameriann Boiler Manufacturers' Association. Feb. 13. One-day winter meeting. Fort Pitt Hotel, Pittsburgh. Secretary H. N. Covell, 191 Duquesne Street, Brooklyn, N. Y.

Ameriann Institute of Mining and Metallurgical Engineers. Feb. 20-25. Spring meeting. Engineering Societies Building, New York. Secretary, Frederick E. Sharpless, 29 West Thirty-ninth Street, New York.

Ameriann Association of Engineers. Feb. 22. Congress Hotel, Chicago. Secretary, C. E. Drayer, 45 West Adams Street, Chicago.

March

Ameriann Society for Steel Treating. March 3. Sectional meeting. Hotel McAlpin, New York. Secretary, W. H. Eisenman, 4609 Prospect Avenue, Cleveland.

Refractories Manufacturers' Association. March 15, 16 and 17. Annual meeting, Chicago. Secretary, F. W. Donahoe.

April

National Metal Trades Association. April 19 and 20. Annual meeting, Hotel Astor, New York. Secretary, Louis W. Fischer, Peoples Gas Building, Chicago.

Ameriann Supply and Machinery Manufacturers' Association and Southern Supply & Machinery Dealers' Association. Joint Meeting, April 21 to 26, Birmingham. F. D. Mitchell, 233 Broadway, New York, is secretary of the American association and A. M. Smith, Smith-Courtney Co., Richmond, Va., is secretary of the Southern association.

Society of Industrial Engineers. April 26 to 28. Spring meeting, Hotel Statler, Detroit. George C. Dent, business manager, 327 S. La Salle Street, Chicago.

Ameriann Electrochemical Society. April 27 to 29. Spring meeting, Baltimore. Acting secretary, Dr. Colin G. Fink, 110 Park Avenue, New York.

IRON OUTPUT DECLINES SLIGHTLY

Eight Furnaces Blown in, Seven Blown Out

January Production 335 Tons Per Day Less Than in December

The upward swing in the pig iron production of the country, which characterized the last few months in 1921, came to a standstill in January when the output of the blast furnaces showed a slight decline from that of December. The production in January was 335 tons per day less than that in December as contrasted with an increase of 6013 tons per day in December over November. A feature of the January output is the marked increase in the production of steel-making pig iron and a sharp decrease in that of merchant pig iron. The increase in steel-making pig iron in January over December was 957 tons per day and the decrease in merchant pig iron in January from that in December was 1292 tons per day.

The production of coke and anthracite furnaces for the 31 days in January amounted to 1,638,697 gross tons or 52,861 tons per day as compared with 1,649,086 tons or 53,196 tons per day in December, also a 31-day month. The decrease in January from December was 10,389 tons or 335 tons per day.

The total number of furnaces in blast on Feb. 1 was 126 as compared with 125 on Jan. 1. At the low point in 1921, or on Aug. 1, only 69 furnaces were in blast. The capacity of the 126 furnaces in blast Feb. 1 is estimated at 53,305 tons per day as contrasted with a capacity of 53,735 tons per day for the 125 furnaces in blast Jan. 1. In January eight furnaces were blown in and seven were blown out.

For the first time in many months spiegeleisen in any quantity was produced. Of the total output of manganese-alloys in January of 6874 tons 1230 tons was spiegeleisen and 5644 tons was ferromanganese. The last production of spiegeleisen in any quantity was 4015 tons in July, last year.

Daily Rate of Production

The daily rate of production of coke and anthracite pig iron by months, from January, 1921, is as follows:

	of Works	Merchant	Total
January	62,327	15,618	77,945
February	58,060	11,127	69,187
March	42,691	8,777	51,468
April	33,841	5,914	39,768
May	33,051	6,340	39,394
June	39,114	6,050	35,494
July	23,086	4,803	27,889
August	26,037	4,743	30,780
September	27,189	5,661	32,850
October	32,365	6,850	40,215
November	37,960	9,223	47,183
December	41,173	12,023	53,196
	12,130	10,731	52,861

The figures for daily average production, beginning with January, 1916, are as follows:

	1916	1917	1918	1919	1920	1921	1922
Jan.	102,746	101,613	82,835	105,006	102,720	69,187	52,861
Feb.	106,456	94,173	82,835	105,006	102,720	69,187	
Mar.	107,667	101,882	103,648	99,685	108,900	51,468	
Apr.	107,592	111,165	109,607	81,607	91,327	39,768	
May	108,422	110,238	111,175	68,002	96,312	39,394	
June	107,053	109,002	110,793	70,495	101,451	35,494	
July	104,017	108,220	110,354	78,340	98,931	27,889	
Aug.	103,346	104	109,311	88,496	101,529	30,780	
Sept.	106,745	104	113,942	82,932	104,310	32,850	
Oct.	113,189	106	112,482	60,115	106,212	40,215	
Nov.	110,394	106,859	111,802	79,745	97,830	47,183	
Dec.	102,537	997	110,762	84,944	87,222	53,196	

Production of Steel Companies—Gross Tons

Returns from all furnaces of the United States Steel Corporation and the various independent steel companies, as well as from merchant furnaces producing ferromanganese and spiegeleisen, show the following totals of steel making iron, month by month, together with ferromanganese and spiegeleisen. These

last, while stated separately, are also included in the columns of "total production."

Production of Steel Companies—Gross Tons			
	Total Production		Spiegeleisen and Ferromanganese
	1920	1921	1922
Jan.	2,232,455	1,932,159	1,306,045
Feb.	2,181,679	1,625,695	23,957
Mar.	2,180,668	1,323,443	22,228
Apr.	1,968,542	1,015,621	28,058
May	1,128,720	1,024,678	29,013
June	2,209,776	883,312	35,276
July	2,230,567	715,664	41,294
	2,254,934	807,144	27,628
	2,247,250	815,692	24,310
Oct.	2,393,611	1,034,312	33,407
Nov.	2,150,075	1,138,789	34,751
	2,047,167	1,276,381	36,789
			5,624
			36,985
			37,546
			38,289
			39,546
			34,766
			3,902
			26,944
			3,525
			28,023
			3,958

Output by Districts

The accompanying table gives the production of all coke and anthracite furnaces for January, and the three months preceding:

	January (31 days)	December (31 days)	November (30 days)	October (31 days)
New York	110,867	126,734	91,535	65,502
New Jersey	1,642	5,026	4,525	4,745
High Valley	31,296	31,388	30,020	27,614
Schuylkill Valley	42,144	41,450	35,850	28,176
Lower Susquehanna and Lebanon Valleys	28,227	26,106	19,356	20,581
Pittsburgh district	382,107	390,908	357,851	295,741
Shenango Valley	51,231	52,793	50,555	35,430
Western Penna.	15,511	56,593	67,432	61,742
Maryland, Virginia and Kentucky	22,858	18,917	14,754	15,827
Wheeling district	75,576	72,660	44,966	36,520
Mahoning Valley	190,436	188,391	165,562	157,512
Central and Northern Ohio	161,160	167,307	156,767	140,914
Southern Ohio	31,892	15,534	13,893	14,485
Illinois and Indiana	287,313	299,186	252,566	229,009
Mich., Minn., Mo., Wis. and Colo.	48,236	37,149	20,059	11,940
Alabama	121,073	117,886	108,125	99,948
Tennessee	825	1,064	1,665	990
Total	1,638,697	1,640,997	1,415,481	1,246,676

Capacities in Blast Feb. 1

The following table shows the number of furnaces in blast Feb. 1 in the different districts and their capacity, also the number and daily capacity in gross tons of furnaces in blast Jan. 1:

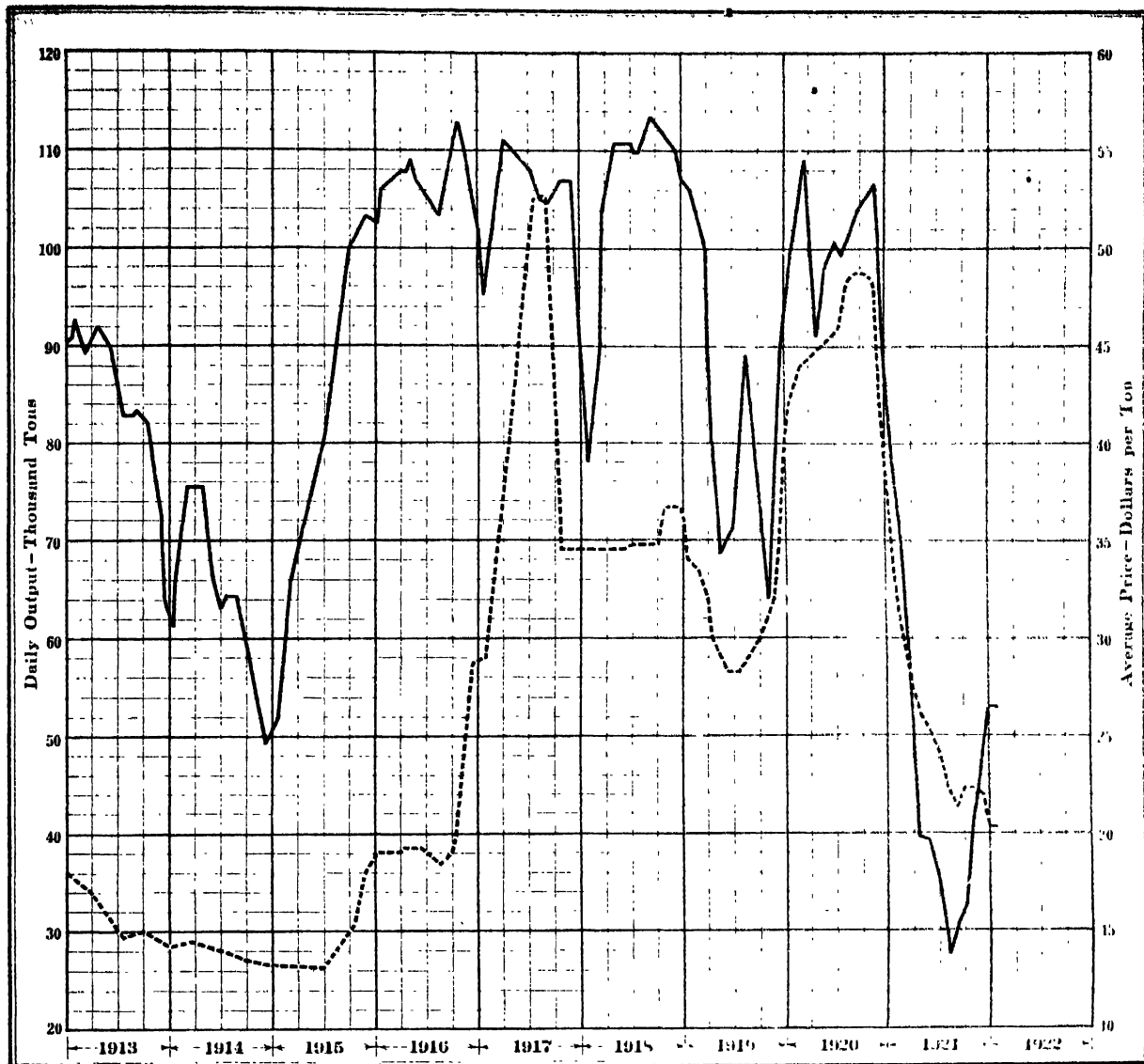
	Total Stacks	In Capacity Feb. 1	In Capacity Jan. 1
		Blast per Day	Blast per Day
New York:			
Buffalo	22	8 3,800	9 3,850
Other New York	4	1 220	1 240
New Jersey	4	1 150	1 160
Pennsylvania:			
Lehigh Valley	18	4 1,010	4 1,010
Spiegeleisen	2	0	0
Schuylkill Valley	15	4 1,360	4 1,400
Lower Susquehanna	10	1 400	1 400
Lebanon Valley	8	2 430	2 400
Perry and spiegeleisen	2	1 80	1 100
Pittsburgh District	55	27 12,500	26 12,000
Perry and spiegeleisen	1	1 140	1 120
Shenango Valley	19	5 2,230	4 1,750
West. Pennsylvania	26	4 1,465	5 1,845
Maryland	6	1 435	1 350
Wheeling District	15	5 2,430	5 2,840
Ohio:			
Mahoning Valley	28	13 6,330	12 6,075
Central and Northern	26	12 5,250	11 5,400
Southern	16	3 1,020	2 500
Illinois and Indiana	42	17 9,270	18 9,960
Mich., Wis. and Minn.	11	2 540	3 1,140
Colorado and Missouri	6	2 800	1 255
The South:			
Virginia	16	0	0
Kentucky	7	1 300	1 255
Alabama	41	10 3,615	11 4,150
Tenn., Ga. and Texas	16	1 30	1 35
Total	419	126 53,305	125 53,735

Furnaces blown in during January were the following:

No. 4 Aliquippa and No. 6 Eliza furnaces of the Jones & Laughlin Steel Co. in the Pittsburgh district; No. 4 Newcastle furnace of the Carnegie Steel Co. in the Shenango Valley; the new Trumbull-Cliffs furnace in the Mahoning Valley; the furnace of the Upson Nut Co. in northern Ohio; the Portsmouth and Sarah furnaces in southern Ohio, and one furnace of the Colorado Fuel & Iron Co. in Colorado.

Among the furnaces blown out or banked were the following:

No. 2 furnace of the Donner Steel Co. in the Buffalo district; one Monessen furnace of the Pittsburgh Steel Co. in the Pittsburgh district; the Adrian furnace in western Pennsylvania; the Jisco furnace in southern Ohio; one Gary furnace in Indiana; one Detroit furnace, A. in Michigan.



The Full Line Represents the Daily Production of Pig Iron and the Dotted Line Is the Average of the Price Per Ton of No. 2 Southern Pig Iron at Cincinnati, Local No. 2 Iron at Chicago and No. 2X Iron at Philadelphia.

and one Woodward furnace of the Woodward Iron Co. in Alabama.

Of the furnaces blown in, one was a Steel Corporation furnace and seven were independent steel furnaces. Of those blown out or banked one was a Steel Corporation furnace, two were independent steel company furnaces and four were merchant furnaces.

Diagram of Pig Iron Production and Prices

The fluctuations in pig iron production from 1913 to the present time are shown in the accompanying chart. The figures represented by the heavy line are those of daily average production by months of coke and anthracite iron. The dotted curve on the chart represents monthly average prices of Southern No. 2 foundry pig iron at Cincinnati, local No. 2 foundry iron at furnaces in Chicago, and No. 2X at Philadelphia. They are based on the weekly quotations of THE IRON AGE.

Production of Coke and Anthracite Pig Iron in the United States by Months, Beginning Jan. 1, 1918.—Gross Tons					
	1918	1919	1920	1921	1922
Jan.	2,411,768	3,302,260	3,015,181	2,416,292	1,638,697
Feb.	2,319,299	2,940,168	2,978,879	1,937,257	1,638,697
Mar.	3,218,091	3,090,243	3,375,907	1,595,522	1,638,697
Apr.	3,288,211	2,478,218	2,739,797	1,193,041	1,638,697
May	3,446,412	2,108,056	2,985,682	1,221,221	1,638,697
June	3,323,791	2,114,863	3,043,540	1,064,833	1,638,697
July	3,420,988	2,428,541	3,067,043	864,555	1,638,697
Aug.	3,389,585	2,743,388	3,147,402	954,193	1,638,697
Sept.	3,418,270	2,487,965	3,129,323	985,529	1,638,697
Oct.	3,486,941	1,863,558	3,292,597	1,246,676	1,638,697
Nov.	3,354,074	2,392,850	2,934,908	1,415,481	1,638,697
Dec.	3,433,617	2,633,268	2,708,855	1,643,086	1,638,697
Tot. yr.	33,506,047	30,582,878	36,414,114	16,543,686	16,543,686

Awards in Forgings and Castings

WASHINGTON, Feb. 7.—Awards have been made by the War Department on approximately 2,419,682 lb. of aeropautical motor forgings, castings, etc., at Long Island City, on bids opened Jan. 16, as follows:

General Aluminum & Brass Mfg. Co., Detroit, 402,054 lb. scrap aluminum, at \$0.12859 per lb.; McGrath Iron Co., Inc., Brooklyn, 1,257,639 lb. (561.44 gross tons) scrap iron, \$13.44 per gross ton; and H. Jaffre, 220 Broadway, New York, 747,795 lb. scrap bronze, \$0.105675 per lb., and 13,194 lb. scrap brass, \$0.085675 per lb.

The prices were for material "as is" and "where is," loading to be done by and at the expense of the purchasers. In the aggregate these prices are slightly higher than those offered on informal bids for the same material several weeks ago.

Furnace Will Use Black Sand

SEATTLE, Feb. 1.—Black sand found on the Pacific Ocean beach near Westport, Grays Harbor, southwestern Washington, will be shipped to the furnace at Tacoma, Wash., for making iron according to C. W. Atkins of Aberdeen, Wash., who says that the furnace has placed an order with him for 4000 tons as a beginning. It is stated that the furnace, which can heat the sand to 5000 degrees Fahr., will produce a good quality of iron. The first shipment will be made about March 1. Tests have been made covering a period of several years but no furnace in the Northwest was able to produce suf-

Iron and Steel Markets

MARKET BROADENING

More Buyers; Little Increase in Tonnage

Railroad Purchases Conspicuous - Improvement in Exports - Lower Prices

A broadening demand, though without appreciably increasing tonnage and still largely for replenishment, has marked the week. With it has come a crystallization of prices on heavy tonnage products. Consumers may now buy bars, plates and shapes in smaller lots at 1.40c., Pittsburgh, than they could a week ago. Higher prices obtain on orders in which delivery is a prime factor.

Railroad buying has now taken the stage. The Burlington has bought 6800 cars, involving 85,000 tons of steel, the largest order of the kind in many months. The road has 500 more cars to place and the St. Paul, the Norfolk & Western and other lines bring up the total of pending cars inquiries to 6800. Most of the business still remains in the West.

A large amount of passenger equipment is under negotiation, including 50 cars for the Central Railroad of New Jersey and 50 for the Baltimore & Ohio. The Union Pacific has bought 45 cars for passenger service. The Burlington will also buy 55 locomotives, the Denver & Rio Grande 20 and other roads 10.

A total of 15,500 tons of rails has been awarded, including 8500 for the Southern Railway, which, however, has postponed until the spring the purchase of 26,000 tons of 85-lb. rails. Other pending rail business approximates 50,000 tons.

Fabricated structural steel is maintaining its conspicuous place, with awards approximating 15,000 tons and fresh projects under active consideration amounting to 17,000 tons.

Mill operations have, if anything, improved. Chicago district activity is probably in excess of 50 per cent of capacity; the Steel Corporation as a whole is operating at fully 50 per cent, while the East approximates 35 per cent. Pittsburgh reports a further increase in tin plate mill operations.

January production of pig iron was practically at a standstill as compared with December. The total was 1,638,697 tons, or 52,861 tons per day, as compared with 1,649,086 tons, or 53,196 tons per day in December, a decline of 10,389 tons, or 335 tons per day. An increase of 957 tons per day in the production of steel company furnaces and a decrease of 1292 tons per day from merchant furnaces as compared with the December data may tell the story of steel makers' participation in the foundry iron market.

Eight furnaces blew in last month and seven blew out. The number active on Feb. 1 was 126 with an estimated capacity of 53,305 tons per day against 125 on Jan. 1 with a daily capacity of 53,735 tons.

Steel production for January, based on the ingot statistics collected by the American Iron and Steel Institute for 30 companies, was 1,892,500 tons, or an annual rate of 23,542,500 tons compared with

December's rate of 21,084,250 tons. The making of steel slumped in December while pig iron manufacture then increased; and January in steel represented a close return to the November steel rate while January in iron remained above the November iron rate.

On Southern pig iron, \$15.50 is now the usual quotation, but \$15 has been named and, for the first time in several years, this iron is becoming a real factor in the North, particularly in the Chicago district. A rail and river route, which will be inaugurated Feb. 15, will still further reduce the price of delivered iron from \$1 to \$1.50 per ton. Basic iron in the Valley has receded to \$17.75, the lowest price since 1916, and malleable has declined 50 cents. In the East, there has been considerable buying by heater manufacturers, including one lot of 5000 tons by a New Jersey company.

Increased activity is noted in the export market. Following closely the 7000 tons of 100-lb. rails for South Manchuria is an inquiry for 10,000 tons of 60-lb. rails for the Imperial Government Railways of Japan. Nail business with Japan is good. American plants have difficulty at present with markets other than the Far East because of high ocean freights, particularly in competition with Europe for the heavy tonnage products. A 12,000 ton rail order for Brazil was lost to Belgium; and transportation cost is interfering with a plate order with India.

Germany has practically ceased to be a factor in international markets. What with increased ocean freights, international exchange and German export taxes, prices on some products to-day are 50 per cent higher than they were in November.

High-speed steel is weak, a 10-ton lot being bought at 65c. per lb.

THE IRON AGE composite price for pig iron is now \$18.10, the lowest since September, 1916, and hardly 15 per cent above the 10-year pre-war average. The steel composite price is the lowest since December, 1915. At 2.019c. it is not quite 20 per cent above the 10-year pre-war average.

Pittsburgh

PITTSBURGH, Feb. 7.

Pittsburgh is enjoying probably the highest rate of plant operations this week than before since last fall. But as the demand is largely of a replacement or replenishment character, there is some uncertainty whether some of the capacity which has become active in the past week can be continued in operation for any considerable time. The Pittsburgh Steel Co. on Sunday night turned on the blast at one of its blast furnaces which was banked Dec. 24 and to-day started up six of its 12 open-hearth furnaces, in which no steel had been made since the holidays. The Carnegie Steel Co. is producing iron at about the rate of 50 per cent of normal capacity. This company recently put on a furnace at Newcastle, Pa., but on Sunday blew out one of this group and for this week has two of its Lucy furnaces in blast. One of the latter, however, is to be blown out for relining, probably at the end of this week. The Lucy furnaces are making ferromanganese and spiegeleisen. The Jones & Laughlin Steel Co. has seven of its 12 blast furnaces making iron and is expected to put on another at its Woodlawn, Pa., works in the near future, on ferromanganese. Of the

A Comparison of Prices .

Advances Over the Previous Week in Heavy Type, Declines in Italics
At date, one week, one month, and one year previous

For Early Delivery

Pig Iron, Per Gross Ton	Feb. 7, 1922	Jan. 31, 1922	Jan. 10, 1922	Feb. 8, 1921
No. 2X, Philadelphia	\$21.34	\$21.34	\$21.34	\$32.09
No. 2 Valley furnace	19.00	19.00	19.50	28.00
No. 2, Southern, Cin. Off.	20.00	20.50	21.00	32.00
No. 2, Birmingham, Ala. f.	15.50	16.00	16.50	27.50
No. 2 foundry, Chicago*	18.50	18.50	19.00	30.00
Basic, del'd, eastern Pa.	19.81	19.81	20.25	31.40
Basic, Valley furnace	17.55	18.00	18.25	30.00
Bessemer, Pittsburgh	21.46	21.46	21.46	33.96
Malleable, Chicago*	18.50	18.50	19.00	30.50
Malleable, Valley	19.00	19.50	19.50	30.00
Gray forge, Pittsburgh	20.96	20.96	20.96	28.96
L. S. charcoal, Chicago	30.50	30.50	31.50	40.50
Ferromanganese, del'd	58.35	58.35	60.00	90.00

Rails, Billets, etc., Per Gross Ton:	Feb. 7, 1922	Jan. 31, 1922	Jan. 10, 1922	Feb. 8, 1921
O.-h. rails, heavy, at mill	\$40.00	\$40.00	\$40.00	\$47.00
Bess. billets, Pittsburgh	28.00	28.00	28.00	43.50
O.-h. billets, Pittsburgh	28.00	28.00	28.00	43.50
O.-h. sheet bars, P'gh	29.00	29.00	29.00	47.00
Forging billets, base, P'gh	32.00	32.00	32.00	48.50
O.-h. billets, Phila.	33.74	33.74	33.74	49.24
Wire rods, Pittsburgh	36.00	36.00	36.00	57.00
Skelp, gr. steel, P'gh, lb.	1.50	1.50	1.50	2.45
Light rails at mill	1.50	1.50	1.45	2.45

Finished Iron and Steel, Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Iron bars, Philadelphia	1.81	1.81	1.85	2.70
Iron bars, Chicago	1.60	1.60	1.60	2.68
Steel bars, Pittsburgh	1.40	1.50	1.50	1.15
Steel bars, Chicago	1.55	1.60	1.60	2.53
Steel bars, New York	1.78	1.83	1.88	2.53
Tank plates, Pittsburgh	1.40	1.40	1.50	2.40
Tank plates, Chicago	1.55	1.60	1.60	2.78
Tank plates, New York	1.78	1.78	1.83	2.78
Beams, Pittsburgh	1.40	1.50	1.50	2.25
Beams, Chicago	1.55	1.60	1.60	2.63
Beams, New York	1.78	1.83	1.88	2.63
Steel hoops, Pittsburgh	1.90	1.90	2.00	3.05

*The average switching charge for delivery to foundries in the Chicago district is 70c. per ton.

†Silicon, 1.75 to 2.25. ‡Silicon, 2.25 to 2.75.

The prices in the above table are for domestic delivery and do not necessarily apply to export business.

Sheets, Nails and Wire, Per Lb. to Large Buyers	Feb. 7, 1922	Jan. 31, 1922	Jan. 10, 1922	Feb. 8, 1921
Sheets, black, No. 28 P'gh	2.00	3.00	3.00	4.20
Sheets, galv. No. 28 P'gh	1.00	1.00	1.00	5.70
Sheets, blue and'd 3 & 10	2.25	2.25	2.25	3.20
Wire nails, Pittsburgh	2.50	2.50	2.50	3.25
Plain wire, Pittsburgh	2.25	2.25	2.25	3.25
Barbed wire, galv. P'gh	1.15	3.15	3.15	4.10
Tin plate, 100 lb. box, P'gh	\$1.75	\$4.75	\$4.75	\$7.00

Old Material, Per Gross Ton	Feb. 7, 1922	Jan. 31, 1922	Jan. 10, 1922	Feb. 8, 1921
Car wheel, Chicago	\$1.00	\$1.00	\$15.50	\$21.00
Car wheels, Philadelphia	16.00	16.50	16.50	25.00
Heavy steel scrap, P'gh	11.50	14.00	14.50	16.00
Heavy steel scrap, Phila	12.00	12.00	11.50	14.50
Heavy steel scrap, Chgo	11.25	11.25	11.50	15.50
No. 1 cast, Pittsburgh	16.00	16.00	16.25	23.00
No. 1 cast, Philadelphia	16.00	16.50	16.50	23.50
No. 1 cast Chgo (net ton)	13.00	12.00	13.00	18.00
No. 1 RR. wrot, Phila	11.50	11.50	14.50	20.00
No. 1 RR. wrot Chgo (net)	10.00	10.00	10.50	13.50

Coke, Connellsville, Per Net Ton at Oven	Feb. 7, 1922	Jan. 31, 1922	Jan. 10, 1922	Feb. 8, 1921
Furnace coke, prompt	\$2.75	\$2.75	\$2.75	\$4.50
Foundry coke, prompt	5.50	5.75	5.75	5.50

Metals, Per Lb. to Large Buyers	Cents	Cents	Cents	Cents
Lake copper, New York	43.50	43.62½	43.87½	43.50
Electrolytic copper, refinery	44.25	43.27½	43.62½	43.00
Zinc, St. Louis	4.50	4.50	4.77½	5.00
Zinc, New York	4.85	4.85	5.12½	5.50
Lead, St. Louis	4.10	4.40	4.40	4.50
Lead, New York	4.70	4.70	4.70	4.75
Tin (Strait), New York	32.00	32.00	32.12½	32.50
Antimony (Asiatic), N. Y.	4.40	4.40	4.50	5.25

Composite Price, Feb. 7, 1922, Finished Steel, 2.019c. Per Lb.

Based on prices of steel bars, beams, tank plates, plain wire, open-hearth rails, black pipe and black sheets

These products constitute 88 per cent of the United States output of finished steel.

Jan. 31, 1922,	2.048c.
Jan. 10, 1922,	2.062c.
Feb. 8, 1921,	2.943c.
10-year pre-war average,	1.684c.

Composite Price, Feb. 7, 1922, Pig Iron, \$18.10 Per Gross Ton

Based on average of basic and foundry irons, the basic being Valley quotation, the foundry an average of Chicago, Philadelphia and Birmingham

Jan. 31, 1922,	\$18.31
Jan. 10, 1922,	18.60
Feb. 8, 1921,	29.93
10-year pre-war average,	15.72

140 blast furnaces in the district bounded by Johnstown, Pa., and Wheeling, W. Va., and Warren, Ohio, there are 55 now in blast. The numerical percentage is close to 40 per cent and it is the highest rate attained in about a year. Among finishing mills the highest rate of operation still is in tin plate plants, among which the number of active units has been increased by the starting of one more mill of the Washington Tin Plate Co., and a partial resumption at the Yorkville, Ohio, works of Wheeling Steel Corporation. Other classes of finishing mills at least are holding their own with last week.

Prices still reflect considerable instability, the only important exception being sheets, on which a majority of makers are holding firmly to the 3c. base for black and 4c. base for galvanized on new rollings. On sizable tonnages of plates, shapes and bars the market is 1.40c., and large buyers of nails are being accommodated at \$2.40 base per keg. This base on plates, shapes and bars is from 1c. per 100 lb. in the case of bars to 8c. per 100 lb. on structural beams and plates below the 10-year average prices of THE IRON AGE from 1905 to

1914 inclusive. The only important transaction in sheet bars the past week indicates that the market is not above \$29, Pittsburgh, on this material.

A direct sale of basic pig iron from a producer to a consumer has established \$17.75, Valley furnace, as the market on that grade. Scrap prices are drifting lower under smaller demand. Coal prices are slightly steadier as a result of purchases in anticipation of a strike of the miners on April 1.

Pig Iron.—The sole feature of the past week has been the sale of 1000 tons of basic iron to a Pittsburgh district sheet maker by a Valley steel works at \$17.75, Valley furnace, and since the transaction was a direct one and did not involve resale iron, the sale establishes that price as the market. This price represents a decline of 25c. a ton and is the lowest price touched since November, 1915. The same buyer is reported to have also purchased 500 tons of resale iron slightly under that price. Malleable grade also is weaker, some recent transactions having been done at \$19, Valley furnace. Practically nothing has been done lately in foundry or Bessemer iron, prices of which are nominally

unchanged. Prices of all grades of iron are liquidating values and have no relation to costs.

We quote Valley turnace, the freight rate for delivery to the Cleveland or Pittsburgh district being \$1.96 per gross ton.

Barn	\$17.75
Bessemer	19.50
Gray Forge	19.00
No. 2 foundry	19.00
No. 3 foundry	19.00
Malleable	19.00

Ferroalloys.—Aside from the fact that at least two makers of 50 per cent ferrosilicon have shut down their furnaces and temporarily are out of the market, the situation in ferroalloys shows no important change. The minimum asking price on this material now is \$58, furnace, freight allowed, with some makers asking \$60. Since the last business done was \$55, the market would appear to be quotable from \$55 to \$60. There have been no important transactions in ferromanganese in the week under review. All makers, including the Carnegie Steel Co., are quoting 80 per cent material at \$58.35 Atlantic Seaboard, or \$63.67 delivered Pittsburgh common freight points. We note a sale of 200 tons of 16 to 19 per cent spiegeleisen to a Valley consumer at around \$20 delivered. Interest in this material is not particularly large.

We quote 78 to 82 per cent ferromanganese \$58.35 c.i.f. Atlantic seaboard for domestic, English and German. Average 20 per cent spiegeleisen, nominal at \$30 to \$32 delivered Pittsburgh or Valley, 50 per cent ferrosilicon, domestic, \$55 to \$60 furnace, freight allowed. Bessemer ferrosilicon is quoted f.o.b. Jackson and New Straitsville, Ohio, furnaces as follows: 10 per cent, \$78.50, 11 per cent, \$41.80, 12 per cent, \$45.10, 13 per cent, \$49.10, 14 per cent, \$54.10, silvery iron, 6 per cent, \$27, 7 per cent, \$28, 8 per cent, \$29.50, 9 per cent, \$31.50, 10 per cent, \$33.50, 11 per cent, \$36, 12 per cent, \$38.50. The present freight rate from Jackson and New Straitsville, Ohio, into the Pittsburgh district is \$1.00 per gross ton.

Billets, Sheet Bars and Slabs.—The market is still inactive and prices largely are nominal. A Pittsburgh district maker of strip steel is seeking from 1500 to 2000 tons of 1½-in. to 2½-in. billets, but interest in billets generally is pretty small and this also is true of slabs. Non-integrated makers of tin plate are specifying fairly well against contracts for sheet bars, but the only important sale to sheet makers recently was one of 1000 tons which was placed at \$29 Pittsburgh. The Pittsburgh Steel Co. today started up six open hearth furnaces, after a shutdown of about six weeks.

We quote 4 x 4 in. soft Bessemer and open-hearth billets at \$28 to \$29, 2 x 2 in. billets, \$29 to \$30, Bessemer and open hearth sheet bars, \$30; slabs, \$29 to \$30; forging billets, ordinary carbons, \$32 to \$33, all f.o.b. Youngstown or Pittsburgh mills.

Wire Rods.—Demands from domestic consumers are neither large nor numerous, but there is a comparatively good export demand. On domestic business the market is quotable from \$36 to \$37, Pittsburgh or Youngstown, on the base size of common soft rods, while most of the export orders are at around \$35, Pittsburgh. Prices are given on page 445.

Steel Skelp.—There is only a moderate demand and while makers generally are quoting 1.50c. for pipe skelp, the fact that large tonnages of plates can be placed as low as 1.40c. gives basis for a belief that large tonnages of skelp might be placed at the same figure.

Wire Products.—Orders and specifications have been considerably better so far this month than they were in the same period last month, but no one claims that they are as large as they should be, in view of the fact that distributors in practically all parts of the country are going along with very small stocks. The explanation undoubtedly is to be found in the uncertainty over prices, both present and prospective. There is no question that large buyers are able to obtain nails at \$2.40 base per keg, and plain wire at a corresponding reduction from the official quotation. Small buyers are trying to place business at these prices and it is because manufacturers are refusing that orders are not heavier.

We quote wire nails at \$2.50 base per keg, Pittsburgh, and bright basic and Bessemer wire at \$2.25 base per 100 lb., Pittsburgh.

Steel Rails.—Business in standard rails is not especially satisfactory, for in spite of the fact that the railroads tributary to Pittsburgh, have specified against February, March and April shipments they also are

seeking to have payments begin about six months hence. Makers of light rails still are holding to 1.50c. base for 25-lb. to 45-lb. sections, rolled from new steel, but are not making many sales because of competition from those rerolling old standard rails.

We quote 25 to 45-lb. sections, rolled from new steel, 1.50c. base; rolled from old rails, 1.45c. base; standard rails, \$40 per gross ton mill for Bessemer and open-hearth sections.

Iron and Steel Bars.—The effort of all makers of steel bars is to maintain a base of 1.50c. and on small lots this price is obtainable, but on fairly sizable tonnages as low as 1.40c. has been done, and this may be regarded as the price to large buyers. Replacement orders are more numerous than they have been recently, but only a few really large tonnages are coming out. There is only a moderate demand for iron bars and prices are largely untested.

We quote steel bars rolled from billets at 1.40c. to 1.50c.; reinforcing bars, rolled from billets, 1.40c. to 1.50c. base; reinforcing bars, rolled from old rails, 1.35c. to 1.40c.; refined iron bars, 2c. to 2.10c. in carloads, f.o.b. mill, Pittsburgh.

Structural Material.—Very little business of other than small tonnages is coming to fabricating shops in this district. There is some encouragement, however, in the fact that the inquiry is good, one company here in the past week having had no less than 40 requests for prices. Among the inquiries were some which have been dormant for some time, this indicating that investors still have the intention of some time going ahead with the projects. Plain material demands are few and generally small, and the common quotation of Pittsburgh mills still is 1.50c. for structural beams. However, business has been done in competitive territory at 1.40c. on fairly large lots, and the market is quotable from 1.40c. to 1.50c., according to the tonnage involved. Prices are given on page 445.

Plates.—Makers in this and nearby districts still are quoting 1.50c., Pittsburgh, but admit that only small lots can be sold at that figure and that 1.40c. has been done on attractive tonnages. Few of the latter are developing in this district, because not much business is coming to railroad equipment manufacturers here, and tank and barge builders lately have not been getting many orders.

Sheets.—Demand still reflects considerable caution among buyers, who show a continued disposition to take on only such tonnages as are actually required and to accompany the order with the shipping instructions. Demand is strictly on a replacement basis and while orders are greater in number than they were recently, they do not increase much in size and it still takes time to accumulate enough business to formulate a rolling schedule. The leading interest in proportion to its productive capacity, is faring better in current business than the independents. There are occasional deviations, but as a general proposition the market is rather well established at 3c. base for black and 4c. base for galvanized sheets, on new rollings. Concessions on wasters from regular quotations are much less than usual, due to the fact that the comparatively low operations of the mills prevent much of an accumulation of this class of material, while the demand for it is rather good. Prices are given on page 445.

We quote sheared plates, ¼ in. and heavier, tank quality, at 1.50c. f.o.b. Pittsburgh.

Iron and Steel Pipe.—There is a fairly steady demand for standard pipe in both steel and wrought iron from jobbers for replenishment of stocks, but there is no advance buying and a portion of current production is being stocked. Several line pipe inquiries are pending, but the possibility of an early drop in oil prices is hindering the closing of this business and also is restricting the demand for oil country pipe. Observance of the discounts is not especially rigid. Discounts are given on page 445.

Boiler Tubes.—Demand is entirely of a replacement character, with few, if any, sizable orders coming out. Charcoal iron tubes are firmly held, but prices of steel tubes, especially seamless, are very much in buyers' favor. Card discounts are given on page 445.

Hot-Rolled and Cold-Rolled Strips.—Demand from

the established price of 3.50c., base, for cold-rolled strips are few and unimportant, but on hot-rolled strips, on account of competition from sheets, plates and skelp, the regular quotation 2c., base, Pittsburgh, is merely an asking price and the bulk of the business is being placed at from 1.85c. to 1.90c. Business in both kinds of material has been rather good during the past few weeks, but represents largely the restoration of inventories which were allowed to drop pretty low over the end of last year and the first three weeks of this year.

Tin Plate.—Specifications not only are coming along well, but almost all consuming industries are represented in them. There is unusually full occupation of tin plate capacity in this and nearby districts, and the indications point to a further increase since the Washington Tin Plate Co. has succeeded in getting going on an open shop basis, and the Wheeling Steel Corporation this week is making an effort to start up some of its mills at Yorkville, Ohio, which have been idle since last June, as a result of the refusal of that interest to renew its agreement with the Amalgamated Association of Iron, Steel and Tin Workers. The Yorkville plant is being started on an open shop basis. Observance of \$4.75 per base box, Pittsburgh, for standard coke tin plate is a little more general than it was a few weeks ago.

We quote standard production coke tin plate \$4.75 per base box f.o.b. Pittsburgh for carload lots.

Cold-Finished Steel Bars and Shafting.—Reports about business conditions are somewhat irregular, but the experience of most makers is that buyers are merely rounding out existing stocks, and that there is no very pronounced tendency to anticipate requirements. On the other hand, one maker in this district so far this year has had orders which amount to about one-third of the total business done during 1921. The market still is quotable at 1.90c. to 2c. base, but the lower figure is on desirable tonnages and most of those now coming out cannot thus be classified. Ground shafting is unchanged at 2.25c. base, f.o.b. mill, for carload lots.

Hoops and Bands.—The market in both products is extremely limited and hardly enough is going on to definitely establish prices. The quotable range on hoops is 1.90c. to 2c. base, Pittsburgh, but the higher figure is more of an asking than a selling basis. On bands, prices anywhere from 1.75c. to 1.90c. base are heard.

Nuts and Bolts.—Demands upon makers in this district possibly are more numerous than they were recently, but individually and in the aggregate bookings are small and business pretty much localized as a result of the fact that makers in other districts are not adhering strictly to a Pittsburgh base. The New York Central Lines will open bids Feb 8 on from 5000 to 8000 kegs of track bolts. Discounts are given on page 445.

Rivets.—Makers in this district still are holding heavy rivets at \$2.25 to \$2.35, base per 100-lb. Pittsburgh, but business at these prices is confined closely to this immediate territory, for Chicago makers are quoting \$1 per ton less, f.o.b. Chicago, and this, together with the heavy freight, keeps local makers out of the Chicago territory. On the other hand, Chicago producers are not coming East at the prices they quote. Business still leaves much to be desired, for while orders are numerous enough, they are small individually and the lack of volume is discouraging. Prices and discounts are given on page 445.

Spikes.—The New York Central Lines will open bids Feb. 8 on 40,000 to 50,000 kegs. This being an exceptionally attractive order, the common impression is that it will bring out lower prices than lately have prevailed. The market now is quoted at \$2.15 to \$2.20 base per 100-lb. for standard spikes, but this order is expected to be placed at below the lower figure. Interest in small spikes is slight. Prices are given on page 445.

Old Material.—The trend of prices is down because there is almost no demand from melters and dealers are taking on tonnages pretty sparingly since most

of them are well up with their obligations and the possibility of a slow turnover, as well as lower prices, checks purchases for throwing down on the yards. Rather high prices were paid for scrap offered by the railroads this month, a dealer paying \$14.56 per gross ton, Pittsburgh, for the heavy melting steel of the Pennsylvania Railroad, Central Region. The buyer is delivering this material against a contract taken some time ago at about \$13.50, Pittsburgh. Such buying constitutes the sole support of prices. On open market transactions in heavy melting steel, \$14 has become the maximum price and the more common bid is \$13.50. Users of turnings are less anxious for supplies and prices are down about 50¢ a ton. The market also is weaker on borings. Prices are nominal on low phosphorus steel scrap.

We quote for delivery to consumers' mills in the Pittsburgh and other districts (taking the Pittsburgh freight rate, as follows):

Heavy melting steel, Steubenville, Follansbee, Brierley, Monessen	
Midland and Pittsburgh	\$13.50 to \$14.00
No. 1 cast, capods, size	16.00 to 16.50
Rolling mills, heavy and light, Carnegie, Ohio, Condit, Md., Huntington, W. Va., and Union	
Pa.	13.00 to 13.50
Compressed sheet steel	11.75 to 12.00
Embossed sheets, zinc and lead	10.50 to 11.00
Railroad knuckles and couplers	11.00 to 11.50
Railroad coil and leaf plate	11.00 to 11.50
Low phosphorus standard base and	
bullet ends	13.00 to 13.50
Low phosphorus plate and other grades	11.00 to 11.50
Railroad malleable	12.50 to 13.00
Rail car axles	23.00 to 24.00
Locomotive axles steel	21.00 to 22.00
Steel car axles	15.00 to 15.50
Cast iron wheels	15.00 to 15.50
Rolling steel wheels	14.00 to 15.00
Machine shop turnings	3.00 to 4.00
Sheet bar crop ends	3.50 to 4.00
Heavy steel axle turnings	11.00 to 11.50
Short shoveling turnings	11.00 to 11.50
Heavy breakable cast	13.50 to 14.00
Stove plate	12.50 to 13.00
Cast iron borings	11.50 to 11.75
No. 1 railroad wrought	11.00 to 12.00

Pittsburgh Rumors About Three Company Merger

PITTSBURGH, Feb. 2.—The story is current here that completion of the merger of the Youngstown Sheet & Tube Co., the Inland Steel Co. and the Steel & Tube Co. of America has been delayed because it has been discovered that the combination would not have sufficient ore lands to be fully self-contained for more than a short period. To correct this condition an effort is said to have been made to bring the Brier Hill Steel Co., Youngstown, which has a controlling interest in the Biwabik and Pennington Mining Co. into the merger. It is also intimated that negotiations have been started for the acquisition of some of the Breitung ore properties. Beside the matter of ore reserves, a desire to include a Pittsburgh district plant in the combination also is said to have hindered completion of the deal. In this connection, is a report that the Midland, Pa., plant of the Crucible Steel Co. of America is being considered. This plant has two modern 600-ton blast furnaces, a by-product coke plant comprising 100 Koppers ovens, 10 basic and two acid open-hearth furnaces, blooming, billet and bar mills and is essentially a soft steel plant, although built to provide steel for the other Pittsburgh district mills of the Crucible company, the principal business of which is tool and special steels.

The W. & B. Douglas Co., Middletown, Conn., pumps, has increased its operating schedule to four days a week in the foundry, and to five days in most other departments. The company is shipping goods as far west as California, and is doing an excellent business in Cuba and Europe.

The Four-Cylinder Car Division, Nash Motors Co., Milwaukee, on Feb. 1 resumed an 8-hour day in all departments, affecting about 400 employees who for some time have been working mornings only. B. W. Twyman is general manager.

Chicago

• CHICAGO, Feb. 7.

The placing of 6800 freight cars by the Burlington is the feature of the week. This is the largest car order placed in years and will mean an addition of 85,000 tons of steel to mill books. Other good-sized railroad orders are in immediate prospect; in fact, current car purchases are exceeding the maximum expectations of the steel trade. Concomitant with better railroad buying is a steady expansion in general demand for rolled steel. Jobbers are commencing to lay in stocks and miscellaneous manufacturers from all sections of the West are placing small orders. In the building field also, there are signs of quickening activity, although obstructive union tactics are proving a hindrance here and there, notably in Chicago.

While business is improving, prices are settling to a new level, 1.55c. to 1.60c., Chicago, being commonly quoted on plates, shapes and bars, while attractive tonnages are being placed for less. Bolt and nut discounts, which have long been weak and ill-defined, are now on an f.o.b. factory basis except for products which are not made in quantity in Western plants.

In the pig iron market Southern competition is becoming a real factor, a recession in price to \$15, Birmingham, coupled with river and rail rates, having brought delivered prices practically to a parity with those from Chicago furnaces at numerous points in this vicinity.

The Inland Steel Co.'s operations have shown further improvement, steel output being on a 50 per cent basis. The Illinois Steel Co. is running at the same rate as a week ago, while the Interstate Iron & Steel Co. is operating at better than 50 per cent at its steel plant and merchant mill.

Ferroalloys.—A large local consumer has purchased 100 tons of ferromanganese at the market. A railroad equipment manufacturer is inquiring for 250 tons. An inquiry for one car of spiegeleisen is current.

We quote 75 to 82 per cent ferromanganese, \$66.75, delivered, 50 per cent ferrosilicon, \$56 to \$57.50, delivered, spiegeleisen, 15 to 22 per cent, \$26.00 to \$37, delivered.

Pig Iron.—For the first time in several years, Southern iron is getting on a competitive basis with the Northern product in this territory. Southern foundry has been sold at as low as \$15, base Birmingham, or the equivalent in terms of f.o.b. furnace, and the all-rail rate brings the delivered price in Chicago to \$21.67. While this is about \$2.50 above the delivered price in Chicago for local iron, there are certain points in Chicago territory where the advantage is in favor of the South. Southern competition will be accentuated on Feb. 15, when combination rail and water rates will further reduce the delivered prices of the Southern product by from \$1 to \$1.50 a ton. The iron will be hauled by barge down the Tennessee River to Metropolis, Ill., where it will be transferred to a railroad. Each barge will hold 400 tons and a single steamer will tow from three to four barges from the furnace to Metropolis in 40 hours. Northern merchant furnaces continue to pile some iron, but report that shipments are steadily increasing in volume. While current orders and inquiries are individually small, ranging from a carload to 200 or 300 tons, interest in the market is more general than it has been since last fall. The Chicago, Milwaukee & St. Paul is inquiring for 600 tons of malleable and 100 tons of foundry for prompt delivery, and the New York Central wants eight cars of No. 2 foundry and three cars of charcoal for early shipment to its Elkhart, Ind., shops.

Quotations on Northern foundry, high phosphorus malleable and basic irons are f.o.b. local furnace and do not include a switching charge averaging 70c. per ton. Other prices are for iron delivered at consumers' yards, or when so indicated, f.o.b. furnace other than local.

Lake Superior charcoal, averaging	
sl. 1.50, delivered at Chicago.....	\$30.50 to \$31.50
Northern coke, No. 1, sl. 2.25 to 2.75.....	18.50 to 19.00
Northern coke, foundry, No. 2, sl.	
1.75 to 2.25.....	18.50
Northern high phos.....	18.50
Southern foundry, sl. 1.75 to 2.25.....	21.67
Malleable, not over 2.25 sl.....	18.50
Basic.....	18.50
Low phos., Valley furnace, sl. 1 to 2	
per cent copper free.....	29.50
Silvery, sl. 8 per cent.....	\$2.82 to \$4.22

Railroad Equipment.—The Chicago, Burlington & Quincy has placed orders for 6800 freight cars and still has 500 to place, being undecided as to whether they will be automobile or box cars. The distribution of the orders is as follows: Western Steel Car & Foundry Co., 1000 composite gondola cars; American Car & Foundry Co., 500 refrigerator cars, 500 stock cars and 500 composite gondola cars; Pullman Co., 500 composite gondola cars, 500 box cars and 400 refrigerator cars; Mount Vernon Car Manufacturing Co., 1000 box cars; General American Car Co., 500 box and 400 refrigerator cars; Bettendorf Co., 1000 all steel gondola cars. The Burlington will also soon place orders for 55 locomotives. The Union Pacific has ordered 25 baggage cars from the American Car & Foundry Co. and 20 coaches from the Pullman Co. The Chicago, Milwaukee & St. Paul is inquiring for 1000 box cars. The Pacific Fruit Express is expected to close for 3300 refrigerator cars during the current week. The Baltimore & Ohio is in the market for 50 passenger service cars. The Norfolk & Western is inquiring for 1000 gondola and 1000 hopper cars and also contemplates the purchase of power. The Denver & Rio Grande is in the market for 20 Pacific type engines, while the Norfolk Southern and the Kentucky & Indiana Terminal are asking for prices on five locomotives each. The New York, Ontario & Western has ordered four mountain type engines from the American Locomotive Co.

Bars.—Demand for soft steel bars continues to show gradual improvement. Not only are further specifications coming from car builders, but jobbers and miscellaneous manufacturers are commencing to replenish their stocks. Even the farm implement makers who have been practically idle for a year, are buying in a small way. In the reinforcing field, building construction is expanding and a round tonnage for spring road building has been placed. On Feb. 3 the Milwaukee Sewerage Commission opened bids on 5000 tons of reinforcing bars for the Jones Island sewage disposal plant. The Inland Steel Co. was low bidder with a figure of \$31.90 delivered on soft steel bars and will undoubtedly get the order, although a formal award will not be made until later this week. This bid is said to be equivalent to 1.475c., f.o.b. mill, after deducting freight and extras. Other bidders f.o.b. Milwaukee were: Corrugated Bar Co., \$32.95 for new steel; Concrete Steel Co., \$33.30 for new steel; Calumet Steel Co., \$29.24 for re-rolled steel; Inland Steel Co., \$29.90 for re-rolled steel; Paul J. Kalman Co., \$34 for new steel; Donner Steel Co., \$36.90 for new steel. The Kansas City Bolt & Nut Co. has closed a contract with the Kansas City Stockyards Co. to furnish 670 tons of soft steel deformed reinforcing bars for the construction of the American Royal Exposition Building. Soft steel bars are commonly quoted at from 1.55c. to 1.60c., Chicago, while attractive tonnages are moving at concessions of \$1 to \$2 a ton.

Mill prices are: Mild steel bars, 1.55c. to 1.60c., Chicago; common bar iron, 1.60c., Chicago; rail carbon, 1.50c., mill or Chicago.

Jobbers quote 2.52c. for steel bars out of warehouse. The warehouse quotation on cold-rolled steel bars and shafting is 3.40c. for rounds and 3.90c. for flats, squares and hexagons. Jobbers quote hard and medium deformed steel bars at 1.90c. base. Hoops and bands, 3.13c.

Wire Products.—Demand is not so brisk as in recent weeks and more is heard of price concessions, although it cannot be said that the market has developed marked weakness. For mill prices, see finished iron and steel, f.o.b. Pittsburgh, Page 445.

We quote warehouse prices f.o.b. Chicago: No. 9 and heavier black annealed wire, \$3.13 per 100 lb.; No. 9 and heavier bright basic wire, \$3.28 per 100 lb.; common wire nails, \$3.25 per 100 lb.; cement coated nails, \$2.65 per keg.

Sheets.—Notwithstanding reports of isolated concessions on galvanized in other sections of the country, the local market on sheets appears to be firm in all departments. Domestic business is commencing to revive and this, added to a good export backlog, has put the local independent mill in a comfortable position.

Mill quotations are 3c. for No. 28 black, 2.25c. for No. 10 blue annealed and 4c. for No. 28 galvanized, all being Pittsburgh prices, subject to a freight rate to Chicago of 85c. per 100 lb.

Jobbers quote: Chicago delivery out of stock, No. 10 blue annealed, 3.85c.; No. 28 black, 4.15c.; No. 28 galvanized, 5.15c.

Steel Castings.—Current and prospective business is largely in steel castings required for railroad and

and locomotives. The importance of railroad orders may be grasped when it is realized that there are 40 tons of steel castings in the average locomotive and two and one-half in the average freight car. The freight car order just placed by the Burlington will result in the placing of fully 15,000 tons of steel castings. The list price and discounts on page 348-350 of THE IRON AGE of Feb. 9, indicate the current market.

Plates.—Local mills report a further increase in the volume of business. Heavy specifications continue to be received from car builders, one company having sent in rolling instructions on 10,000 tons of plates, shapes and bars within the past week. The placing of the Burlington freight cars will result in the placing of fully 85,000 tons on mill books. Other good sized car orders are in immediate prospect, so that steel producers are assured a steady stream of tonnage business for some time. Steel buying is not confined to the car shops. Jobbers are commencing to replenish their stocks, one local warehouse having placed an order for 6000 tons of plates, shapes and bars, and small manufacturers also are placing orders to take care of their immediate needs. Demand is more widely distributed than for some time and while the trade is cautious about jumping to conclusions, it is swinging to the belief that real progress towards industrial revival is being made. Prices are softening concurrently with the increase in mill bookings. from 1.55c. to 1.60c., Chicago, is commonly quoted, while attractive lots are moving at 1.50c. and less. In fact, heavy tonnages of desirable specifications have been bought by car builders at as low as 1.45c. and 1.40c. The making of sharp concessions to secure large tonnages has been a characteristic of the market ever since the present depression set in and is accounted for by the desire of mills to avoid interruptions in operations which might prove necessary if they were entirely dependent on the ordinary run of bookings.

The ruling mill quotations range from 1.55c. to 1.60c., Chicago. Jobbers quote 2.63c. for plates out of stock.

Structural Material.—Prospects of a settlement of the local building controversy were given another set back when the carpenters voted to insist on their demand for a wage of \$1.10 an hour. This action followed the unanimous decision of the Chicago Building Trades Council to accept the Landis award. While this development has again introduced uncertainty in the local building situation, prospects for construction activity in other sections of the West are steadily growing brighter. The placing of 17,137 tons of the Chicago Union Station, announced in this column last week, has been followed by the largest number of fabricating awards reported for a considerable period. Plain material prices are settling to a lower level as demand increases. From 1.55c. to 1.60c., Chicago, is commonly quoted, and on large tonnage concessions of \$1 to \$2 under those prices have been made. Recent fabricating awards include:

Equitable Life Insurance Co. Building, Des Moines, Iowa, 3200 tons, to American Bridge Co.

Putnam Department Store Building, Davenport, Iowa, 1088 tons, to Rock Island Bridge & Iron Works

Chicago Union Mail Terminal, conveyor and structural steel supports, 370 tons, to Pittsburgh Bridge & Iron Co.

Masonic Temple, Eureka, Cal., 150 tons, to American Bridge Co.

University of Montana, Library Building, Missoula, Mont., 104 tons, to Minneapolis Steel & Machinery Co.

Alambau Paper Co., pulp mill, Park Falls, Wis., 110 tons, to Worden-Allen Co.

Addition to Illinois Masonic Orphanage, LaGrange, Ill., 100 tons, to Gage Structural Steel Co.

Sisters of St. Mary Hospital, St. Louis, 914 tons, reinforced concrete substituted for structural steel.

The mill quotation on plain material ranges from 1.55c. to 1.60c., Chicago. Jobbers quote 2.63c. for plain material out of warehouse.

Bolts and Nuts.—Demand is still unsatisfactory, although some buying is being done by jobbers and the railroads, and a few automobile makers are sounding the market. Ford's operations are improving, his program for February calling for 60,000 cars. Bolt and nut discounts, although still very weak, appear to be stabilizing on a new basis. F.o.b. factory prices are the rule on machine bolts, carriage bolts, lag bolts, plow

bolts, hot pressed nuts and stove bolts, while on materials largely made in the East, such as machine bolts and cold-punched nuts, semi-finished hexagon nuts, cold-punched chamfered and trimmed nuts, and tire bolts, f.o.b. Pittsburgh is still quoted. The following discounts f.o.b. factory are fairly representative for less than carload orders. On carload orders an additional discount of 5 per cent or more is not unusual.

Small machine bolts, rolled threads, 70 and 10 and 10 off; cut threads, 70 and 10 off; large machine bolts, 70 and 10 off; small carriage bolts, rolled threads, 70 and 10 off; cut threads, 70 off; large carriage bolts, 70 off; lag bolts, 70 and 10 and 10 off; hot pressed nuts, black \$5.75 off, tapered, \$5.50 off; stove bolts in packages, 80 and 10 and 10 and 10 off; in the bulk, 80 and 10 and 10 and 10 and 2 1/2 off.

Jobbers quote structural rivets, 3/16, boiler rivets, 3/53; machine bolts up to 3/4 x 1 in., 60, 10 and 10 per cent off; larger sizes, 60 to 10 off; carriage bolts up to 3/4 x 6 in., 60 and 10 off; larger sizes, 55 and 10 off; hot pressed nuts, square and hexagon tapered, \$3.75 off; black nuts, \$4 off; coach or lag screws, gullet points, square heads, 65 and 5 per cent off. Quantity extras are unchanged.

Cast Iron Pipe. St. Paul has awarded 1290 tons to the National Cast Iron Pipe Co. The United States Cast Iron Pipe & Foundry Co. is low bidder on 300 tons for high pressure pipe for the Detroit Board of Fire Commissioners. Sellers are encouraged by the amount of business in prospect. Milwaukee is expected to ask for bids on about 2000 tons Feb. 20. On Feb. 3 the sewerage commission of that city let 100 tons of miscellaneous class A pipe to James B. Clow & Sons. New inquiries include:

Minneapolis. See tone bids to be in Feb. 10, Muscatine, Iowa, 650 tons, Feb. 14, Geybull Wyo., 330 tons, Feb. 13; New Ulm, Minn., 65 tons, Feb. 28.

We quote per net ton, f.o.b. Chicago, as follows: Water pipe, 4 in., \$15.60 to \$16.60; 6 in. and above \$11.60 to \$12.60; class A and gas pipe, \$3 extra.

Coke.—The prospect of a coal strike has stimulated the demand for coke. For the first time in many months, foundries are contracting ahead, a number of contracts covering requirements for from six months to the rest of the year having been closed. Local by-product foundry is selling at \$10.75 delivered Chicago switching district, while Connellsville can be bought for less.

Old Material.—Although a tendency towards weakness is reported in some quarters, consumptive buying has been too limited to establish any material changes in prices. Among the few recent transactions may be mentioned purchases of 2000 or 3000 tons of malleable by two local foundries at \$13 per gross ton delivered, and purchases by an iron mill of 500 tons of No. 2 wrought at \$10 per net ton delivered and approximately 250 tons of No. 1 busheling at \$8.25 per net ton delivered. Railroad lists include the Pennsylvania South-Western Region, 5000 tons; the Union Pacific, 2500 tons; the Pere Marquette, 2000 tons; the Pullman Co., 1000 tons; the Chicago & Eastern Illinois, 900 tons; and the Erie, a blind list.

We quote delivery in consumers' yards Chicago and vicinity, all freight and transfer charges paid, as follows:

	Per Gross Ton	
Iron rails	\$16.00 to \$16.50	
Relaying rails	20.00 to 25.00	
Cast iron car wheels	15.00 to 15.50	
Rolled or forged steel car wheels	13.00 to 13.50	
Steel rails, re-rolling	12.00 to 12.50	
Steel rails, less than 3 ft.	12.50 to 13.00	
Heavy melting steel	12.25 to 11.75	
Frogs, switches and guards cut apart	11.25 to 11.75	
Shoveling steel	10.75 to 11.25	
Low phos. heavy melting steel	13.50 to 14.00	
Drop forge flashings	7.50 to 8.00	
Hydraulic compressed sheet	7.50 to 8.00	
Axis turnings	8.50 to 9.00	
	Per Net Ton	
Iron angles and splice bars	14.00 to 14.50	
Steel angle bars	10.50 to 11.00	
Iron arch bars and transoms	15.00 to 15.50	
Iron car axles	19.50 to 20.00	
Steel car axles	12.50 to 13.00	
No. 1 busheling	8.25	
No. 2 busheling	6.00 to 6.50	
Cut forge	10.00 to 10.50	
Pipes and flues	6.50 to 7.00	
No. 1 railroad wrought	10.50 to 11.00	
No. 2 railroad wrought	10.00 to 10.50	
Steel knuckles and couplers	11.25 to 11.75	
Coil springs	12.50 to 13.00	
No. 1 machinery cast	13.00 to 13.50	
No. 1 railroad cast	12.50 to 13.00	
Low phos. punchings	11.00 to 11.50	
Locomotive tires, smooth	9.50 to 10.00	
Machine shop turnings	4.50 to 5.00	
Cast borings	6.00 to 6.50	
Stove plate	12.00 to 12.50	
Grate bars	10.50 to 11.00	
Brake shoes	10.50 to 11.00	
Railroad malleable	11.25 to 11.75	
Agricultural malleable	11.25 to 11.75	

New York

NEW YORK, Feb. 7.

Pig Iron.—The postponing of the opening of bids on the vehicular tunnel until Feb. 15 has caused considerable disappointment among the pig iron men, many of whom expected to figure with contractors on the iron for the segments. One New Jersey heater company has closed for the 5000 tons for which it was announced last week it was in the market. Another heater company has closed for from 2000 to 3000 tons. While details as to the transactions are lacking, it is known that a considerable part of the iron was purchased from nearby furnaces. It is doubtful whether any of it will come from the Buffalo district, although in that district some very low prices are being made in cases of keen competition. A New Jersey valve and fitting company is in the market for 800 tons for delivery over four months beginning with May, and a number of other inquiries are pending. There is a tendency to inquire for deliveries extending through the second quarter and sometimes into August. On the whole the market is more active and feeling more cheerful.

We quote delivered in the New York district as follows, having added to furnace prices \$2.52 freight from eastern Pennsylvania, \$5.16 from Buffalo and \$6.16 from Virginia:

East Pa. No. 1 16y. sd. 2 7/8 to 3 2/8	\$23.52
East Pa. No. 2 16y. sd. 2 7/8 to 2 7/8	23.01
East Pa. No. 2 16y. sd. 1 1/2 to 2 1/2	22.52
Buffalo sd. 1 7/8 to 2 1/8	24.96
No. 1 Virginia, sd. 1 7/8 to 2 2/8	28.16

Ferromanganese.—The representative of one British producer of ferromanganese has been authorized to quote the alloy at \$62.50, seaboard, as compared with \$58.35, which has prevailed up to this time. It is presumed that this quotation will at once become general as far as the British alloy is concerned. The market is quiet, sales being confined to carload lots. There are two fairly large inquiries before the market, one for 250 to 500 tons and another for 300 to 500 tons. The spiegel-eisen market continues moderately active, with sales of 300 tons reported as well as carload lots, and with an inquiry before the market of 500 tons. There is no activity in the manganese ore market, but it is reported that an inquiry into the Russian manganese ore situation has shown that it is practically impossible to ship any quantity of high grade ore from Russia, owing to the demoralization of the railroads and the bad condition of the ports, so that not much is expected of any attempt to obtain Russian manganese ore in the near future. The 50 per cent ferrosilicon market is fairly active and contracts for delivery of 1922 have been made by a few of the large steel companies, several thousand tons being involved, the prices being those generally prevailing. There have also been sales of carload lots here and there and the interesting statement is made that 200 to 300 tons has been sold for export to England. Demand for ferrochromium is very light and quotations are largely nominal. Quotations follow:

Ferromanganese, domestic, seaboard, per ton	\$58.35
Ferromanganese, British, seaboard, per ton	\$62.50
Spiegel-eisen 20 per cent, furnace, per ton	\$26.00
Ferrosilicon 50 per cent delivered, per ton	\$55.00 to \$60.00

Ferrotungsten, per lb. of contained metal	40c. to 50c.
Ferrochromium 6 to 8 per cent carbon, 60 to 70 per cent Cr, per lb. Cr, delivered	12c. to 14c.
Ferrovanadium per lb. of contained vanadium	\$1.00

Ores

Manganese ore, foreign, per unit, seaboard	22c. to 25c.
Tungsten ore, per unit, in 60 per cent concentrates	\$2.00 up
Chrome ore, 40 to 45 per cent Cr ₂ O ₃ , crude, per net ton, Atlantic seaboard	\$20.00 to \$25.00
Chrome ore, 45 to 50 per cent Cr ₂ O ₃ , crude, per net ton, Atlantic seaboard	\$25.00 to \$27.00
Molybdenum ore, 85 per cent concentrates, per lb. of MoS ₃ , New York	50c. to 60c.

Warehouse Business.—The past week is generally conceded to mark an improvement over any week in January. Whether it is a sporadic recovery or a permanent change for the better is a question. Prices are undoubtedly weak in some quarters, and although most warehouses see no revision of quotations for the present, some believe that a change may be made in the near future. In and around New York City there is

reported slight activity in structural steel for building construction and a Brooklyn warehouse with men on the road in New England reports some fair-sized purchases of No. 16 gage blue annealed sheets by New England stove manufacturers. Brass and copper prices are unchanged and business is even more active than in January, which was reported as an improvement over last year. Dealers in wrought iron and steel pipe report no change in the dullness of this market. We quote prices on page 458.

Finished Iron and Steel.—Business has broadened sufficiently to make the price on large lots of heavy tonnage products what has been regarded as the quotation for the hitherto infrequent large inquiry, namely 1.40c. Pittsburgh. In short in the lean market which has obtained, keen competition had developed prices for some time below the general quotation but these same prices have been named on the less spectacular offerings and the prices are no longer special. In the local domestic market structural steel work continues the outstanding avenue of consumption; in fact, it is estimated that 100,000 tons of work is actively being considered in the East. Noteworthy is the number of speculative undertakings. These are being consummated apparently on the basis of a belief that any freight reductions or fuel reductions will not be reflected in to-day's minimum for building materials, at least steel. Railroad car work is still conspicuously a Western matter. The Burlington has closed on 5300 cars and 2000 more for that road are pending and the Milwaukee is in the market for 1000 or more box cars. In the East a considerable number of passenger cars will be bought; the Central Railroad of New Jersey wants 50 and a lot is wanted by the Baltimore & Ohio and the Boston & Maine. The New York Central will take bids this week on 40,000 to 50,000 kegs of spikes and on a round lot of wheels. New structural steel work includes the following:

Building for Vacuum Oil Co., Olean, N. Y., 250 tons.
Loft building, West Thirty-eighth Street, 1000 tons.
Art Museum, Corning, N. Y., 500 tons.
Two loft buildings, West Thirty-seventh Street, each 1000 tons.

Apartment house, Park Avenue, 500 tons.
Columbia University, 200 tons.
Two highway bridges, Monmouth County, N. J., 500 tons.
Title Guaranty & Trust Co., Jamaica, L. I., 300 tons.

Late awards include the following:

Training school, Cortland, N. Y., 1000 tons, to Lehigh Structural Steel Co.

Crane runways, Ellison Co., Elkland, Pa., 300 tons.

Brooklyn Edison Co., 600 tons, to the Phoenix Bridge Works.

Apartment house, West Seventy-fifth Street, 600 tons, to the Harris Structural Co.

Paper mill, Spring Grove, Pa., 500 tons, to the Belmont Iron Works.

Transportation towers, to be erected in the South, 500 tons, to American Bridge Co.

Tanks for Mexican Petroleum Co., Carteret, N. J., 3500 tons, to American Bridge Co.

New York State Highway Commission, 350 tons, to the Shoemaker-Satterthwaite Bridge Co.

We quote for mill shipments, New York, as follows: Soft steel bars, 1.78c. to 1.88c.; plates, 1.78c. to 1.88c.; structural shapes, 1.78c. to 1.88c.; bar iron, 1.78c. to 1.88c. On export shipments the freight rate is 28 1/2c. per 100 lb., instead of 38c., the domestic rate.

High Speed Steel.—Purchases in this market are, as usual, small. Consumers evidently believe that it is unnecessary to carry more than a very small quantity of steel in stock and show no inclination to recede from their position of hand-to-mouth buying. Producers generally quote 80c. to 90c. per lb. on 18 per cent tungsten high speed steel, with special brands ranging up to as high as \$1.05 per lb.

Cast-Iron Pipe.—The optimism that has been felt for some time past continues. Prices are firm. In this district, two municipal lettings will be made; one on Feb. 10, for furnishing 600 tons of 8-in. to 16-in. cast-iron pipe to the New York City Department of Water Supply, Gas and Electricity; the other on Feb. 14, for about the same tonnage of 8-in. to 16-in. pipe to contractors holding municipal contracts. We quote per net ton

f.o.b. New York, carload lots, as follows: 6-in. and larger, \$47.30; 4-in. and 5-in., \$52.30; 3-in., \$62.30, with \$4 additional for Class A and gas pipe.

Coke.—The coke market is developing considerable more activity, due largely, it is believed, to the prospect of the coal strike in the bituminous regions April 1. Many foundries are showing a disposition to accumulate stocks. Connellsville foundry coke is quoted at \$3.75 to \$3.50, ovens, a rather wide range, but there is little good coke available at less than \$4. By-product coke is selling at \$8.59 delivered New Jersey points, this being on the basis of \$4.25 for Connellsville coke and \$4.34 freight.

Old Material.—There is no appreciable change from last week. Buyers continue to show some activity with a strong bearish tendency. In most instances they evidently consider the present market from \$1 to \$1.50 per ton too high on heavy melting steel. Sellers are, however, holding rather firmly to current prices. Some activity is noted in New England, a Worcester consumer having closed with a Massachusetts seller on a small quantity of heavy melting steel. A broker with a branch office in New York has reduced his buying price on cast borings and machinery cast by 50c. per ton. Short length steel rails are off about 25c., while heavy melting steel is fairly firm at \$8 to \$8.50 per ton, last week's quotation.

Buying prices per gross ton, New York, follow		
Heavy melting steel, yard	\$8.00 to	\$8.50
Steel rails, short lengths, or equivalent	8.25 to	8.75
Re-rolling rails	9.50 to	10.00
Relaying rails, nominal	27.00 to	28.00
Steel car axles	10.00 to	10.50
Iron car axles	18.50 to	19.00
No. 1 railroad wrought	10.00 to	10.50
Wrought iron track	8.50 to	9.00
Forge fire	9.00 to	9.50
No. 1 yard wrought, long	9.00 to	9.50
Cast borings (clean)	7.00 to	7.50
Machine shop turnings	4.00 to	4.50
Mixed borings and turnings	4.50 to	5.00
Iron and steel pipe (1 in. diam. not under 2 ft. long)	7.25 to	7.75
Stove plate	9.75 to	10.25
Locomotive grate bars	9.50 to	10.00
Malleable cast (railroad)	8.00 to	8.50
Car wheels	10.50 to	11.00

Prices which dealers in New York and Brooklyn are quoting to local foundries, per gross ton, follow:

No. 1 machinery cast	\$16.50 to	\$17.00
No. 1 heavy cast (columns, building materials, etc.), cupola size	15.50 to	16.00
No. 1 heavy cast, not cupola size	14.00 to	14.50
No. 2 cast (radiators, cast boilers, etc.)	10.00 to	10.50

Bids on Tunnel Postponed

Bids for construction work and materials on the Hudson River vehicular tunnel were postponed at 3.30 p. m. Feb. 7, one-half hour after the scheduled opening, in response to the plea of four contractors that they could not obtain their bonds by Feb. 7. Duplicate resolutions were passed by the New York State Bridge and Tunnel Commission and the New Jersey Interstate Bridge and Tunnel Commission, in executive session, stating that the public interest demanded that the opening of bids be deferred until Feb. 15, at 3.00 p. m., in the Hall of Records, New York, up until which time proposals will be accepted. The following is the resolution as passed by both commissions:

Be it resolved by the New York State Bridge and Tunnel Commission and the New Jersey Interstate Bridge and Tunnel Commission concurring, that the public interest demands that the opening of bids on Contracts Nos. 3 and 4 be and the same hereby is deferred, and that sealed bids and proposals will be received at the Office of the Commissions, Room 617, Hall of Records, New York, until Wednesday, the fifteenth day of February, 1922, at 3 o'clock p. m., Eastern standard time, at which time or at a later date to be fixed by the commissions the proposals will be publicly opened.

The Nichols-Lintern Co., Cleveland, manufacturer of the Lintern electro-magnetic sander and the well known N-L line of electric railroad car equipment, is moving into a new factory building especially designed for its requirements. The company has been active since 1913. Officers are: William Lintern, president and manager; John B. Lintern, vice president; Lewis B. Forte, secretary and treasurer.

Cleveland

CLEVELAND, Feb. 7.

Iron Ore.—The effect of the restoration of the higher rail rates on ore was shown in the movement from Lake Erie docks during January. Consumers increased their dock shipments in December in order to avoid paying the higher freight charges and the movement from the docks fell off sharply during January, dock shipments for the month being only 211,533 gross tons as compared with 597,398 tons during December. Dock shipments during January, 1921, were 723,294 tons. The dock balance Feb. 1 was 8,223,216 tons as compared with 9,217,089 tons on the same date a year ago.

We quote delivered lower lake ports: Old range Bessemer, 55 per cent iron, \$6.15; Old range non-Bessemer, 51½ per cent iron, \$5.75; Mottled Bessemer, 55 per cent iron, \$6.20; Mottled non-Bessemer, 51½ per cent iron, \$5.55.

Pig Iron.—Sales during the week were rather light and soft spots have appeared in prices on foundry iron, which is the only grade that is active. A number of sales of foundry iron, including a 500 ton lot to a sanitary interest, are reported at \$19 for No. 2, but some business has been booked at \$18.75 or lower for shipment to competitive points and in a few cases \$18.50 quotations have appeared. However, a lot of about 400 tons of iron running 1.15 to 1.60 in silicon brought \$18.50. A sale of 100 tons of low silicon malleable iron is reported at \$18.25. One selling agency booked 3300 tons during the week in lots of 200 tons and under. Consumers continue to follow the policy of buying in small lots. As an example, one foundry that is melting close to 1000 tons of iron per month has been for some time placing two 100-ton lot orders per week. Locally the demand has improved, several sales in lots of 200 tons and under being made during the week, all at the base price of \$20 for foundry iron. Among inquiries is one from a western Pennsylvania consumer for 500 tons of foundry iron on which \$18.50 is reported to have been quoted and one from an Ohio cast iron pipe foundry for an unspecified tonnage. The Allegheny Steel Co. has purchased 500 tons of additional resale basic iron which will be shipped from a nearby furnace. Southern iron has declined about 50c. to \$15.50. One Alabama producer is quoting No. 2 iron at a price equivalent to \$15.60 Birmingham. All producers report an improvement in shipping orders. Many foundries are busier and are taking more iron than they have been. One Cleveland foundry that specializes on automobile castings which has been melting little iron recently has released 500 tons for February shipment. M. A. Hanna & Co. will blow in their "B" furnace in Detroit this week to take the place of their "A" furnace, which had to be blown out about three weeks ago because of an accident.

Quotations below are for local furnace for Northern foundry iron, not including a 50c. switching charge. Other quotations are delivered Cleveland being based on a \$1.96 freight rate from Valley points; a \$2.36 rate from Jackson and a \$2.67 rate from Birmingham.

Basic	\$19.96
Northern No. 2 (4½ to 5.5% Si)	\$19.00 to 20.00
Southern No. 2 (4½ to 5.5% Si)	22.27
Ohio, direct, 4½ to 5.5% Si	22.86
Standard low pig, Valley furnace	32.00

Bolts, Nuts and Rivets. The interest of bolt and nut makers is centered on several thousand tons of large bolts required for the vehicular tunnel, New York, for which bids will be opened Feb. 15. Keen competition is expected to bring out some very low prices. Orders improved somewhat during the week, but buying is almost wholly in small lots. While lower prices are reported in other districts, Cleveland makers are inclined to hold to regular quotations. Rivet orders are still light. Orders that are being taken by local makers are at regular prices as they are not inclined to meet the concessions of \$1 to \$2 a ton that are being named by some rivet makers.

Finished Material.—Encouraging reports are coming from various metal working industries indicating an improvement in plant operations and these are reflected in some improvement in small orders for miscellaneous lots of steel. A leading Detroit automobile manufacturer during the week gave out specifications for con-

siderable tonnage for early shipment on existing contracts. An Ohio axle manufacturer is inquiring for 300 tons of bars. The demand for wire from manufacturers has improved and a fair volume of business is coming out in welded pipe and tin plate. The principal development in the price situation during the week is a little further easing off, permitting consumers to buy smaller lots of steel bars, plates and structural material at 1.40c. than they could a week ago. However, 1.50c. is still the recognized market price and small lot orders are being booked at that price. With the prevailing market weakness, consumers are buying only for immediate requirements and some are believed to be holding back small orders with the expectation of getting the 1.40c. price. Hoops are weak and the 1.90c. price on these is becoming more general. The demand for hot-rolled strip steel has improved, but the price is irregular. One strip mill has taken some business at 1.85c. Cold-rolled strip steel is still dull but firm. Little activity is developing in the building field. The Alliance Structural Co., Alliance, Ohio, has taken the bank building for the Elyria Saving & Trust Co., Elyria, Ohio, requiring 200 tons. The new plant of the Sandusky Cement Co., Cleveland, to be built at Sylvania, Ohio, will require 1500 tons of structural material. An inquiry is pending for 200 tons of reinforcing bars for a school building in Elyria. The Sinclair Oil Co. has placed additional oil tanks requiring 1500 to 2500 tons of plates. Reports have reached here that another lake boat has been placed with a Canadian shipyard. This is for a sand and gravel carrier of Welland Canal size.

Jobbers quote steel bars, 2.36c.; plates and structural shapes, 2.46c.; No. 9 galvanized wire, 3.25c.; No. 9 annealed wire, 2.50c.; No. 28 black sheets, 3.75c.; No. 28 galvanized sheets, 4.75c.; No. 16 blue annealed sheets, 3.10c.; hoops and bands, 2.96c.; cold-rolled rounds, 3.25c.; flats, squares and hexagons, 3.75c.

Sheets.—The demand continues slow. While regular prices appear to be holding well, there are reports that black sheets have been shaded \$5 a ton to 2.75c. by one or two mills and there is still irregularity in the heavier gages of blue annealed sheets on which quotations of 2.10c. or possibly lower are being made for No. 10 gage. Plate mills are quoting unannealed sheets on a 1.50c. plate base, or 1.80c. for No. 10.

Tool Steel.—High speed tool steel is very weak. While small orders are being taken at 80c. to 85c. per lb. for 18 per cent tungsten steel, it is understood that an inquiry for a 10-ton lot has brought out quotations around 65c. per lb.

Coke. The market is not as active as it has been, but there is still some demand for small lots of foundry coke. Prices are unchanged at \$4 to \$4.25 per ton for standard Connellsville foundry coke.

Old Material.—The market continues dull, but prices are holding fairly well. About the only activity during the week was between dealers who purchased some small lots of scrap to clean up on old orders, mostly with Youngstown mills. Some of the mills are buying small lots of scrap when offered at attractive prices. There seems to be some disposition among consumers to cut production costs by buying the cheapest grade of scrap that they can use in open-hearth furnaces. Recent buying by a Cleveland consumer has resulted in a little further stiffening of prices on blast furnace scrap, but lower than the quoted prices would have to be named for shipment from Cleveland to mills in Youngstown and other districts.

We quote per gross ton, f.o.b. Cleveland, as follows:

Heavy melting steel	\$12.00 to \$12.50
Steel rails, under 3 ft.	12.50 to 13.00
Steel rails, rerolling	14.00 to 14.50
Iron rails	12.00 to 12.50
Iron car axles	18.00 to 19.00
Low phosphorus melting	13.00 to 13.50
Cast borings	9.00 to 9.25
Machine shop turnings	9.00 to 9.25
Mixed borings and short turnings	9.00 to 9.25
Compressed steel	9.00 to 9.50
Railroad wrought	12.00 to 12.50
Railroad malleable	12.50 to 13.00
Light bundled sheet stampings	6.00 to 7.00
Steel axle turnings	9.50 to 10.00
No. 1 cast	15.00 to 16.00
No. 1 bushing	8.75 to 9.00
Drop forge flashings, over 10 in.	8.75 to 9.00
Drop forge flashings, under 10 in.	7.50 to 8.00
Railroad grate bars	12.75 to 13.00
Stove plate	13.00 to 13.25
Pipes and flues	8.50 to 9.00

Birmingham

BIRMINGHAM, Feb. 6.

Pig Iron.—In spite of the fact that some iron has been sold under \$16, the Birmingham base was nearer than that any other figure at the close of the first week in January and indications pointed to firming up. One maker reports the largest number of sales covering greater territory than in two months. Tonnage was not large, but indicated decidedly more active interest. It is understood that a Southern pipe maker secured Birmingham iron in a 500-ton lot at \$15.50. This was made in competitive territory, also handrunning with sales both in the South and outside at \$16. Pacific Coast business was at \$16. Departures from the \$16 base do not seem to have reflected abandonment of that base, but represented direct and keen competition in each instance. Trade seems to have learned to differentiate between Birmingham and Sheffield iron, the latter having a freight differential of 40c. to 80c. to competing points. Judging by reports from stove plants and other foundries, melt in the South is getting back toward the November capacity. One maker, who entered January with 2000 tons on books, shipped make and 1000 tons out of stocks. He entered February with 6000 tons on books for prompt delivery and will ship make and exhaust stocks. The tone of the market was altogether stronger at the end of the week than at the beginning. Several lots of 500 and 600 tons have been taken by Ohio and St. Louis melters, and Louisville melters took two 100-ton lots at \$16 base. Pipe plants are buying more iron than in some time with indications of increasing tendency.

We quote per gross ton f.o.b. Birmingham district furnaces as follows:

Foundry, silicon 1.75 to 2.25	\$15.50 to \$16.00
Basic	15.00
Charcoal, warm blast	32.00

Finishing Mills.—For the first time in many months the Tennessee company this week went to 77 per cent of ingot production, seven of the nine open-hearth furnaces operating following six the week before, five the week before that and four to five average the past year. Bessemer plate, guide and bar mills are on double turn. The rail mill went from 6000 to 8000 tons. The structural steel mill resumed. The car works and tie-plate plant continue going. Seven thousand tons of rails for Japan left Mobile a few days ago. The Gulf States Steel Co. is resuming at its blast furnace, but open hearths are down.

Cast Iron Pipe.—A ship out of Mobile carried 3500 tons of high pressure and sanitary pipe to California points, including San Diego, San Francisco, Menlo Park, Alhambra, Calexico and several other points, with more to follow. Sanitary pipe is opening up slowly. Dome makers are guaranteeing against price declines. The base is \$37. McWane Cast Iron Pipe Co. has begun making shipments of special handlengths of high pressure pipe and plans manufacture of pipe as small as one in. in diameter. Honolulu has taken a quantity. Birmingham makers expect to land the 3000-ton order for Schofield Barracks, Honolulu.

Coal and Coke.—Governor Kilby has offered to buy the properties of the Montevallo Mining Co., in bankruptcy, and operate them for the State with convicts. Convicts were used there by the company under lease. Coal operators do not like the plan and may contest the State's right to take this step. The matter is before the Federal court in bankruptcy. Coke is rather weak at \$5 to \$5.25.

Old Material.—Increasing operations at some steel plants give hope of some business there soon. Cast scrap is moving in fair quantities but dealers cannot get out of the district. The business is altogether unsatisfactory.

We quote per gross ton f.o.b. Birmingham district yards as follows:

Steel rails	\$11.00 to \$12.00
No. 1 steel	10.00 to 11.00
No. 1 cast	14.00 to 15.00
Car wheels	13.00 to 14.00
Tramcar wheels	12.00 to 13.00
No. 1 wrought	12.00 to 13.00
Stove plate	11.00 to 12.00
Cast iron borings	4.00 to 7.00
Machine shop turnings	6.00 to 7.00

Boston

BOSTON, Feb. 7.

Pig Iron.—The situation is uncertain in this territory. On the one hand, eastern Pennsylvania and Buffalo furnaces openly talk of stiffening prices, but definite information regarding going business is lacking. On the other hand, Northern iron is offered at \$18.25, furnace, and it is still possible to obtain eastern Pennsylvania at \$19.50 or less, depending on the tonnage involved. The only two sizable tonnage prospects, the Saco Lowell Shops, Boston, and the Gurney Heater Co., Framingham, Mass., have been covered. Sentiment among foundries is hopeful, but incoming business develops slowly and the gain in the daily New England melt is hardly perceptible. Comparatively few foundries are anticipating pig iron requirements. Purchases are mainly for the purpose of keeping enough stock on hand for mixture purposes, usually involving car lots. The pig iron market to-day is without its incentive. The trade can only guess what would happen if open bids on several round tonnages were asked at one time. Last week a Providence, R. I., melter inquired on a small tonnage of No. 2X iron. With the inquiry it was stated the buyer expected to do \$18, furnace. A Buffalo interest offered \$18.25, furnace. That price developed competition from eastern Pennsylvania iron interests. In addition to the above mentioned tonnages closed, the Malleable Iron Works, New Britain, Conn., has bought 200 tons No. 2X at private terms; a Massachusetts stove maker 500 tons No. 2X, Buffalo, at approximately \$23.50 delivered and another Massachusetts foundry 200 tons No. 1X, Buffalo, at \$19, furnace. Otherwise sales reported are confined to car lots at prices that suggest no stiffening in pig iron values, if silicon differentials are taken into consideration. Local Virginia furnace representatives say prospects of furnaces being blown in within the near future are bright.

We quote delivered at common New England points as follows, having added to furnace prices \$4.06 freight from eastern Pennsylvania, \$5.16 from Buffalo, \$6.58 from Virginia and \$10.66 from Alabama:

East. Penn., sil.	2.25 to 2.75	\$21.06 to \$24.56
East. Penn., sil.	1.75 to 2.25	23.56 to 24.06
Buffalo, sil.	2.25 to 2.75	23.71 to 24.96
Buffalo, sil.	1.75 to 2.25	23.71 to 24.46
Virginia, sil.	2.25 to 2.75	29.08 to 30.08
Virginia, sil.	1.75 to 2.25	28.58 to 29.58
Alabama, sil.	2.25 to 2.75	27.16 to 27.66
Alabama, sil.	1.75 to 2.25	26.66

Warehouse Business.—The movement of iron and steel out of warehouse stocks, in the aggregate, continues to improve, but slowly. Individual orders are for small amounts of stock, but more orders are coming in. The demand for sheets and structural steel is relatively better than that for bars, flats, etc. Jobbing prices on wire nails have been reduced from \$3.50 and \$3.75 to \$3.40 per keg base, while cut nails have been reduced 10c. per 100 lb. to \$4.15 per keg base. Wood screws are 2½ points lower on the print. The demand for bolts and nuts is expanding, but business is far from brisk.

Jobbers now quote: Soft steel bars, \$2.55½ per 100 lb. base; flats, \$3.06½; concrete bars, stock lengths, \$2.55½; structural angles and beams, \$2.65½; plates, \$2.65½ to \$2.83; tire steel, \$3.85 to \$4.25; open hearth spring steel, \$4.50; crucible spring steel, \$11.50; bands, \$3.15½ to \$3.53; hoop steel, \$3.15½; cold rolled steel, \$3.40 to \$3.90; toe calk steel, \$8; refined iron, \$2.55½ per 100 lb. base; best refined iron, \$4.25; Wayne iron, \$5.50; Norway iron, \$5.50; No. 10 blue annealed sheets, \$3.18 per 100 lb. base; No. 28 black sheets, \$4.50; No. 28 galvanized sheets, \$5.50.

Coke.—Both the New England Coal & Coke Co., Boston, and the Providence Gas Co., Providence, R. I., have reduced their price on by-product foundry coke 25c. a ton to \$10.15 delivered where the local freight rate does not exceed \$3.40. The movement of coke from ovens to foundry yards shows the first encouraging increase noted in months. The movement is not based on any material increase in foundry outputs but rather on a desire to insure a supply of fuel should the threatened strike at the mines develop.

Old Material.—The market is less active, but no weakening in prices is noted. If anything, prices on some materials are firmer. For instance, as high as \$9 was paid this week at shipping point for chemical borings, which represents an advance of about 25c. During the last few days, the upward tendency in bor-

ings prices has been checked by larger offerings by metal turning industries. Buying of machine shop turnings by Massachusetts nail and other interests has served to lift the market 75c. to \$1. The nail maker is paying \$6 delivered for turnings. Buying of blast furnace borings and turnings has strengthened quotations for the better offerings. Dealers are still paying \$5 for forged scrap. A New England horseshoe maker, running full, is paying \$15 delivered for railroad wrought, and buying every few days. Dealers' inquiries for horseshoes at \$13.50 shipping point discloses a scarcity of such scrap. The market on machinery cast, stove plate, malleable, heavy melting steel, yard wrought, car axles, shafting and wheels is virtually at a standstill. Dealers and consumers apparently are as far apart on price as ever, with no indication of either side giving in.

The following prices are on gross ton lots delivered consuming points:

No. 1 machinery cast	\$18.00 to \$18.50
No. 2 machinery cast	16.00 to 16.50
Stove plate	13.00
Railroad math. cast	13.00 to 13.50
The following prices are on gross ton lots f.o.b. Boston late shipping point:	
No. 1 heavy melting steel	\$8.00 to \$9.00
No. 1 railroad wrought	10.50 to 11.00
No. 1 yard wrought	9.50 to 10.00
Wrought pipe (12 in. 2 ft. long)	7.00 to 7.25
Machine shop turnings	4.00 to 4.50
Cast iron borings, roll	7.50 to 8.00
Cast iron borings, chn	8.50 to 9.00
Blast furnace borings	3.00 to 3.50
Forged scrap and band	1.50 to 5.00
Street car axles and chn	10.50 to 11.00
Car wheels	11.50 to 12.00
Rolling tools	10.00 to 10.50

St. Louis

ST. LOUIS, Feb. 7.

Pig Iron. An improvement is noted in the buying of pig iron, but this buying is still almost entirely confined to carload orders, which are for quick shipment. About the largest sale of the week was 150 tons, and the biggest inquiry pending is for 400 tons from a southern Indiana melter for first quarter delivery. One of the encouraging factors in the trade is the stove foundry situation. Buck's Stove & Range Co., one of the largest concerns in the district, resumed operations on Feb. 1. An adjustment of the labor situation is all that is keeping the Belleville, Ill., plants from resuming operations, and some of the Quincy, Ill., and Hannibal plants are operating. Southern iron has declined to \$15.50, Birmingham, while the market for Northern iron is at \$19, Chicago.

We quote delivered consumers' yards, St. Louis, as follows, having added to furnace prices \$2.88 freight and war tax from Chicago and \$5.91 from Birmingham:

Northern, br., sil.	1.75 to 2.25	\$21.80
Northern, sil.	1.75 to 2.25	21.80
Southern foundry, sil.	1.75 to 2.25	21.80

Finished Iron and Steel.—Business is quiet in the finished iron and steel trade. Pending adjustment of the labor situation here, the demand for structural material has fallen off until there is hardly anything being done. The contract for the Jewish Hospital at Memphis, Tenn., involving 300 tons of reinforcing bars, went to the James Alexander Construction Co., that city. The Vincennes Bridge Co. is getting prices for the 2000 tons of structural shapes for bridges at Muskogee and Gore, Okla., being undecided whether to buy the material already fabricated or to do the fabricating. The railroads centering in St. Louis have issued no inquiry for several weeks, and one line has issued instructions that no more buying be done until after March 1.

Stock out of warehouse we quote: Soft steel bars, per lb., iron bars, 2.62½; structural shapes, tank plates, 2.73½; No. 10 blue annealed sheets, No. 28 black sheets, cold rolled, one pass, 4.15c.; lawn rounds, shafting and screw stock, 3.65c.; structural, \$3.52½ per 100 lb.; boiler rivets, \$3.62½; tank 7 16 in. and smaller, 65 and 5 per cent off list; bolts, large, 60-10 per cent, small, 60, 10 and 10 per cent; large, 45-5 per cent, small, 60 and 10 in. lag screws, 65-15 per cent; hot pressed nuts, square iron blank, \$4; and tapped, \$3.75 off list.

Coke.—Foundries in the St. Louis district are buying more coke, but orders still are largely confined to carloads. Consumers are content to buy only as they

need the coke and order for immediate shipment. There is an improvement in the demand for domestic coke.

Old Material.—No buying by consumers and only a few transactions between dealers was the week's record in old material. The market remains weak and although no lowering of prices has been noted, the tendency is downward. Railroad offerings before the week follow: Chicago & Alton, 1200 tons Pennsylvania System (Southwestern Region), 5900 tons.

We quote dealers' prices for consumers' works, St. Louis industrial district and dealer's yards as follows:

Per Gross Ton

Old iron r.i.s.	\$11.00 to \$14.50
Steel rails, retorting	16.00 to 17.00
Steel rails less than 2 ft.	12.50 to 13.00
Relaying rails, standard section	23.00 to 28.00
Cast iron cut wheels	13.50 to 14.00
No. 1 heavy railroad machine steel	10.00 to 10.50
No. 1 heavy shoeing steel	9.50 to 10.00
Ordinary shoeing steel	9.50 to 10.00
Forge, switches and cutters, cut steel	10.00 to 10.50
Ordinary hand tools	4.00 to 4.50
Cast steel rollers	9.50 to 10.00

Per Net Ton

Heavy axle and car turnings	6.00 to 6.50
Iron angle bars	13.00 to 12.50
Steel angle bars	9.00 to 9.50
Iron cut axles	18.00 to 18.50
Steel cut axles	12.50 to 13.00
Wrought iron arch bars and trunnions	15.00 to 15.50
No. 1 railroad wrought	9.50 to 10.00
No. 2 railroad wrought	8.50 to 9.00
Railroad spring	10.00 to 10.50
Steel couplers and knuckles	10.00 to 10.50
Locomotive tire, 42 in. and over	
Smooth inside	8.00 to 8.50
No. 1 dealers' large	8.00 to 8.50
Cast iron boilers	5.50 to 6.00
No. 1 bushelling	8.00 to 9.00
No. 1 boilers cut in sheets and logs	6.00 to 6.50
No. 1 railroad cast	12.00 to 12.50
Stove plate and light cast	11.00 to 11.50
Railroad malleable	8.50 to 9.00
Agricultural malleable	9.00 to 9.50
Pipes and flues	7.50 to 8.00
Heavy railroad sheet and tank	5.50 to 6.00
Light railroad sheet	3.50 to 4.00
Railroad gate bar	9.50 to 10.00
Machine shop turnings	3.00 to 3.50
Country mixed iron	6.00 to 6.50
Uncut railroad mixed	7.00 to 7.50
Horse shoes	9.50 to 10.00
Railroad brake shoes	9.50 to 10.00

Buffalo

BUFFALO, Feb. 6.

Pig Iron.—Prices have weakened and the market is quiet. A base price of \$18.50 is quoted by one furnace and \$19 is quoted on any tonnage by several others, but no big business has developed out of these concessions. Sales for the week did not exceed 7000 tons and were principally carload lots. Inquiry for delivery later than second quarter has not appeared up to date and the only request for prices on iron for late in the year is in connection with the vehicular tunnel project, but no Buffalo furnace has deviated from the policy not to try for this business under present conditions. A furnace which has contracts of long standing finds encouragement in shipping instructions just received which call for the shipment of 1000 tons per month until further notice.

We quote f.o.b. per gross ton Buffalo as follows:

No. 1 foundry, 2.75 to 3.25 sil	\$19.50 to \$20.00
No. 2X foundry, 2.25 to 2.75 sil	19.00 to 19.50
No. 2 plain, 1.75 to 2.25 sil	18.50 to 19.00
Basic	18.00 to 18.25
Malleable	19.50
Lake Superior charcoal	31.75

Finished Iron and Steel.—Except for a lively demand for certain wire products such as cloth and netting, the market is apathetic. Orders are small and little of any unusual interest is apparent. Sheet prices are firmer than any other and on a 200-ton inquiry for black sheets sent out by a Buffalo buyer, every mill quoted 3c. The largest bar inquiry now engaging mills and agencies is one for 500 tons and prices as low as \$1.42½ have been quoted. Structural business is unusually dull. The local Erie Railroad car shops have been taken over by a corporation formed for that purpose and known as the Seminole Construction Co. William H. Fitzpatrick, Jr., is the president. Sellers are informed that agitation for more favorable freight rates has something to do with the lack of interest in products.

Old Material.—Brokers are interested in obtaining prices on 25,000 tons of turnings and borings and a

few dealers who are in touch with various changes in these products are quoting \$12 on borings and \$11 on turnings, delivered Pittsburgh. Production is extremely light and it is not likely the order could be placed here in full if the prices are found favorable. The steel situation is unchanged and prices have not been advanced.

We quote dealers' asking prices per gross ton f.o.b. Buffalo as follows:

Heavy melting steel	\$13.00 to \$14.00
Low phosph., 0.04 and under	17.00 to 18.00
No. 1 railroad wrought	15.00 to 16.00
Car wheels	16.50 to 17.50
Machine shop turnings	7.50 to 8.00
Cast iron borings	7.00 to 8.00
Heavy axle turnings	10.50 to 11.50
Grate bars	12.00 to 13.00
No. 1 bushelling	10.00 to 11.00
Stove plate	15.00 to 16.00
Bundled sheet stampings	8.00 to 9.00
No. 1 machinery cast	17.00 to 18.00
Hydraulic compressed	10.50 to 11.50
Railroad malleable	13.00 to 14.00

Warehouse Business.—An increase in the number of orders but for slightly less quantities is noted, but generally warehouse business is dull.

We quote warehouse prices f.o.b. Buffalo as follows: Structural shapes, 2.65c.; plates, 2.65c.; plates, No. 8 gage, 3.3c.; soft steel bars and shapes, 2.55c.; hoops and bands, 3.1c.; blue annealed sheets, No. 10, 3.40c.; galvanized steel sheets, No. 28, 5.25c.; black sheets, No. 28, 4.25c.; cold-rolled strip steel, 5.90c.; cold-rolled round shafting, 3.40c.

Cincinnati

CINCINNATI, Feb. 7.

Pig Iron.—The Cincinnati market was rather quiet during the week, but indications point to a more active period just ahead. In the district proper, few sales of any consequence were reported, and even carload business fell off somewhat. The more important sales were one of 300 tons of Southern to an Indiana melter at \$15.50 base, Birmingham; one of 200 tons of Southern to a Kentucky melter at the same figure; another of 250 tons of lake iron to a Dayton melter at a price reported to be \$18, furnace base, and 250 tons of Jackson County silvery at the full schedule. Outside the district, a sale of 1,000 tons of Chicago iron was made to a Michigan melter at around \$18.75 furnace. Inquiries current include one for 500 tons from a central Ohio manufacturer; one from an Indiana sanitary manufacturer for 500 tons; one from a western Indiana melter for 400 tons, equal parts of Northern and Southern, and a 350-ton inquiry for high silicon iron from Indianapolis. A Michigan melter is also inquiring for 500 tons of malleable and an Indiana manufacturer is expected to enter the market shortly for a round tonnage of basic. Prices show little change, but weakness in some markets is more apparent. At least two Southern furnaces are now quoting \$15.50, base and it is reported that lake furnaces have shaded \$18. Chicago iron is regularly quoted at \$18.75 to \$19. Southern Ohio furnaces are adhering firmly to \$19.50 to \$20 and sales have been made at both figures. On Bessemer iron it is said that \$19, Ironton basis has been done. Settlement of the molders' strike in Cincinnati and some adjacent cities is looked upon as an encouraging sign and it is expected that a slow but steady increase in the melt will be seen from now on.

Based on freight rates of \$4.50 from Birmingham and \$2.52 from Ironton, we quote f.o.b. Cincinnati:

Southern coke, sil. 1.75 to 2.25 (base)	\$20.00 to \$20.50
Southern coke, sil. 2.25 to 2.75 (No. 2 soft)	20.50 to 21.00
Ohio silvery, 8 per cent sil.	32.03
Southern Ohio coke, sil. 1.75 to 2.25 (No. 2)	22.02 to 22.52
Basic, Northern	21.03
Malleable	22.02 to 22.52

Finished Material.—The past week was rather quiet in the finished material market, the largest order reported being for 300 tons of structural material for stock purposes. A tentative inquiry for several hundred tons of sheets is before the trade and will probably be placed if the buyer can develop a price of 3.75c. on galvanized sheets. It is reported that this price can now be done from some of the small mills on orders of 100 tons or over, as a local buyer claims to have placed

Philadelphia

PHILADELPHIA, Feb. 7.

an order for 500 tons of galvanized sheets at this figure. The larger companies, however, are strictly maintaining the 3c. and 4c. base and report during the week a slight improvement in the number of orders placed. There is no indication of buyers contracting ahead, as most of the orders placed are for one and two carloads for immediate shipment. The same condition also applies to bars, shapes and plates. Reinforcing bars, however, are in more demand, as some projects involving 100 tons and over, are before the trade. On wire products, there is a fair demand for wire fence and wire nails, but prices are inclined to weakness, reports having been heard of a \$2.40 base on nails during the week. Low prices are hard to confirm, but some sellers, who are quoting the regular prices which have been in effect for some time are losing orders and the supposition is that smaller mills are taking the business at lower figures. Prices on bars, shapes and plates are about the same as last week, 1.45c. being the regular price on small tonnages with 1.40c. for larger tonnages. In the structural field, there is very little activity, and no new projects have come up. The only award made during the week was a high school building for Columbus, Ohio, to a Detroit general contractor. This project will involve 200 tons of structural steel. The Federal Reserve Bank building at Nashville, Tenn., which will take a substantial tonnage, is held up for the time being. A number of projects involving considerable tonnages of reinforcing bars are up, including an office building for the Edwards Mfg. Co., Cincinnati, a Masonic hall at Dayton, Ky., and addition to the auditorium of the National Cash Register Co. Dayton, Ohio. The Business Men's Club building at Cincinnati is also up for bids. This involves 150 tons of structural steel and about 800 tons of reinforcing bars. Plans have also been approved for a viaduct at Cincinnati to cost \$1,500,000. This work will probably come up later for bids. Chicago and New York capitalists are reported to have purchased property in Columbus, Ohio, and will erect two apartment buildings costing \$1,000,000 each. The Jersey Cereal Food Co., Cereal, Pa., is planning the erection of a new plant somewhere in the Middle West and it is expected that Columbus, Ohio, will be favorably considered.

Warehouse Business.—Warehouse business is unusually quiet, orders during the week being few. Local warehouses are suffering somewhat from mill competition, as no order apparently is too small for a mill to place on its books. Some activity is reported by wire and nail jobbers. Prices are unchanged.

Iron and steel bars, 2.75c. base; hoops and bands, 3.35c. base; shapes and plates, 2.85c. base; reinforcing bars, 2.82½c. base; cold rolled rounds, 1½ in. and larger, 3.50c. base; under 1½ in. and flats, squares and hexagons, 4c.; No. 10 blue annealed sheets, 3.60c.; No. 28 black sheets, 4.25c.; No. 28 galvanized sheets, 5.25c.; wire nails, \$3.00 per keg base; No. 9 annealed wire, \$2.85 per 100 lb.

Coke.—There is more activity in the coke market, but whether this movement has any connection with the threatened coal strike or increasing foundry operations is hard to determine. At any rate, inquiries are more plentiful, and prices have a tendency to stiffen. Some producers of domestic coke have raised their prices 15c. a ton, the quotation now being \$2.90, Connelville. Other prices are unchanged.

Old Material.—There is absolutely nothing being done in the scrap market in this district, according to dealers. Consumers are apparently going to liquidate present stocks before replenishing, and dealers are expecting an advancing market when buying is resumed.

We quote dealers' buying prices, f.o.b. cars:

Per Gross Ton	
Bundled sheets	\$3.50 to 4.00
Iron rails	12.00 to 12.50
Relaying rails, 50 lb. and up	25.00 to 26.00
Rerolling steel rails	10.50 to 11.00
Heavy melting steel	9.00 to 9.50
Steel rails for melting	9.00 to 9.50
Car wheels	12.00 to 13.00
Per Net Ton	
No. 1 railroad wrought	8.50 to 9.50
Cast borings	3.00 to 3.50
Steel turnings	2.00 to 2.50
Railroad cast	12.00 to 12.50
No. 1 machinery	13.50 to 14.50
Burnt scrap	7.50 to 8.00
Iron scales	15.50 to 16.50
Locomotive tires (smooth inside)	9.50 to 10.00

What change there is in the steel trade in this section is for the better. One manufacturer of plates reports that business in January was the largest in any month since November, 1920. Thus far in February, the January record has been maintained. Another plate maker has five furnaces active. These furnaces were idle in December; ingot output is about 35 per cent of capacity. An eastern Pennsylvania tin plate producer notes a decided improvement in specifications against contracts. The local office of a large Pittsburgh producer reports tin plate mills beginning to-day operating at 90 per cent capacity; 75 per cent of the wire mills employed and all the furnaces in the pipe department active, but bars, shapes and structural mills still limping along at 50 to 40 per cent of capacity.

Pig Iron.—Sales of 10,000 to 12,000 tons of foundry iron have come to the surface. To-day the Thatcher company closed for 2500 tons. The Richardson & Boynton Co. has distributed orders for 5000 tons among four furnaces; two in eastern and two in central Pennsylvania. The prices obtained were \$20 to \$20.50 for No. 2X and \$19.50 to \$20 for No. 2 plain. The Central foundry bought about 1000 tons from two eastern Pennsylvania furnaces and is believed to have bought an additional 1000 from other producers. Another foundry has closed for about 1000 tons. Central Pennsylvania furnaces also received a share of the contract placed by the Saco Lowell shops. The remainder of the business went to Buffalo furnaces. There is a difference of opinion in regard to prices obtained on this latter tonnage, but it is understood to have been on the basis of \$18.50 Buffalo for No. 2 plain, although it is claimed that this price was shaded for some Massachusetts orders. A number of small orders for prompt shipment were taken by other eastern Pennsylvania furnaces, ranging from 100 to 500 tons each. Deliveries on the larger tonnages are to begin in February and extend over the second quarter of the year. In one case, delivery will extend into the third quarter. One sale of special gray forge iron amounting to 500 tons was made at \$19 furnace. The A. P. Smith Co. is now in the market for 800 tons of foundry grades and other small inquiries bring the total pending to between 3000 and 4000 tons. A cast iron pipe manufacturer may possibly be in the market to cover a recent contract for 5000 tons of gas pipe, but this interest made some large pig iron purchases early in December. The Westinghouse Electric & Mfg. Co. has an inquiry out for about 1000 tons including 700 tons of foundry grades and 300 tons of malleable and high silicon; the latter only 50 tons. A sale of Virginia iron—high silicon—has been made at \$23.50 furnace, to be shipped from stock. This is equivalent to about \$20.50 for 1.75 to 2.25 silicon. Steel-making iron is dull. Most of the users of basic iron have covered their requirements and there is no inquiry in the market now for an appreciable tonnage. One sale of 600 tons of copper-bearing low phosphorus has been made at \$28 furnace; standard, copper free metal is neglected. The Eastern Steel Co. is seriously considering blowing out the Warwick furnace and the Colonial furnace will probably be idle on March 1 unless there is a decided change for the better in prices.

The Swede furnace No. 3 has been blown in preparatory to blowing out No. 2 speedily.

The following quotations are, with the exception of those on low phosphorus iron for delivery at Philadelphia, and include freight rates varying from 84 cents to \$1.54 per gross ton:

East. Pa. No. 2 plain, 1.75 to 2.25 sil	\$20.84 to \$21.26
East. Pa. No. 2X, 2.25 to 2.75 sil	21.34 to 21.76
Virginia No. 2 plain, 1.75 to 2.25 sil	27.24 to 27.74
Virginia No. 2X, 2.25 to 2.75 sil	27.74 to 28.24
Basic delivery eastern Pa.	19.84
Gray forge	20.50 to 21.50
Malleable	23.00 to 24.00
Standard low phos. (f.o.b. furnace)	30.00
Copper bearing low phos. (f.o.b. furnace)	28.00

Billets.—Demand from home consumers is light. Rerolling are still available at \$28 to \$29 and forging billets at \$32 to \$33, f. o. b. Pittsburgh. Some few sales have been made by Eastern mills on this basis.

billets and sheet bars upon which domestic prices have been cut several dollars a ton.

Ferroalloys.—No improvement is noted in the demand, but several small sales have been made on a basis of \$58.35 seaboard. Spiegeleisen is quiet, but firm. Output is inconsiderable and stocks on furnace banks have been reduced. It is estimated that not more than 500 tons are available in the district, and this is nearly all low grade. Eighteen to 20 per cent alloy is quotable at \$25 to \$27 furnace.

Plates.—Manufacturers are more hopeful. Output is better. Specifications against contracts are larger. One manufacturer reports business taken in January as the largest since November, 1920. Orders taken from manufacturers of storage tanks and steel barrels are more encouraging. Several orders have also been received from shipbuilders for repair work, mainly for marine boilers. The outlook from a price standpoint leaves much to be desired by sellers, while one maker is or possibly two are obtaining 1.50c. base, Pittsburgh, for small lots, others are making sales at 1.10c. to 1.15c. base. This includes Pittsburgh as well as eastern Pennsylvania mills. The postponement of the interstate vehicular tunnel contract until Feb. 15 makes no change in the general situation. One order for 200 tons of plate for car repair work has been taken by a local mill at close to 1.40c. base. We quote plates 1.40c. to 1.50c. Pittsburgh.

Structural Material.—Bookings of orders for structural shapes have been at the expense of prices, although some mills are holding out strenuously for 1.50c. base. Some orders for plain material have been taken for 1.40c. to 1.45c., Pittsburgh. Fabricators have been the principal buyers. Among the prospective contracts in this territory are 2000 tons for the Curtis Publishing Co. building, 1500 tons for the Public Library and 1500 to 2000 tons for the Benjamin Franklin Hotel to be erected on the site of the Continental Hotel. Bethlehem fabricators recently secured an order for 500 tons of shapes for the Wesley Hotel, but this project now seems to be held in abeyance.

Rails.—The Southern Railway has ordered 8500 tons of 100-lb. rails for the Tennessee company but has postponed until spring the purchase of 26,000 of 85-lb. sections. The Western Maryland inquiry for 4000 tons is held in abeyance. The Baltimore & Ohio is still negotiating for 17,000 tons. The C. & O. inquiry for 26,000 tons includes 4000 tons for the Hocking Valley.

Bars.—A few more inquiries are in the market and some few additional sales have been made at 1.40c., base, Pittsburgh. Among the new inquiries in the market are 1500 tons of concrete bars for the Detroit reservoir. Inquiries are still pending on about 4000 tons. Bar iron makers quote 1.40c. to 1.45c. base, Pittsburgh.

Rivets.—An order for 500 tons of special quality rivets is understood to have been placed to-day by the Merchant Shipbuilding Co., Chester, at close to 2c. per lb. These are to be utilized in the manufacture of steel pipe for the New York aqueduct.

Warehouse Business.—Some slight improvement is reported in the placing of orders for black and galvanized sheets and for structural shapes. Prices are without essential change and are as follows for Philadelphia, delivered:

Soft steel bars and small shapes, 2.50c.; iron bars (except bands), 2.50c.; round edge iron, 2.80c.; round edge steel, iron finish, 1½ x ½ in., 2.95c.; round edge steel, planished, 3.70c.; tank steel plates, ¼-in. and heavier, 2.75c.; tank steel plates, 3/16-in. 2.92c.; blue annealed steel sheets, No. 10 gage, 3.50c.; light black sheets, No. 28 gage, 4c.; galvanized sheets, No. 28 gage, 5c.; square twisted and reformed steel bars, 2.65c.; structural shapes, 2.60c.; diamond pattern plates, ¼-in., 4.60c.; 3/16-in., 4.785c.; ½-in., 4.90c.; spring steel, 4.10c.; round cold-rolled steel, 3.25c.; squares and hexagons, cold-rolled steel, 3.75c.; steel hoops, No. 13 gage and lighter, 3.25c.; steel bands, No. 12 gage to 1/16-in., inclusive, 3.10c.; iron bands, 3.90c.; rails, 2.75c.; coil steel, 8c.; Norway iron, 5c.; too steel, 1.50c.

Coke.—Buying of furnace coke is confined within narrow limits, but the market remains firm at \$3.25, Connellsville. Foundry coke ranges from \$3.75 to \$4.50 at ovens according to quality, but the bulk of the sales are at \$4 to \$4.50, ovens.

Old Material.—Steel mills have bought additional lots of heavy steel melting scrap ranging from 1000 to 2000 tons each. Purchases previously made are a little

weeks have been about 15,000 tons. Midvale is still buying at \$12.50 delivered, Nicetown, and \$11.50 delivered, Coatesville. The Bethlehem Steel Co. has bought at \$12 to \$12.50. Pencoyd has been buying at \$12. Alan Wood is bidding \$12 and the Worth Steel Co. is paying \$12, delivered. Cast iron car wheels are quotable at \$15 to \$16. Steel car axles are nominal at \$17.50 to \$18.50. One Eastern mill is reported to be buying railroad steel at \$11.75. There is still considerable interest in the offering of 105,000 tons at the Hog Island shipyard by the Shipping Board. Bids will be received until noon, Feb. 15. We quote various grades of old material for delivery at consumers' works in this district as follows:

No. 1 heavy melting steel.....	\$12.00 to \$12.50
Scrap rail.....	12.00 to 12.50
Steel rails, re-rolling.....	15.00 to 15.50
No. 1 low phos. heavy, 0.01 and under.....	18.00 to 19.00
Cast iron car wheels.....	15.00 to 15.50
No. 1 railroad wrought.....	14.50 to 15.00
No. 1 yard wrought.....	12.00 to 12.50
No. 1 forge fire.....	10.00 to 10.50
Bundled sheets (for steel works).....	9.50 to 10.00
No. 1 bushing.....	11.00 to 12.00
No. 2 bushing.....	9.00 to 10.00
Turnings (short shoveling grade for blast furnace use).....	9.25 to 10.25
Mixed borings and turnings (for blast furnace use).....	9.25 to 10.25
Machine-shop turnings (for rolling mill and steel work use).....	9.00 to 9.50
Heavy axle turnings (or equivalent).....	9.50 to 10.00
Cast borings (for steel works and rolling mills).....	12.00 to 12.50
Cast borings (for chemical plants).....	13.50 to 14.00
No. 1 cast.....	16.50 to 17.00
Railroad grate bars.....	14.00 to 14.50
Stove plate (for steel plant use).....	14.00 to 14.50
Railroad malleable.....	12.50 to 13.50
Wrought iron and soft steel pipes and tubes (in w specifications).....	12.00 to 12.50
Iron car axles.....	No market
Steel car axles.....	17.00 to 18.50

GERMANY NOT A COMPETITOR

German Prices as High or Higher Than American
— Japan Buys Wire, Nails and Sheets

NEW YORK, Feb. 7.—A slight improvement in the export situation seems evident, although business is still largely confined to Far Eastern buying and inquiring. Part, at least, of the present improved condition in export selling is probably caused by the better situation of American sellers on price. German competition in Far Eastern markets, which a few months ago threatened to become extremely serious, has gradually receded as Continental prices increased and exchange magnified the difference. To-day, German sellers, in the great majority of cases, are forced to quote f.o.b. Hamburg a price equivalent to, or higher than, the American quotations f.o.b. Pittsburgh. This is true of steel bars, structural material and plates, and on blue annealed sheets, wire nails and heavy gages of plain wire the German price is distinctly higher. A New York exporter who in November filled orders from customers in Japan for blue annealed sheets, placing them in Germany at an average price of \$40 per ton, found the price up to \$57 per ton in December and \$60 per ton and higher now, which brings the German quotation above the prevailing American price. German wire nails, which last summer and early in the fall of 1921 were considerably lower in price than the American product, are now from 25c. to 35c. per keg higher as a rule and difficult to obtain on early delivery.

The recent report, published in some papers, of a 15,000-ton rail order being placed by a Southern railroad with the Hugo Stinnes interests and later canceled is without substantial foundation.

Bids have been opened in Japan on the inquiry of the South Manchuria Railway Co. for between 6000 and 7000 tons of heavy rails. Quotations of American mills are reported to have been \$47 per ton, c.i.f. Dairen, in one instance, and about \$46.25 per ton in another. Several other fair-sized contracts for various kinds of material for Japan are still pending. For example, the Imperial Government Railways of Japan are in the market for 10,000 tons of 60-lb. rails.

America lost 12,000 tons of rails for Brazil to Belgium. American plate makers fear that they cannot get an attractive plate order from India largely because of the high ocean freights. At the present time it is found difficult to compete with Europe on the

British Iron and Steel Market

Pig Iron Quieter—Steel Business Slack—Coke a Trifle Higher—Pig Iron and Tin Plate Lower—Exchange Much Firmer
(By Cable)

LONDON, ENGLAND, Feb. 7.

As consumers are apparently satisfied with respect to their urgent demands, the pig iron market is quieter. Scotland is still receiving iron of Continental make under old contracts. Germany is taking fair quantities of Cleveland pig iron.

Hematite is weak. Mixed numbers are being sold at £4 10s. (\$19.53). The home trade is generally inactive, but export demand is improving.

Bilbao Rubio is now sold at 25½s. (\$5.53) ex-ship Tees. Scotland has purchased some French ore at 20s. (\$4.34) ex-ship Tees.

Scotch Durham coke is firmer, on Continental demand.

English steel makers are resuming operations, fixing minimum home quotations on ship plates at £10 10s. (2.03c. per lb.); on sections at £10 (1.94c. per lb.) basis, delivered. Business generally is slack. Wages of North-eastern Coast workers have been reduced 33½ per cent; of Midlands workers, 20 per cent.

Clyde shipbuilding for January consisted of eight vessels launched, amounting to 52,062 gross tons register.

Belgian merchants have sold merchant bars at £8 9s. (1.64c. per lb.); rods at £9 17½s. (1.91c. per lb.); both c.i.f., India. French merchant bars are sold at £8 5s. to £8 10s. (1.60 to 1.65c. per lb.) f.o.b., for April and May delivery. Belgian structural steel is held at £7 7½s. to £7 10s. (1.43 to 1.45c. per lb.) f.o.b. Luxembourg beams are quoted at £7 10s. to £7 15s. (1.45 to

1.50c. per lb.) f.o.b., for April and May shipment. Belgian wire rods are held at £8 15s. to £9 (\$37.98 to \$39.06) f.o.b., for April and May delivery.

German plates are priced at £8 5s. (1.60c. per lb.) f.o.b. for April and May shipment. German merchants are quoting wire rods (country of origin not specified) at £8 17½s. (\$38.52) f.o.b.

Continental foundry pig iron is priced at £5 (\$21.70) per ton.

Tin plate is easier on acceptance by the works of low bids offered by merchants covering orders. March delivery has sold at 18¾s. (\$4.07) f.o.b. A substantial oil order has been placed at a cheap price. Wasters are easier, sellers of 20 x 11-in. asking 18½s. (\$4.01) f.o.b.

Merchants have sold, to Indian specifications, black sheets at £12 10s. to £13 15s. (2.42 to 2.66c. per lb.) c.i.f. Japanese specifications have been done at £16 (3.10c. per lb.) f.o.b.

We quote per gross ton, except where otherwise stated, f.o.b. maker's works, with American equivalent figured at \$4.31 per £1 as follows.

Durham coke delivered	4 10s. to 4 11s.	\$5.61 to \$5.86
Cleveland No. 1 foundry	1 10s.	20.62
Cleveland No. 3 foundry	1 10s.	19.53
Cleveland No. 1 foundry	1 10s.	18.99
Cleveland No. 1 forge	1 10s.	19.53
Cleveland basic	1 10s.	19.53
Hematite	1 10s.	30.78
East Coast mixed	1 10s.	19.53 to 20.07
Petromangnese	15 0s. to 14 10s.	6.10 to 6.22
Rods, 60 lb. and up	8 0s. to 8 10s.	31.26 to 31.28
Billets	8 0s. to 8 10s.	29.58 to 32.55
Sheet and tin plate bars		
Welsh	11 10s. to 12 10s.	31.17 to 32.01
Tin plates base box	6 10s. to 6 10s.	10.7 to 4.18
		C. per lb.
Ship plate	9 0s. to 10 10s.	1.71 to 2.03
Boiler plates	12 10s. to 14 0s.	2.32 to 2.71
Tees	9 10s. to 11 0s.	1.84 to 2.13
Channels	8 10s. to 10 0s.	1.70 to 1.99
Beams	8 10s. to 10 0s.	1.60 to 1.94
Round bars 4 to 6 in.	10 10s.	.63
Galvanized sheets 24 in.	15 12½s. to 16 0s.	1.03 to 1.16
Black sheets	12 10s. to 13 0s.	2.17 to 2.52
Steel hoops	17 0s. to 17 5s.	4.43 to 2.97
Cold rolled steel strip 20 in.	21 0s.	1.70

*Export price

Continental Pig Iron Eliminated—Steel Prices Now Competing with Continent—Low Output of Ships

LONDON, ENGLAND, Jan. 25.—Conditions continue to improve, though the recovery is only gradual. The reducing of Cleveland pig iron to a basis price of 90s. has considerably augmented the demand, and consumers, finding that hopes of any further concessions are improbable for some time, have once more started to buy. The result has been that makers have been enabled to get more furnaces going, thus helping to relieve the unemployment and also to reduce standing charges. Scotland, an important consumer of Cleveland pig iron, is able to buy fairly well now, as the steamer freight rates have been reduced, while export markets are showing a good deal more interest and of late sales have been made to Scandinavia and also to Germany. Continental pig iron is quite out of the running, not only on account of the uncertainty of shipments, but British pig iron is considerably cheaper than continental, few makers of the latter offering foundry iron at less than 100s. f.o.b.

The recovery in the hematite iron trade is not so rapid as in the foundry. There is a certain demand which has enabled makers to relight additional furnaces but the business moving is not sufficient to stabilize values. Makers are very keen for orders that are about and are ready to grant concessions, with the result that East Coast mixed numbers are now freely obtainable at 95s.

In finished iron and steel, inquiry increases, mostly for export, and a fair amount of business is being done but works in general are only partly employed. Makers, however, are somewhat stiffer in their price attitude, maintaining that to sell at anything below the official minimum quotations is a loss, and therefore they are not keen to cut values further. One of the main hindrances to the developments of the home trade

are, of course, the large costs still involved in transport and in the general manufacturing costs to the consumers in working up material to the finished article.

It is encouraging to see that the volume of business going to continental works is decreasing as British prices more nearly approach those of the continent, or rather as the continental prices go up. There seems to be no relief in respect of shipments from that side, which are greatly in arrears, due, it is stated, almost entirely to the acute shortage of fuel.

Shipbuilding is still in a bad way as will be seen by the following notes from Lloyds Register. The merchant tonnage in construction in the United Kingdom for the quarter ended Dec. 31 was 2,640,319 tons while the total gross tonnage launched during the year was 1,538,052 tons, representing a reduction of over 500,000 tons compared with 1920, which was a record year, and over 300,000 tons less than the tonnage launched in 1913. The world's total shipbuilding output for 1921 is given as 4,341,679 tons, being a decrease of about 1,500,000 tons over 1920. The largest vessel launched in this country was the "Laconia" for the Cunard Line, of 19,730 tons. The Clyde production for the last year declined by over 175,000 tons while the Wear output was over 170,000 tons less than in 1920. The following figures represent the shipbuilding output for 1921 of the various countries as stated: United Kingdom, 1,538,052 tons; United States, 1,006,413 tons; Germany, 509,064 tons; Holland, 232,402 tons; Japan, 227,425 tons; France, 210,633 tons, and Italy, 164,748 tons.

The Eric Foundry Co., Eric, Pa., recently shipped one of its new improved type sheet galvanizing plants to the Empire Rolling Mill Co., Cleveland. Two of these galvanizing units have been ordered by the Otis Steel Co., Cleveland, for installation at its Riverside Works, and will be shipped shortly.

NON-FERROUS METALS

The Week's Prices

Cents Per Pound for Early Delivery

	Copper, New York			Straits		Tin		Lead		Zinc	
Feb.	Lake	Electro-lytic*	New York	New York	St. Louis	New York	St. Louis	New York	St. Louis		
1.....	13.62½	13.37½	31.75	1.70	4.40	4.85	4.50				
2.....	13.50	13.25	31.75	1.70	4.40	4.85	4.50				
3.....	13.50	13.25	31.50	4.70	4.40	4.85	4.50				
4.....	13.50	13.25		4.70	4.40	4.85	4.50				
6.....	13.50	13.25	31.62½	4.70	4.40	4.85	4.50				
7.....	13.50	13.25	32.00	1.70	4.40	4.85	4.50				

*Rebulet quotations

New York

NEW YORK, Feb. 7.

Conditions in all the markets are changed but slightly. Demand for copper and zinc continues very light with prices lower for copper. The lead market is the strongest of all and there has been some moderate activity in tin, prices in both markets being steady.

Copper.—One of those periods of seasonable dullness, which frequently characterize the copper market, has prevailed for some weeks and there is very little demand either from domestic or foreign consumers. Electrolytic copper is available from some of the large producers at 13.75c., delivered, as contrasted with 13.87½c. and 14c. a week ago and from small producers it can be bought at 13.50c., delivered, or 13.25c., refinery, which is the prevailing level at which business is being done. From a few dealers and speculators small lots are reported obtainable as low as 13.37½c., delivered, but such cases are few. The principal cause of the light demand is the heavy buying in the last quarter of last year and also an expectation on the part of some consumers that the starting up of the copper mines will increase supplies of refined copper. Lake copper, in sympathy with electrolytic, is slightly lower.

Tin.—In the past week, Feb. 3 and 4 were the most active days, but as a whole the market has been quiet. Previous to those days there were sellers who held firmly at quotations which were sufficiently higher than buyers' prices at all times so that a deadlock resulted and the market was stagnant. On one of the two days referred to, or Feb. 3, dealers were the principal buyers and about 200 tons of forward tin was sold, mostly at 30.75c. to 30.87½c. On Feb. 4 a large independent tin plate maker inquired for liberal amounts with the result that some orders for future delivery were placed at 31c. to 31.12½c. Yesterday and to-day have been very quiet with the quotation for spot Straits to-day at 32c., New York. The London market for spot standard tin to-day was £155 15s., future standard at £157 15s., and spot Straits £158 5s., all about £3 to £4 per ton less than a week ago. Deliveries into consumption in January are reported to have been 4275 tons, with metal in stocks and landing on Jan. 31 at 1331 tons. Imports for the month were 3910 tons, against 1245 tons in January, 1921. Arrivals thus far this month have been 645 tons, with 8460 tons reported afloat.

Lead.—Prices are unchanged and demand continues steady. The leading interest continues to quote 4.70c., New York and St. Louis, while from the independents the metal can be bought at no less than 4.40c., St. Louis, or 4.70c. to 4.75c., New York and Eastern points.

Zinc.—After declining almost daily for several weeks the market for prime Western zinc may be characterized as firmer, in that quotations have remained steady for a week at 4.50c., St. Louis, or 4.85c., New York, which is the quotation for early delivery. There is some disposition to quote futures on the same basis, but this is not general. Demand does not improve and is only of the hand-to-mouth order.

Antimony.—Wholesale lots for early delivery are unchanged in a quiet market at 4.40c. per lb., New York, duty paid.

Aluminum.—The leading interest continues to quote virgin metal, 98 to 99 per cent pure, in wholesale lots for early delivery at 19c. to 19.10c. per lb., f.o.b. plant, depending on the quantity. The same grade through importers is obtainable at 17c. to 18c., New York, duty paid.

Old Metals.—The market is very depressed with values slightly lower. Dealers' selling prices are as follows:

	Cents Per Lb.
Copper, heavy and crucible.....	13.00
Copper, heavy and wire.....	12.00
Copper, light and bottoms.....	9.25
Heavy machine composition.....	10.00
Brass, heavy.....	7.75
Brass, light.....	5.75
No. 1 red brass or composition turnings.....	8.00
No. 1 yellow rod brass turnings.....	6.00
Lead, heavy.....	4.25
Lead, tin.....	3.25
Zinc.....	3.00

Chicago

FEB. 7.—Tin is stronger and while a little business has been closed in this metal, the situation is still far from satisfactory. Inquiry for copper has improved slightly but, on the whole, this metal is weaker and declines are looked for. Lead, zinc and antimony are quiet. In the old metals copper wire, crucible shapes and clips have declined while yellow brass has advanced. We quote in carload lots: Lake copper, 13.50c.; tin, 33c. to 33.50c.; lead, 4.50c.; spelter, 4.60c.; antimony, 6.50c., in less than carload lots. On old metals we quote: Copper wire, crucible shapes and copper clips, 9.50c.; copper bottoms, 7.50c.; red brass, 7.50c.; yellow brass, 6c.; lead pipe, 3.25c.; zinc, 2c.; pewter, No. 1, 22c.; tin foil, 23c.; block tin, 25c.; all buying prices for less than carload lots.

President Orders Naval Work Stopped

WASHINGTON, Feb. 7.—One of the immediate effects of the Conference on Limitation of Armaments, which came to an end here yesterday, was an order by the President suspending work at once on all naval vessels it is proposed to scrap and also to discontinue work on fortifications in Guam and the Philippine Islands. Announcement of the suspension of this work was made to-day at the White House. It was stated, however, that no permanent discontinuance of the work will be ordered unless and until the Senate ratifies treaties drawn up by the conference. Meanwhile contracts for steel for ships to be scrapped and for fortifications are being held up and if ratification of treaties as proposed is made, the contracts will be canceled, it is understood, and necessary adjustments made.

Mr. Dupuy Sues Crucible Steel Co. of America

PITTSBURGH, Feb. 7.—Herbert Dupuy, former Chairman Crucible Steel Co. of America, has entered suit against the company in United States District Court here for \$162,048, to reimburse him for expenses incurred by him as a result of defending himself on charges brought by the Government alleging conspiracy to defraud the Government in connection with Federal income tax returns. Mr. Dupuy was acquitted. He claims that the expenses were entirely the result of acts done by him as an officer of the company and in the interests of the company, and that the company has refused to reimburse him.

Recent boiler developments are to be discussed at a meeting to be held jointly on the evening of Feb. 15 by the New York section of the American Society of Mechanical Engineers and the Stevens Engineering Society at Stevens Institute of Technology, Hoboken, N. J. The chief speaker will be V. Z. Caracristi, consulting engineer, New York, who will consider particularly the 2640 hp. Ladd boilers at the River Rouge plant of the Ford Motor Co.

Prices Finished Iron and Steel, f.o.b. Pittsburgh

Freight Rates

Freight rates from Pittsburgh on finished iron and steel products, in carload lots, to points named, per 100 lb., are as follows:

Philadelphia, domestic...	\$0.36	Kansas City	\$0.815
Philadelphia, export...	0.265	Kansas City (pipe)...	0.77
Baltimore, domestic...	0.35	St. Paul	0.66
Baltimore, export...	0.255	Omaha	0.815
New York, domestic...	0.38	Omaha (pipe)	0.77
New York, export...	0.285	Denver	1.35
Boston, domestic...	0.405	Denver (wire product)...	1.11
Boston, export	0.285	Pacific Coast	1.665
Buffalo	0.295	Pacific Coast, ship plates...	1.335
Cleveland	0.24	Birmingham	0.755
Detroit	0.325	Jacksonville, all rail ..	0.555
Cincinnati	0.325	Jacksonville, rail and	
Indianapolis	0.345	water	0.46
Chicago	0.38	New Orleans	0.615
St. Louis	0.475		

The minimum carload to most of the foregoing points is 36,000 lb. To Denver the minimum loading is 40,000 lb. while to the Pacific Coast on all iron and steel products, except structural material, the minimum is 80,000 lb. On the latter item the rate applies to a minimum of 30,000 lb., and there is an extra charge of 9c. per 100 lb. on carloads of a minimum of 40,000 lb. On shipments of wrought iron and steel pipe to Kansas City, St. Paul, Omaha and Denver the minimum carload is 46,000 lb. On iron and steel items not noted above the rates vary somewhat and are given in detail in the regular railroad tariffs.

Rates from Atlantic Coast ports (i.e., New York, Philadelphia and Baltimore) to Pacific Coast ports of call on most steamship lines, via the Panama Canal, are as follows: Pig iron, 55c.; ship plates, 75c.; ingot and muck bars, structural steel, common wire products, including cut or wire nails, spikes and wire hoops, 75c.; sheets and tin plates, 60c. to 75c.; rods, wire rope, cable and strands, \$1; wire fencing, netting and stretcher, 75c.; pipe, not over 8 in. in diameter, 75c.; over 8 in. in diameter 2 1/2c. per in. or fraction thereof additional. All prices per 100 lb. in carload lots, minimum 40,000 lb.

Structural Material

I-beams, 3 to 15 in., channels, 3 to 15 in.; angles, 3 to 6 in., on one or both legs, 3/4 in. thick and over, and zebs, structural sizes, 1.10c. to 1.50c.

Sheared plates, 1/4 in. and heavier, tank quality, 1.50c.

Wire Products

Wire nails, \$2.50 base per keg, galvanized, 1 in. and longer, including large-head barbed roofing nails, taking an advance over this price of \$1.25 and shorter than 1 in., \$1.75; bright Bessemer and basic wire, \$2.25 per 100 lb.; annealed fence wire, Nos. 6 to 9, \$2.25; galvanized wire, \$2.75; galvanized barbed wire, \$3.15; galvanized fence staples, \$3.15; painted barbed wire, \$2.65; polished fence staples, \$2.65; cement-coated nails, per count keg, \$2.00; these prices being subject to the usual advances for the smaller trade, all f.o.b. Pittsburgh, freight added to point of delivery, terms 60 days, net, less 2 per cent off for cash in 10 days. Discounts on woven-wire fencing are 68 to 70 1/2 per cent off list for carload lots, 67 to 69 1/2 per cent for 1000-rod lots, and 66 to 68 1/2 per cent for small lots, f.o.b. Pittsburgh.

Bolts and Nuts

Machine bolts, small, rolled threads, 70, 10 and 5 to 70, 10 and 7 1/2 per cent off list
Machine bolts, small, cut threads, 70 and 5 to 70 and 10 per cent off list
Machine bolts, larger and longer, 65, 10 and 5 to 70 and 10 per cent off list
Carriage bolts, 3/4 in. x 6 in., 65, 10 and 5 to 70 and 10 per cent off list
Smaller and shorter rolled threads, 65, 10 and 10 per cent off list
Cut threads, 65 and 10 to 70 per cent off list
Longer and larger sizes, 65 and 10 to 70 per cent off list
Lag bolts, 70 and 10 to 70, 10 and 5 per cent off list
Plow bolts, Nos. 1, 2 and 3 heads, 60 and 10 per cent off list
Other style heads, 20 per cent extra
Machine bolts, c.p.c. and t. nuts, 3/4 in. x 4 in., 65 and 5 per cent off list
Smaller and shorter, 65 per cent off list
Larger and longer sizes, 65 per cent off list
Hot pressed sq. or hex. blank nuts, \$5.50 off list
Hot pressed nuts, tapped, \$5.00 to \$5.25 off list
C.p.c. and t. sq. or hex. blank nuts, \$5.25 off list
C.p.c. and t. sq. or hex. blank nuts, tapped, \$5.00 off list
Semi-finished hex. nuts:
1/4 in. to 3/16 in. inclusive, 80, 10 and 10 per cent off list
Small sizes S. A. E., 80, 10, 10 and 10 per cent off list
5/16 in. to 1 in. inclusive, U. S. S. and S. A. E., 70, 10 and 10 per cent off list
Stove bolts in packages, 80, 10 and 5 per cent off list
Stove bolts in bulk, 80, 10 and 7 1/2 per cent off list
Tire bolts, 65, 10 and 10 per cent off list
Track bolts, carloads, 3c. to 3.25c. base
Track bolts, less than carloads, 4c. to 1.25c.

Upset and Hex. Head Cap Screws

1/4 in. and under, 80 and 10 to 80, 10 and 10 per cent off list
5/16 in. to 3/4 in., 80 and 10 to 80, 10 and 10 per cent off list
Upset Set Screws
1/4 in. and under, 80, 10 and 5 to 85 per cent off list
5/16 in. to 3/4 in., 80, 10 and 5 to 85 per cent off list
Milled Square and Hex. Cap Screws
All sizes, 75 and 10 to 80 per cent off list
Milled Set Screws
All sizes, 70, 10 and 10 per cent off list

Rivets

Large structural and ship rivets, \$2.25
Large boiler rivets, 2.35
Small rivets, 10, 10 and 10 to 10, 10 and 5 per cent off list

Wire Rods

No. 5 common basic or Bessemer rods to domestic consumers, \$36 to \$41, chain rods, \$36 to \$41, screw stock rods, \$41 to \$42, riv. and bolt rods and other rods of that character, \$46 to \$47, high carbon rods, \$43 to \$49, depending on carbon.

Railroad Spikes and Track Bolts

Railroad spikes, 3/4 in. and larger, \$2.15 to \$2.20 base per 100 lb. in lots of 1000 lbs. of 200 lb. each or more; spikes, 3/4 in., 3/4 in. and 7/16 in., \$2.25 to \$2.30 base, 3/4 in., \$2.25 to \$2.30 base. Bolt and tower spikes, \$2.25 to \$2.30 base per 100 lb. in carload lots of 200 kegs or more, f.o.b. Pittsburgh. Track bolts, 3c. to 3 1/2c. base per 100 lb. The plates, \$2 per 100 lb. Angle bar, 2 1/2 in. per 100 lb.

Terne Plates

Prices of terne plate are as follows: 8 lb. coating, 200 lb., \$9.20 per package; 8 lb. coating, 1 C., \$9.60; 15-lb. coating, 1 C., \$11.80; 26-lb. coating, 1 C., \$13; 25-lb. coating, 1 C., \$14.75; 30-lb. coating, 1 C., \$15.25; 35-lb. coating, 1 C., \$16.25; 40-lb. coating, 1 C., \$17.25 per package, all f.o.b. Pittsburgh, freight added to point of delivery.

Iron and Steel Bars

Steel bars, 1 1/2 in. to 1 1/2 in. from mill. Refined bar iron, 2c. to 2 1/2c.

Welded Pipe

The following discounts are to jobbers for carload lots on the Pittsburgh home card

Steel			Rust Weld			Iron		
Inches	Black	Galv.	Inches	Black	Galv.	Inches	Black	Galv.
1/2	50 1/2	58 1/2	1/2	39 1/2	25 1/2	2 1/2	12 1/2	29 1/2
3/4	60	68 1/2	3/4	49 1/2	35 1/2	3	13 1/2	30 1/2
1	60	68 1/2	1	49 1/2	35 1/2	4	14 1/2	31 1/2
1 1/4	60	68 1/2	1 1/4	49 1/2	35 1/2	6	16 1/2	33 1/2
1 1/2	60	68 1/2	1 1/2	49 1/2	35 1/2	8	18 1/2	35 1/2
2	60	68 1/2	2	49 1/2	35 1/2	10	20 1/2	37 1/2
2 1/2	60	68 1/2	2 1/2	49 1/2	35 1/2	12	22 1/2	39 1/2
3	60	68 1/2	3	49 1/2	35 1/2	14	24 1/2	41 1/2
3 1/2	60	68 1/2	3 1/2	49 1/2	35 1/2	16	26 1/2	43 1/2
4	60	68 1/2	4	49 1/2	35 1/2	18	28 1/2	45 1/2
4 1/2	60	68 1/2	4 1/2	49 1/2	35 1/2	20	30 1/2	47 1/2
5	60	68 1/2	5	49 1/2	35 1/2	22	32 1/2	49 1/2
5 1/2	60	68 1/2	5 1/2	49 1/2	35 1/2	24	34 1/2	51 1/2
6	60	68 1/2	6	49 1/2	35 1/2	26	36 1/2	53 1/2
6 1/2	60	68 1/2	6 1/2	49 1/2	35 1/2	28	38 1/2	55 1/2
7	60	68 1/2	7	49 1/2	35 1/2	30	40 1/2	57 1/2
7 1/2	60	68 1/2	7 1/2	49 1/2	35 1/2	32	42 1/2	59 1/2
8	60	68 1/2	8	49 1/2	35 1/2	34	44 1/2	61 1/2
8 1/2	60	68 1/2	8 1/2	49 1/2	35 1/2	36	46 1/2	63 1/2
9	60	68 1/2	9	49 1/2	35 1/2	38	48 1/2	65 1/2
9 1/2	60	68 1/2	9 1/2	49 1/2	35 1/2	40	50 1/2	67 1/2
10	60	68 1/2	10	49 1/2	35 1/2	42	52 1/2	69 1/2
10 1/2	60	68 1/2	10 1/2	49 1/2	35 1/2	44	54 1/2	71 1/2
11	60	68 1/2	11	49 1/2	35 1/2	46	56 1/2	73 1/2
11 1/2	60	68 1/2	11 1/2	49 1/2	35 1/2	48	58 1/2	75 1/2
12	60	68 1/2	12	49 1/2	35 1/2	50	60 1/2	77 1/2
12 1/2	60	68 1/2	12 1/2	49 1/2	35 1/2	52	62 1/2	79 1/2
13	60	68 1/2	13	49 1/2	35 1/2	54	64 1/2	81 1/2
13 1/2	60	68 1/2	13 1/2	49 1/2	35 1/2	56	66 1/2	83 1/2
14	60	68 1/2	14	49 1/2	35 1/2	58	68 1/2	85 1/2
14 1/2	60	68 1/2	14 1/2	49 1/2	35 1/2	60	70 1/2	87 1/2
15	60	68 1/2	15	49 1/2	35 1/2	62	72 1/2	89 1/2
15 1/2	60	68 1/2	15 1/2	49 1/2	35 1/2	64	74 1/2	91 1/2
16	60	68 1/2	16	49 1/2	35 1/2	66	76 1/2	93 1/2
16 1/2	60	68 1/2	16 1/2	49 1/2	35 1/2	68	78 1/2	95 1/2
17	60	68 1/2	17	49 1/2	35 1/2	70	80 1/2	97 1/2
17 1/2	60	68 1/2	17 1/2	49 1/2	35 1/2	72	82 1/2	99 1/2
18	60	68 1/2	18	49 1/2	35 1/2	74	84 1/2	101 1/2
18 1/2	60	68 1/2	18 1/2	49 1/2	35 1/2	76	86 1/2	103 1/2
19	60	68 1/2	19	49 1/2	35 1/2	78	88 1/2	105 1/2
19 1/2	60	68 1/2	19 1/2	49 1/2	35 1/2	80	90 1/2	107 1/2
20	60	68 1/2	20	49 1/2	35 1/2	82	92 1/2	109 1/2
20 1/2	60	68 1/2	20 1/2	49 1/2	35 1/2	84	94 1/2	111 1/2
21	60	68 1/2	21	49 1/2	35 1/2	86	96 1/2	113 1/2
21 1/2	60	68 1/2	21 1/2	49 1/2	35 1/2	88	98 1/2	115 1/2
22	60	68 1/2	22	49 1/2	35 1/2	90	100 1/2	117 1/2
22 1/2	60	68 1/2	22 1/2	49 1/2	35 1/2	92	102 1/2	119 1/2
23	60	68 1/2	23	49 1/2	35 1/2	94	104 1/2	121 1/2
23 1/2	60	68 1/2	23 1/2	49 1/2	35 1/2	96	106 1/2	123 1/2
24	60	68 1/2	24	49 1/2	35 1/2	98	108 1/2	125 1/2
24 1/2	60	68 1/2	24 1/2	49 1/2	35 1/2	100	110 1/2	127 1/2
25	60	68 1/2	25	49 1/2	35 1/2	102	112 1/2	129 1/2
25 1/2	60	68 1/2	25 1/2	49 1/2	35 1/2	104	114 1/2	131 1/2
26	60	68 1/2	26	49 1/2	35 1/2	106	116 1/2	133 1/2
26 1/2	60	68 1/2	26 1/2	49 1/2	35 1/2	108	118 1/2	135 1/2
27	60	68 1/2	27	49 1/2	35 1/2	110	120 1/2	137 1/2
27 1/2	60	68 1/2	27 1/2	49 1/2	35 1/2	112	122 1/2	139 1/2
28	60	68 1/2	28	49 1/2	35 1/2	114	124 1/2	141 1/2
28 1/2	60	68 1/2	28 1/2	49 1/2	35 1/2	116	126 1/2	143 1/2
29	60	68 1/2	29	49 1/2	35 1/2	118	128 1/2	145 1/2
29 1/2	60	68 1/2	29 1/2	49 1/2	35 1/2	120	130 1/2	147 1/2
30	60	68 1/2	30	49 1/2	35 1/2	122	132 1/2	149 1/2
30 1/2	60	68 1/2	30 1/2	49 1/2	35 1/2	124	134 1/2	151 1/2
31	60	68 1/2	31	49 1/2	35 1/2	126	136 1/2	153 1/2
31 1/2	60	68 1/2	31 1/2	49 1/2	35 1/2	128	138 1/2	155 1/2
32	60	68 1/2	32	49 1/2	35 1/2	130	140 1/2	157 1/2
32 1/2	60	68 1/2	32 1/2	49 1/2	35 1/2	132	142 1/2	159 1/2
33	60	68 1/2	33	49 1/2	35 1/2	134	144 1/2	161 1/2
33 1/2	60	68 1/2	33 1/2	49 1/2	35 1/2	136	146 1/2	163 1/2
34	60	68 1/2	34	49 1/2	35 1/2	138	148 1/2	165 1/2
34 1/2	60	68 1/2	34 1/2	49 1/2	35 1/2	140	150 1/2	167 1/2
35	60	68 1/2	35	49 1/2	35 1/2	142	152 1/2	169 1/2
35 1/2	60	68 1/2	35 1/2	49 1/2	35 1/2	144	154 1/2	171 1/2
36	60	68 1/2	36	49 1/2	35 1/2	146	156 1/2	173 1/2
36 1/2	60	68 1/2	36 1/2	49 1/2	35 1/2	148	158 1/2	175 1/2
37	60	68 1/2	37	49 1/2	35 1/2	150	160 1/2	177 1/2
37 1/2	60	68 1/2	37 1/2	49 1/2	35 1/2	152	162 1/2	179 1/2
38	60	68 1/2	38	49 1/2	35 1/2	154	164 1/2	181 1/2
38 1/2	60	68 1/2	38 1/2	49 1/2	35 1/2	156	166 1/2	183 1/2
39	60	68 1/2	39	49 1/2	35 1/2	158	168 1/2	185 1/2
39 1/2	60	68 1/2	39 1/2	49 1/2	35 1/2	160	170 1/2	187 1/2
40	60	68 1/2	40	49 1/2	35 1/2	162	172 1/2	189 1/2
40 1/2	60	68 1/2	40 1/2	49 1/2	35 1/2	164	174 1/2	191 1/2
41	60	68 1/2	41	49 1/2	35 1/2	166	176 1/2	193 1/2
41 1/2	60	68 1/2	41 1/2	49 1/2	35 1/2	168	178 1/2	195 1/2
42	60	68 1/2	42	49 1/2	35 1/2	170	180 1/2	197 1/2
42 1/2	60	68 1/2	42 1/2	49 1/2	35 1/2	172	182 1/2	199 1/2
43	60	68 1/2	43	49 1/2	35 1/2	174	184 1/2	201 1/2
43 1/2	60	68 1/2	43 1/2	49 1/2	35 1/2	176	186 1/2	203 1/2
44	60	68 1/2	44	49 1/2	35 1/2	178	188 1/2	205 1/2
44 1/2	60	68 1/2	44 1/2	49 1/2	35 1/2	180	190 1/2	207 1/2
45	60	68 1/2	45	49 1/2	35 1/2	182	192 1/2	209 1/2
45 1/2	60	68 1/2	45 1/2	49 1/2	35 1/2	184	194 1/2	211 1/2
46	60	68 1/2	46	49 1/2	35 1/2	186	196 1/2	213 1/2
46 1/2	60	68 1/2	46 1/2	49 1/2	35 1/2	188	198 1/2	215 1/2
47	60	68 1/2	47	49 1/2	35 1/2	190	200 1/2	217 1/2
47 1/2	60	68 1/2	47 1/2	49 1/2	35 1/2	192	202 1/2	219 1/2
48	60	68 1/2	48	49 1/2	35 1/2	194	204 1/2	221 1/2
48 1/2	60	68 1/2	48 1/2	49 1/2	35 1/2	196	206 1/2	223 1/2
49	60	68 1/2	49	49 1/2	35 1/2	198	208 1/2	225 1/2
49 1/2	60	68 1/2	49 1/2	49 1/2	35 1/2	200	210 1/2	227 1/2
50	60	68 1/2	50	49 1/2	35 1/2	202	212 1/2	229 1/2
50 1/2	60	68 1/2	50 1/2	49 1/2	35 1/2	204	214 1/2	231 1/2
51	60	68 1/2	51	49 1/2	35 1/2	206	216 1/2	233 1/2
51 1/2	60	68 1/2	51 1/2	49 1/2	35 1/2	208	218 1/2	235 1/2
52	60	68 1/2	52	49 1/2	35 1/2	210	220 1/2	237 1/2
52 1/2	60	68 1/2	52 1/2	49 1/2	35 1/2	212	222 1/2	239 1/2
53	60	68 1/2	53	49 1/2	35 1/2	214	224 1/2	241 1/2
53 1/2	60	68 1/2	53 1/2	49 1/2	35 1/2	216	226 1/2	243 1/2
54	60	68 1/2	54	49 1/2	35 1/2	218	228 1/2	245 1/2
54 1/2	60	68 1/2	54 1/2	49 1/2	35 1/2	220	230 1/2	247 1/2
55	60	68 1/2	55	49 1/2	35 1/2	222	232 1/2	249 1/2
55 1/2	60	68 1/2	55 1/2	49 1/2	35 1/2	224	234 1/2	251 1/2
56	60	68 1/2	56	49 1/2	35 1/2	226	236 1/2	253 1/2
56 1/2	60	68 1/2	56 1/2	49 1/2	35 1/2	228	238 1/2	255 1/2
57	60	68 1/2	57	49 1/2	35 1/2	230	240 1/2	257 1/2
57 1/2	60	68 1/2	57 1/2	49 1/2	35 1/2	232	242 1/2	259 1/2
58	60	68 1/2	58	49 1/2	35 1/2	234	244 1/2	261 1/2
58 1/2	60	68 1/2	58 1/2	49 1/2	35 1/2	236	246 1/2	263 1/2
59	60	68 1/2	59	49 1/2	35 1/2	238	248 1/2	265 1/2
59 1/2	60	68 1/2	59 1/2	49 1/2	35 1/2	240	250 1/2	267 1/2
60	60	68 1/2	60	49 1/2	35 1/2	242	252 1/2	269 1/2
60 1/2	60	68 1/2	60 1/2	49 1/2	35 1/2	244	254 1/2	271 1/2
61	60	68 1/2	61	49 1/2	35 1/2	246	256 1/2	273 1/2
61 1/2	60	68 1/2	61 1/2	49 1/2	35 1/2	248	258 1/2	275 1/2
62	60	68 1/2	62	49 1/2	35 1/2	250	260 1/2	277 1/2
62 1/2	60	68 1/2	62 1/2	49 1/2	35 1/2	252	262 1/2	279 1/2
63	60	68 1/2	63	49 1/2	35 1/2	254	264 1/2	281 1/2
63 1/2	60	68 1/2	63 1/2	49 1/2	35 1/2	256	266 1/2	283 1/2
64	60	68 1/2	64	49 1/2	35 1/2	258	268 1/2	285 1/2
64 1/2	60	68 1/2	64 1/2	49 1/2	35 1/2	260	270 1/2	287 1/2
65	60	68 1/2	65	49 1/2	35 1/2	262	272 1/2	289 1/2
65 1/2	60	68 1/2	65 1/2	49 1/2</				

PERSONAL

S. W. Wheelock has been made manager of sales in St. Louis for Carnegie Steel Co., Illinois Steel Co. and Tennessee Coal, Iron & Railroad Co., to succeed



S. W. WHEELOCK

W. W. Scott, Jr., who has become general manager of sales for Laclede Steel Co., St. Louis. Mr. Wheelock was manager of sales for the same companies at New Orleans, and he has been succeeded there by Dennis Crowley, Jr., who has been assistant manager of sales at St. Louis, and he, in turn, has been succeeded by W. W. Arpe, who has been in the St. Louis office for several years. Mr. Wheelock has been engaged in the steel trade since 1893, when he entered the service of the Pittsburgh Tool Steel Co. He was with Park Brothers & Co. from 1893 to 1899, when he went with the Illinois Steel Co. He went with the United States Steel Corporation when it was organized in 1901, and from that year until 1907 was in charge of its Denver office. He was assistant manager of sales at St. Louis from 1907 to 1914, when he was transferred to New Orleans as manager. Mr. Wheelock is a member of the American Iron and Steel Institute.

Chas. E. Sanders has resigned as general purchasing agent of the Emerson-Brantingham Co., manufacturer of farm machinery, Rockford, Ill., effective March 1. After that date he will be associated with his son, Raymond Y. Sanders, in the insurance business at 208 South La Salle Street, Chicago.

At the annual meeting of the stockholders of the Inland Steel Co., Chicago, on Jan. 31, former directors were re-elected and Gordon Battelle, Columbus, Ohio, was elected director to succeed Elias Colbert, deceased. L. E. Block and P. D. Block were re-elected chairman of the board and president respectively. Edward M. Adams was elected first vice-president to succeed G. H. Jones and W. D. Truesdale was elected secretary-treasurer. Other vice-presidents are H. C. Jones, E. J. Block, J. W. Lees, W. C. Carroll and Charles R. Robinson, the latter two having recently become affiliated with the company, as previously announced in these columns.

H. W. Wendt, president of the Buffalo Forge Co., Buffalo Steam Pump Co., Geo. L. Squier Mfg. Co. and Canadian Blower & Forge Co., is on a business trip to South America. Mr. Wendt will visit the principal business centers of South America and expects to be away about four months.

Evan F. Jones, Morgan Construction Co., Worcester, Mass., sails Feb. 14 on the George Washington for a 64 days' trip to the Holy Land and other points of interest.

Frederick G. Hughes, general manager, New Departure Mfg. Co., Bristol, Conn., ball bearings, etc., has been made vice-president of that organization, and Lester G. Signourney, sales department, secretary. A. P. Sloan, Jr., vice-president, and John L. Pratt, general manager accessories division General Motors Corporation, have been made New Departure directors.

H. H. Fasnacht, formerly connected with the Shafer Roller Bearing Co., Chicago, has been placed in charge of the engineering sales department of the newly incorporated L. C. Smith Bearings Co., Chicago.

Dr. Eugene Hart, of St. Johns, Mich., was recently elected president of the Triangle Motor Truck Co., that

city. F. C. Burk was made treasurer and general manager.

Arthur X. Merz, secretary Madison-Kipp Co., Madison, Wis., sailed Feb. 4 on the Empress of Scotland for a tour of the Mediterranean sea. He will then seek admission to Russia to investigate possibilities of business. The Madison-Kipp Co. is a large producer of automatic lubricating devices for tractors, etc.

A. J. McFarland, general manager, Portsmouth, Ohio works, Wheeling Steel Corporation, has been transferred to the Steubenville, Ohio, works of the company and will assume the position of general manager made vacant by the resignation of G. B. LeVan. G. W. Moore, general superintendent, Portsmouth works, has been promoted to the position of general manager, vice Mr. McFarland.

Carl C. Brown has been appointed vice president and general sales manager of the Nichols Wire & Sheet Co., headquarters Kansas City, Mo. The Nichols company also operate warehouses at Tulsa, Okla., Ft. Scott, Kan., Joplin, Mo., Davenport, Iowa, and Pittsburgh. Mr. Brown was formerly general sales agent of the Gulf States Steel Co., Birmingham, Ala. He is succeeded at Birmingham by Chas. E. Paddock, former sales representative of the company in the southwest, with headquarters at Oklahoma City.

The Gulf States Steel Co. appointed J. H. Bryan sales-agent, with office at 50 Church Street, New York.

William Metcalf, Jr., former president and owner of the Braeburn Steel Co., has been nominated as an alumni trustee of Cornell University, from which he was graduated in 1901.

Edward Van Winkle, who has been associated with F. A. Waldron, as consulting industrial engineer, has re-established himself in the independent practice of patent and trade mark law at 37 Wall Street, New York.

Fred W. Ramsey has resigned the presidency of the Cleveland Metal Products Co., Cleveland, in order to devote more of his time to civic and philanthropic activities. His resignation was accepted at the annual meeting and L. S. Chadwick, who was engineer of the company for nine years and has recently been vice president in charge of manufacturing, was elected in his place. Mr. Ramsey will continue as a director of the company and will devote part of his time to its affairs. He was manager of the recent Community Chest Campaign in Cleveland and has accepted the chairmanship of the Campaign Committee for the next year.

W. F. Jolley, formerly connected with the Troy Wagon Works Co. and later with the Miami Trailer Co., Troy, Ohio, has been appointed by the Holt Mfg. Co., Peoria, Ill., manager of its London office and will have charge of sales of the company's line of tractors in Europe and Africa.

S. S. Chapin has been chosen as secretary and purchasing agent of the American Fork & Hoe Co., Cleveland, succeeding E. D. Lowell, who died recently. Mr. Chapin had been for some time Mr. Lowell's assistant and as such had general charge of the purchasing.

Lincoln Motor Co. Taken Over by Fords

The Lincoln Motor Co., Detroit, was sold at receiver's sale last Saturday, the purchasers being Henry and Edsel Ford, who bid \$8,000,000. It is announced that the Lincoln plant will operate immediately with a force of 600 men and production will be speeded. Reductions of from \$800 to \$1200 will be made in the price of cars. The Lincoln plant will continue to be managed by Henry M. and Wilfred C. Leland.

At the eighteenth annual meeting of the Associated Employers of Indianapolis, Inc., Feb. 16, addresses will be delivered by Walter Drew, New York, counsel National Erectors' Association, and Earl J. McCone, general manager of the Buffalo Commercial. "Building and the Public" will be discussed by Mr. Drew and "My Sick Friend, Mr. Itt," will be Mr. McCone's address.

OBITUARY

CHARLES LEWIS TAYLOR, partner of Andrew Carnegie and head of the Carnegie Hero Fund Commission since its creation by Mr. Carnegie in 1904, died at his



CHARLES L. TAYLOR

winter home in Santa Barbara, Cal., Feb. 3. He had been in failing health since last September. He retired from active participation in the iron and steel industry in 1901, with the absorption of the Carnegie Steel Co. by the United States Steel Corporation, at which time he occupied the position of assistant to the president. During the preceding 25 years, Mr. Taylor had an active place in the industry and it is said of him that probably no single individual connected with the steel industry between 1880 and 1890 did more in the practical direction of

supplanting wrought iron with soft steel than he did. His thorough knowledge of chemistry and the metallurgy of steel enabled him while superintendent of the Homestead Steel Works to be probably the first one to successfully produce soft steel for manufacture of pipe, nails, ship plate and structural steel. His early connection with the designing as well as the manufacture of steel suitable for steel car construction, was one of his principal achievements, representing pioneer work of an original character and a comprehensive foresight into the requirements of the steel business. Since his retirement from active business, Mr. Taylor had devoted his time principally to philanthropic work, partly of a personal nature and partly in behalf of the pension and relief organizations in which he was associated. He was first chairman of the Carnegie Pension Fund, which now is administered as the United States Steel and the Carnegie Pension Fund. He was born in Philadelphia, April 3, 1857, a son of John D. Taylor, treasurer of Pennsylvania Railroad Co. from 1874 to 1886. He was graduated from Lehigh University in 1876 with the degree of mechanical engineer and immediately after graduation became assistant chemist at the works of the Cambria Iron Co., Johnstown, Pa. He subsequently became assistant superintendent of blast furnaces at that plant. He went to Pittsburgh in 1880 to become chemist for the Pittsburgh Bessemer Steel Co., and in 1882 became superintendent of the company, retaining this position until the company was merged into the Carnegie interests. From 1883 until 1887 he was superintendent of the Homestead Steel Works, his successor being Charles M. Schwab, now chairman of Bethlehem Steel Corporation. The next two years he was general manager of Hartman Steel Co., another Carnegie plant, and from 1890 to 1892 he was assistant secretary of Carnegie, Phipps & Co., Ltd. In 1893 he was made assistant to the president, Carnegie Steel Co., with general supervision over the operations of all works, holding this position until his retirement in 1901.

ARTHUR BOSTWICK, president and one of the founders of the International Nickel Co., died at his home in Lawrence Park, West Bronxville, N. Y., Feb. 4. He was 48 years old and for a number of years resided in Pittsburgh, going to that city in 1898, following his graduation from the Columbia University School of Metallurgy, to become metallurgist at the Homestead works of the Carnegie Steel Co. In 1903 he became chief metallurgist of that company. A few years later, in association with Ambrose Monell and E. T. Wood,

he helped in the organization of the International Nickel Co., becoming assistant to Mr. Monell, the president, in 1911 and advancing to the presidency in 1915. He was a member of the American Society for Testing Materials, the American Society of Mining and Metallurgical Engineers and the American Iron and Steel Institute.

ARTHUR L. OVER, secretary of the Columbia Steel & Shafting Co., Pittsburgh, since its inception in 1899, died at his home in Ben Avon, Pa., Feb. 5, following a brief illness. He was 46 years old and was graduated from the University of Pittsburgh, in both the academic and law departments, completing the latter course in 1897. He was admitted to the Allegheny County bar that year and had practiced law since, beside attending to his business connections.

EPHRAIM TRUSALI, at one time manager of the Sligo rolling mill of Phillips, Nimick & Co., Pittsburgh, and of the Wheatland Iron Mills, Wheatland, Pa., died at his home in Pittsburgh Feb. 3. He was born in Westmoreland County, Pa., 70 years ago.

ALBERT R. WARNER, a director of the White Co., Cleveland, and secretary and treasurer of that company until his retirement from active business life several months ago, died Jan. 26, aged 54 years. His death resulted from a stroke of paralysis.

COLGATE HOYT, of Colgate Hoyt & Co., New York bankers, who died Jan. 30, was quite prominently identified with the Great Lakes shipping industry years ago before he moved from Cleveland to New York. He was associated with Alexander MacDougall, Duluth, in building and operating the type of boats known as whalebacks used for a number of years in the ore carrying trade. He was a brother of the late James H. Hoyt, a prominent Cleveland attorney who represented large lake vessel and iron and steel interests.

AARON B. HILER, for the past 15 years sales representative in the East and a part of the South for the Jones & Lamson Machine Co., Springfield, Vt., died on Jan. 29 at his home, 235 North Center Street, Orange, N. J. The funeral was held Monday evening and burial took place at Rockaway, N. J. Mr. Hiler was one of the best known machine tool salesmen in the country. For some years he had been in poor health, but until a few weeks ago was active in his occupation.

MOSES MOSLER, aged 71 years, president of the Mosler Safe Co., Hamilton, Ohio, died at Grand Canyon, Arizona, on Jan. 19, while en route to the Pacific Coast on a pleasure trip. Mr. Mosler was the last of five brothers who were prominent in the business and professional life of Cincinnati. The Mosler Safe Works, of which he was the head, is the largest of the kind in the world, and employs more than 1000 persons. He is survived by his wife and one daughter, Mrs. E. C. Hyman, wife of the vice-president and treasurer of the company.

ALBERT C. ASHTON, treasurer Ashton Valve Co., Cambridge, Mass., died recently at St. Petersburg, Fla. He was born in England 52 years ago, but educated in this country, being a graduate of the Massachusetts Institute of Technology. Mr. Ashton was affiliated with many societies, including the American Society of Mechanical Engineers.

ARTHUR LEWIS, general sales manager the Great Western Smelting & Refining Co., Chicago, committed suicide at the home of his brother in Seattle, Wash., on Feb. 3. Mr. Lewis, who was 38 years of age, had suffered a nervous break-down.

The following production figures for December, 1921, in metric tons, have been issued by the Belgian Mining Administration, according to Acting Commercial Attaché S. H. Cross, of Brussels: Pig iron, 74,150; raw steel, 60,900; rough steel castings, 360; finished steel, 78,120; finished iron, 16,560; spelter, 7,370; coal, 1,965,350.

Machinery Markets and News of the Works

IMPROVEMENT CONTINUES

Activity in Small Tools Believed to Portend Sales of Heavier Equipment

Some Fair Sized Lists and Numerous Single Machine Inquiries Reported

In almost every quarter, the trend toward improvement in machine-tool inquiries and sales has been sustained. Settlement of the political situation in the Far East is expected to result in an increase of exports. There is a prevalence of small tool orders in practically all markets, which is believed to portend purchases of heavier equipment. One company in the New England district reports January sales of small tools as larger than at any time during the previous six months.

One of the districts showing the greatest activity is Cleveland, where several manufacturers have come into the market for automatic screw machines, the largest reported calling for between 60 and 75 machines. Other inquiries in this market include planers, turret lathes, vertical boring machine, and equipment for motor-valve stem manufacturer. For the first time in months inquiry is reported from the Akron, Ohio, rubber industry. Some manufacturers, who recently had surplus machinery for sale, have withdrawn offers, in view of the improved outlook. One manufacturer of automatic screw machinery has reduced prices about 25 per cent.

Numerous orders are reported by Cincinnati builders, shapers, grinding machines of special type, boring mills, planers, engine lathes and drilling machines be-

ing included. Inquiries for single machines are numerous and a fair percentage is developing into orders. The Hocking Valley Railroad Co. has issued a list calling for seven heavy-duty tools.

Although bookings in the New England district have been light, there is considerable optimism as to future purchases, which, it is believed, cannot be delayed much longer. Inquiry at present seems to be confined largely to used equipment. Negotiations are in progress for the purchase of 20 lathes, ranging in size up to 36-in. One of the largest active inquiries calls for 16 lathes, two planers, two drilling machines, a milling machine, shaper, floor-boring equipment, wet tool grinder and key-seater. Other prospective closings are on pipe machines, punches and shears, and numerous small tools. There is some activity in abrasive wheels.

Less activity was evident in the Pittsburgh district, although sales were slightly better than at any time in January. Some fair sized orders are noted. The Wheeling Steel Corporation is asking for 20 tools for its Portsmouth, Ohio, plant; another list is expected for Steubenville, Ohio. Buying is evidently affected to a certain extent by the prospect of reduced freight rates.

The quietest market during the week was Chicago. As in other centers, single machine inquiries and an inclination to consider used equipment was notable. Western railroads are still delaying action on their lists. The Santa Fe continues to add items to its pending inquiry and is now asking for a power-driven band saw and a wood-working machine. The Erie Railroad and the Illinois Central have placed orders.

New York

NEW YORK, Feb. 7.

Few orders were reported this week in the crane market. Several inquiries have appeared, however, and several inquiries that have been in the market for some time are extremely active and may be closed within the next week. The inquiry of the Lamson Co., Boston, Mass., is again active. Among recent inquiries is one from Stone & Webster, Boston, for a 10-ton and 15-ton overhead traveling crane with alternate specifications, for the Ford plant at Green Island. The Phoenix Utilities Co., New York, which inquired for prices on a 40-ton, 50-ton and 60-ton crane, hand power and one motor with electric hoists, has decided to purchase the 60-ton crane. Bidding to J. E. Woodwell, consulting engineer, 501 Fifth Avenue, New York, on the 75-ton, 66-ft. 4 in. span, 4-motor, overhead traveling crane for a power house in Lansing, Mich., resulted in a low bid of \$15,050 by the Whiting Corporation, \$15,280 by the Milwaukee Electric Crane & Mfg. Co., and \$15,545 by Manning, Maxwell & Moore, Inc.

Among recent sales were three small cranes sold by the Whiting Corporation to S. Firestone, consulting engineer, Rochester, N. Y., for a new plant of the Aetna-Portland Cement Co., at Essexville, Mich. The Industrial Works sold a 30-ton, 50-ft. boom locomotive crane with grab bucket to the Aetna-Portland Cement Co.

The Max Schaffer Co., 26 Warren Street, New York, manufacturer of gas lighting and burning equipment and supplies, will soon take bids for a top addition to its eight-story plant, 75 x 100 ft., at 31-33 West Fifteenth Street, including improvements in the present factory, estimated to cost \$90,000. Maurice Courland, 47 West Thirty-fourth Street is architect.

The Bureau of Supplies and Accounts, Navy Department, Washington, will take bids until Feb. 21, for one surface

condenser, for the navy yard at Iona Island, N. Y.

The Brooklyn Edison Co., 360 Pearl Street, Brooklyn, has made application for permission to issue bonds or stock to an amount of \$10,000,000, a portion of the proceeds to be used for a new power plant on Sixty-sixth Street, estimated to cost in excess of \$500,000. It will be 80 x 130 ft.

The Cutting Larson Co., 109 West Sixty-fourth Street, New York, representing the Oldsmobile Co., has awarded contract to the Barney-Ahlers Co., 110 West Fortieth Street, for a six-story automobile service and repair works, 100 x 120 ft., on Sixty-sixth Street, estimated to cost \$200,000.

The Erie Railroad Co., 50 Church Street, New York, has leased its car repair shops at Buffalo, N. Y., to the Seminole Construction Co., Buffalo, headed by William H. Fitzpatrick, which will operate the plant for contract work for the road. Operations were commenced on Feb. 6, maintaining the present working force. The railroad company is arranging, also, for a lease of its shops at Salamanca, N. Y., to a private operating company. The company has signed a lease with the Youngstown Equipment Co., Youngstown, Ohio, for the operation of its car shops at Brier Hill, Ohio, and locomotive shops at Kent, Ohio.

The Adirondack Power & Light Corporation, Amsterdam, N. Y., has arranged an appropriation of \$1,000,000, for the installation of new equipment at its plant, comprising a 20,000-hp. generator and auxiliary machinery. Charles S. Ruffner is first vice-president and general manager.

Fred L. Brown, Locust Street, Hudson Falls, N. Y., will commence the immediate erection of a two-story automobile service and machine repair building, 70 x 100 ft. The H. P. Cummings Construction Co., Colvin Building, Glen Falls, N. Y., is the contractor.

A one-story automobile service and repair works for company cars will be constructed by the Willow Brook Dairy Co., 5 South Fulton Street, Mount Vernon, N. Y., in connection with the erection of its new local plant, con-

plant for which has been awarded to the Barney-Ablers Co., 110 West Fortieth Street, New York, estimated to cost \$200,000.

The Savage Arms Corporation, 50 Church Street, New York, with plants at Utica, N. Y., and Philadelphia, is arranging its works for a new line of production to include refrigerating machinery and parts, and electrically operated washing machines.

The Radio Mfg. Co., 170 Fifth Avenue, New York, has leased property at 251 Fourth Avenue, for local works.

Fire, Feb. 3, destroyed a machine shop and other buildings at the locomotive shops of the Lehigh Valley Railroad Co., Jersey City, N. J., with loss reported in excess of \$50,000, including equipment.

The Tide Water Oil Co., 11 Broadway, New York, is completing plans for a new one-story works building, 35 x 60 ft., on Lyons Avenue, Irvington, N. J., to cost about \$25,000. Bids will be asked early in April.

A vocational department will be installed in the three-story high school to be constructed at Ashbury Park, N. J., estimated to cost about \$400,000. E. F. Arend, 105 West Fortieth Street, New York, is architect and engineer.

Power equipment and other mechanical apparatus will be installed in the new two-story factory of the American Book Co., 100 Washington Square, East, New York, at Watsessing and Bloomfield avenues, Bloomfield, N. J., ground for which has been broken by the Austin Co., 217 Broadway, New York, contractor, estimated to cost about \$200,000.

The Ford Motor Co., Lincoln Highway, Kearay, N. J., will commence the immediate rebuilding of the portion of its local assembling plant, destroyed by fire, Feb. 1, with loss reported at \$250,000, including equipment. The jacking and other departments were partially destroyed.

A vocational department will be installed in the new four-story high school to be erected at Hightstown, N. J., estimated to cost about \$150,000. Guilbert & Betelle, 685 Broad Street, Newark, N. J., architects, are preparing preliminary plans.

An ordinance covering the vacating of property in the vicinity of the plant of the Standard Underground Cable Co., Perth Amboy, N. J., passed recently by the Board of Aldermen to permit the erection of additions, has been annulled by the State Supreme Court on the grounds of unreasonable exercise of municipal power, and the proposed extensions, estimated to cost about \$200,000, will be held in temporary abeyance.

An electric power plant, machine and other vocational shops will be installed in the four-story junior high school, 117 x 345 ft., to be erected at First Avenue and Loomis Street, Elizabeth, N. J., contract for which has just been awarded to H. Wilhelms Sons, Inc., 803 East Jersey Street, Elizabeth, contractor, estimated to cost \$580,000. C. Godfrey Poggi, 275 Morris Avenue, Elizabeth, is architect.

Officials of the Public Service Corporation, Public Service Terminal, Newark, have organized a subsidiary company, the Public Service Production Co., capitalized at \$3,000,000 to engage in engineering and construction enterprises. A feature of the work will be electric power plant construction and steam railroad electrification. Negotiations are said to be under way with the Lackawanna Railroad for extensive work of the latter character. Thomas N. McCarter, president of the parent company and other operating subsidiaries, will head the new organization. Nathaniel A. Carle, chief engineer for the Public Service Electric Co., will be vice-president and general manager.

The Solar Light Co., 69 Wooster Street, New York, manufacturer of nitrogen high power lamps, etc., has leased a portion of the building at 24 Mechanic Street, Newark, for a branch plant. Possession will be taken at once and necessary equipment installed. Joseph Blum is secretary.

A machine shop for automobile service and repair work will be installed in the new building to be erected at 9-11 New Jersey Railroad Avenue, Newark, for the Black & White Taxi Co., now located at 9 New Jersey Railroad Avenue. It will be one-story, 60 x 125 ft.

The Morse-Rogers Steel Co., Cleveland, advises that for the past three years it has had an Eastern warehouse and office in Newark, but owing to the fact that it required larger quarters, space has been leased in the new Shupe Terminal plant at Lincoln Highway and the Passaic River.

Export Trade Opportunities

The Societe Anonyme des Automobiles Excelsior, Saventhem, Belgium, would like to hear from manufacturers of gang drills and boring machines suitable for making 6-cylinder automobile engines.

Ernst Gleitsmann & Co., Postoffice Box No. 78, Libau, Latvia, advise THE IRON AGE that they desire to represent American manufacturers of machine tools and small tools in Latvia and Russia. They write that they are in touch

with all of the largest buyers in Latvia and Russia and are in a position to close some business. Catalogs and price lists are requested.

Buffalo

BUFFALO, Feb. 6

The Joseph Schonthal Co., Buttles and Michigan avenues, Columbus, Ohio, scrap metals, has acquired the plant and business of the American Foreign Steel Co., Ingham Avenue, Buffalo, devoted to a similar line of operation, and will take immediate possession. The purchase includes all equipment including cranes, scrap breaking machinery, etc., as well as about 5½ acres for future expansion. The consideration is said to be \$80,000. Joseph Neeb, heretofore local manager at the plant, will continue in the same capacity for the new owner.

Fire, Jan. 29, destroyed a portion of the car shops of the New York Central Railroad Co., Grand Central Terminal, New York, at Lyons, N. Y., with loss estimated at close to \$30,000.

A vocational department will be installed in the new high school to be constructed at Oswego, N. Y., George S. Decker, president, estimated to cost about \$250,000. Preliminary plans are being prepared by Coffin & Coffin, 522 Fifth Avenue, New York, architects.

Negotiations are under way for the purchase of the plant and property of the Lamoka Electric Water & Power Corporation, Corning, N. Y., by W. P. Gannon, 103 South Avenue, Syracuse, N. Y., and associates. The purchasing interests will maintain the present company and operations, and plan for the construction of a hydroelectric generating plant on Lake Lamoka with initial capacity of approximately 35,000 hp. to be used in conjunction with the present system.

The Oswego Falls Corporation, Fulton, N. Y., has been organized with a capital of \$2,500,000 to take over and consolidate the plants and businesses of the Oswego Falls Pulp & Paper Corporation, Fulton, and the Skaneateles Paper Co. and the Seal Right Co., Inc., both of Skaneateles. The merged company will operate three mills at the two places noted, and has preliminary plans under consideration for general expansion. For this latter purpose and general financing a bond issue of \$2,100,000 has been sold. H. L. Faddock is president.

Chicago

Chicago, Feb. 6.

The past week has been a quiet one in the local machine tool market, although a few sales of large machines have been closed. Large industrial companies which are normally large purchasers of machine tools are not active in the market and Western railroads are still delaying action on their lists. Inquiries for single machines from widely distributed sources are still the rule and in many cases these prospects are uncovered only after a thorough canvass by the sales forces of local machinery houses. There continues to be a certain amount of shopping in the local district, but in most cases prospective buyers are looking for bargains, showing a preference for used equipment or demonstration machines.

Among recent orders placed may be mentioned a used 60-in. boring mill and a 36-in. x 26-in. x 8-ft. open-side planer bought by the A. Y. McDonald Mfg. Co., Dubuque, Iowa. The Erie Railroad has placed an order for two No. 3 Niles axle lathes with the David A. Wright Machinery Co., Chicago. A 24-in. shaper has been purchased by the Illinois Central. The Santa Fe continues to add a few items to its pending list from time to time, the latest additions being one Atkins No. 7 power-driven hand saw or equivalent, and one Fay & Egan No. 62, or equivalent, universal wood-working machine, arranged for belt drive. Among other small inquiries recently received are the following: Wichita Northwestern Railway Co., Hutchinson, Kan., one used 36-in. x 6-ft. engine lathe, one used air compressor with 8-in. bore, 6-in. stroke and generating not less than 100 lb. pressure per sq. in., and one used 1½-in. bolt cutter; New Ulm Mfg. Co., New Ulm, Minn., a used centerless grinder and a small milling machine; Marinette Iron Works, Marinette, Wis., a used Acme 1¼-in. single bolt cutter; Steel Sign Service Co., Dearborn, Mich., a used iron bottom folder, with a capacity for 24-gage sheets.

The Dwyer Equipment Co., 9 West Kinzie Street, Chicago, manufacturer of "Twinfan" ventilating heating units, has let contract for a one-story plant, 60 x 125-ft., at 4534 North Avenue, to cost \$15,000.

Michaelson & Rognstad, architects, 3815 West Congress Street, Chicago, are preparing plans for a one-story foundry and machine shop, 80 x 144 ft., for the west side, to cost \$60,000. The architects will receive bids in about two weeks.

when the identity of the company for which the plant is to be built will be disclosed. The same architects have received bids on a three-story automobile building and repair station, 25 x 110 ft., 2452 South Michigan Avenue, for Landrey & Maypole, 2440 South Michigan Avenue. It will cost \$40,000.

Orlando Van Dunten, architect, 800 North Clark Street, Chicago, is receiving bids on a two-story automobile and machine repair shop, 42 x 82 ft., at Howard Avenue and North Clark Street, for R. Johnstone, to cost \$20,000.

L. G. Hallberg & Co., architects, 116 South Michigan Avenue, Chicago, are receiving bids on a two-story factory, 100 x 100 ft., on Western Avenue for the David J. Malloy Co. book binders, 633 Plymouth Court, at a cost of \$100,000.

The Western Electric Co., Hawthorne, Ill., is having plans drawn for a four-story factory for the manufacture of packing material.

The General Die Casting Co., recently incorporated with \$25,000 capital stock by M. C. Duhr, J. G. Turner and D. C. Robson, will manufacture die castings in standard and special alloys. It has leased a plant at 2533-2539 North Ashland Avenue, Chicago, and its initial equipment will comprise 12 die casting machines and necessary appliances.

The Public Service Co. of Northern Illinois, 72 West Adams Street, Chicago, proposes to erect a power plant with a capacity of 200,000 kw. on a site of 87 acres which it has acquired near Waukegan, Ill.

The Chicago Grain Products Co., manufacturer of grain alcohol, has started the erection of a power plant in connection with its distillery at Rockford, Ill., to cost \$102,000.

The Central Illinois Public Service Co. is preparing plans for a new power plant at Grand Tower, in Jackson County, Ill., with an initial capacity of 30,000 kw. It also proposes to increase the capacity of its Harrisburg, Ill., plant to 30,000 kw.

The Casey-Hudson Co., manufacturer of screw machine products, 361 East Ohio Street, Chicago, will move to Chelsea, Mich., where it will occupy a foundry and power plant purchased from the Lewis Spring & Axle Co.

The Power plant of the Wood Lake Electric Co., Wood Lake, Neb., was recently destroyed by fire with a loss estimated at \$5,000.

The Peoria Auto Parts Co., Peoria, Ill., is having plans prepared for a new two-story works, 60 x 100 ft., to cost about \$100,000, including equipment. B. L. Hulsch, Jefferson Building, is architect.

The Woodmanse Mfg. Co., 10 Galena Street, Freeport, Ill., manufacturer of pumps, windmills, etc., is planning for the erection of a new two-story addition estimated to cost about \$35,000.

The office of the Purchasing Agent, Post Office Department, Washington, will receive bids until Feb. 20 for six electric tractors, 400 trailers, and 1200 combination balance trucks and trailers for use at the Chicago post office.

The Board of Education, Lincoln, Neb., has commissioned Fiske & Meginnis, architects, 533 Bankers' Life Building, to prepare plans for a one-story vocational shop for use in connection with the city high school, estimated to cost about \$125,000, including equipment. J. G. Ludlam is secretary of the board.

The Farmers' Terminal Packing Co., 320 Commerce Building, St. Paul, Minn., has plans under way for a one-story ice-manufacturing plant, 100 x 100 ft., estimated to cost about \$60,000. Bids will be asked early in the spring. The Neestrom-Lindquist Co., 810 Lumber Exchange Building, Minneapolis, Minn., is architect.

A vocational department will be installed in the two-story high school to be erected at Clarkfield, Minn., estimated to cost about \$100,000. Bids will be called early in March. Prius, Buckley & Ross, Palace Building, Minneapolis, Minn., are architects.

A vocational department will be installed in the three-story and basement high school to be erected by the Board of Education, State Center, Iowa, estimated to cost about \$135,000. Plans are being prepared by H. E. Reimer, architect, Kibby Building, Marshalltown, Iowa.

Detroit

Detroit, Feb. 6.

At a recent meeting of the Northern Wheel Co., Alma, Mich., plans were outlined for taking over the plant of Bollstrom Motors, Inc., St. Louis, Mich. The plan proposes increasing the common stock of the wheel company by \$250,000 to purchase the Bollstrom plant and add new equipment to manufacture automobile wheels.

The Anchor Concrete Machinery Co., Rock Rapids, Iowa, moved to Adrian, Mich., and incorporated for \$100,000.

The plant and site of the Adrian Steel Castings Co. have been purchased and machines for producing blocks, bricks and cement will be made.

The Alamo Heating Co. and the Gray Iron Foundry Co., both of Muskegon, Mich., which have been working on a partnership agreement for the past year in the manufacture of furnaces and other foundry and machine products, have formed a new corporation, capitalized at \$100,000, to operate under the name of the Gray Iron Foundry & Furnace Co.

The Cyclone Motors Co., maker of motorcycles, which recently announced that it would locate in Benton Harbor, and which is headed by John M. Eaton, long associated with the Lincoln Motors, has entered into a contract to buy the plant of the Peninsular Lumber Co., Benton Harbor.

The Brunswick, Balke, Collender Co., Chicago, will locate its entire facilities for the manufacture of phonograph record disks at the present phonograph plant in Muskegon, Mich. About 300 more men will be added to the working force at Muskegon.

The Lincoln Mfg. Co., Detroit, will build an addition in the spring. It will be three stories, 30 x 115 ft., and will cost \$100,000. The company manufactures electric lighting fixtures.

The Victor Screw Works, Inc., and the Peninsular Milled Screw Co., both of Detroit, have been merged under the name of the Victor-Peninsular Co. The consolidated organization will occupy a new plant at Lawton and Hancock streets and will manufacture a complete line of machine screws and other threaded machine products.

Fire, Jan. 24, destroyed a portion of the plant of the Barnes Wire Fence Co., Detroit, with loss estimated at about \$65,000, including equipment. The works of the Selk Brothers Machine Co., also, were partially destroyed, with loss approximating \$23,000.

The Grand Rapids Metal Products Co., 1530 Monroe Avenue, N. W., Grand Rapids, Mich., is planning for the installation of a new drill press and other machine tool equipment.

The Cadillac Tool Co., Detroit, has decided to dissolve, and accordingly this dissolution is going on. A new concern to take its place in the territory of the old company has just been incorporated under the name of the Cadillac Machinery Co. and will have the old personnel of the Cadillac Tool Co., which were engaged in the sale of machine tools. The new concern will not do any manufacturing, as did the old, but will devote its entire efforts to the sale of machine tools. The personnel of the Cadillac Machinery Co. will consist of C. L. Campbell, C. E. French, L. E. Bugbee, C. G. Valentine, and R. J. Borneman, and the same territory will be covered as previously covered by the Cadillac Tool Co. The wish of Mr. Fowl, the former president, as expressed in his will, was that the men associated with him in the Cadillac Tool Co. should continue to be interested in carrying on the business which he started. The result is that at the dissolution of the Cadillac Tool Co. the Cadillac Machinery Co. has been formed. Its sales room is located at the corner of East Lafayette and Beaubien streets.

Philadelphia

PHILADELPHIA, Feb. 6.

The Bureau of Supplies and Accounts, Navy Department, Washington, is taking bids under schedule 9416 for one shearing machine, one cutting machine and power press, until Feb. 21, for use at the Philadelphia Navy Yard.

The Reading Hardware Co., 816 Arch Street, Philadelphia, manufacturer of hardware and metal specialties, with plant at Reading, Pa., has acquired the property of the Haverford Cycle Co., 9 North Street, 25 x 114 ft., for its local branch.

Fire, Jan. 29, completely destroyed the box plant of Clements Brothers, Delaware Avenue and Water Street, Philadelphia, with loss estimated at close to \$70,000, including woodworking and other machinery.

The Wayne Oil Tank & Pump Co., 112 North Broad Street, Philadelphia, with plant on Canal Street, Ft. Wayne, Ind., has leased the new building to be erected at Broad Street and the Richmond branch of the Philadelphia & Reading Railroad for a local factory branch.

The Bureau of Water, City Hall, Philadelphia, is having plans prepared for a one-story machine shop and automobile service works, 100 x 160 ft., at Twenty-eighth and Cambria streets, estimated to cost about \$60,000.

A vocational department will be installed in the new junior high school buildings to be erected by the Board of Education, Philadelphia, consisting of three schools, at Twenty-fourth and Jackson streets; Fifty-fourth and Warrington streets, and at Thirteenth and Loudon streets, respectively. A fund of \$2,000,000 is being arranged.

F. M. White, 1115 Olive Street, Philadelphia, manufacturer of wire products, has awarded contract to **Frank I. Wintz**, 1615 North Twenty-seventh Street, for a two-story and basement addition, 60 x 95 ft., adjoining the present works, estimated to cost about \$25,000. Wire braiding and other machinery will be installed.

The **John E. Thropp's Sons Co.**, Lewis Street, Trenton, N. J., manufacturer of rubber-working machinery, has organized the **Hendrie Rubber Tire Co.**, capitalized at \$200,000 under State laws, to take over and operate the plant of the **Hendrie Rubber Co.**, Torrance, Cal. The plant will be arranged to develop a capacity of 350 tires and 200 tubes per day. The new company is headed by **Thomas H. Thropp**, president and general manager; **Peter D. Thropp**, vice-president; **John E. Thropp**, secretary; and **William Baker**, treasurer. The last noted will take up a residence at Los Angeles and be in charge of operations.

Fire, Jan. 27, destroyed a portion of the ice-manufacturing plant of the **American Ice Co.**, Philadelphia, at Atlantic City, N. J., with loss estimated at about \$60,000. The company has just broken ground for the erection of a one-story and basement addition, 44 x 149 ft., at Arctic and Michigan avenues.

A vocational department will be installed in the three-story and basement, 130 x 165 ft., senior and junior high school, to be erected at Wayne by the **Radner Township School District**, **Joseph C. Egbert**, secretary, 115 North Wayne Avenue, Wayne, Pa., estimated to cost about \$150,000. **H. C. Richards**, 608 Chestnut Street, Philadelphia, is architect.

The **Freed Heater Co.**, Collegeville, Pa., manufacturer of heating equipment, iron castings, etc., is planning for enlargements, with new equipment. The company is now giving employment to about 60 core makers, molders and machinists. A capital stock issue totaling \$100,000 is being arranged to provide funds for the expansion.

The **United Ice & Coal Co.**, Forster and Cowden streets, Harrisburg, Pa., will soon call for bids for its new one-story ice-manufacturing and refrigerating plant, 60 x 150 ft., at Seventh and Schuylkill streets, estimated to cost about \$150,000. It will have an initial daily capacity of about 100 tons. **Mahlow Miller** is head.

The **East Penn Foundry Co.**, Macungie, Pa., has enlargements in its plant under way. New equipment for brass casting and other manufacture will be installed.

The **Nileco Lamp Works, Inc.**, Emporium, Pa., has been chartered under State laws with capital of \$100,000 to manufacture electric lamps, operating at the former plants of the **General Electric Co.**, at Emporium and St. Marys, Pa., recently acquired. **B. G. Erskine** is president, and **Guy S. Felt**, treasurer.

The **Butler Automotive Steel Co.**, Easton, Pa., recently organized, has taken over the local plant and business of the **Butler-Edwards Electric Co.** Operations will be devoted to the manufacture of automobile parts and affiliated steel specialties, and the line of electrical equipment heretofore produced will be discontinued.

James & Son, Plymouth, Pa., manufacturers of mine drills and kindred equipment, have consolidated with the **Bittenbeader-Legrand Mine Drill Works**, Barney Street, Wilkes-Barre, Pa., manufacturer of similar equipment. The present Plymouth works will be removed to Edwardsville, Pa.

Claude V. Brong, 524 Linden Street, Allentown, Pa., operating a mechanical and vulcanizing shop, is planning for the installation of a new department to manufacture storage battery equipment and for general electric battery repair work.

Cleveland

CLEVELAND, Feb. 6

Machine tool orders show some gain and there is a marked increase in the number of inquiries, some of which are for round lots of tools. While a few of the larger inquiries are regarded as tentative, they indicate that machinery users are at least considering the buying of equipment. Several inquiries have come out for automatic screw machines. One is a tentative inquiry from a manufacturer of electrical equipment for 60 to 75 machines. Another is from an automobile manufacturer for 15 machines and a third from a locomotive plant for four to six machines. A Michigan automobile manufacturer is contemplating the purchase of from 15 to 20 planers to replace present equipment. A Detroit plant is figuring on the purchase of machine tool equipment for making 25,000 motor valve stems per day. A **Rattle Creek, Mich.**, manufacturer is reported to be in the market for three turret lathes.

Locally an improvement in single tool orders is noted, much of this business coming from makers of various specialties and some from manufacturers of automobile accessories. One dealer took an order for a lathe for shipment by from the factory. Cases are reported where manu-

facturers have withdrawn from the market some machinery that they had offered for sale, advising the trade that with improvement in the outlook they may have use for the machines. For the first time in months a little machine tool business is coming from the Akron rubber industry. The **Herbrand Co.**, Fremont, placed orders for a 1200-lb. and a 1500-lb. board drop hammer to replace present equipment. A Cleveland foundry and machine shop is inquiring for a 10 ft. vertical boring machine with extensions providing a 16-ft. swing.

The **National Acme Co.**, Cleveland, has announced price reductions on its line of automatic screw machinery effective Feb. 1. These vary on different types of machines, but average approximately 25 per cent.

The **Wright Mfg. Co.**, Lisbon, Ohio, has taken up the manufacture of automobile pistons in connection with its regular line of chain hoists, trolleys and cranes.

The **Palmer Match Co.**, Kenmore, Ohio, recently incorporated with a capital stock of \$5,000,000, will receive bids shortly for its proposed new plant.

The **W. W. Sly Mfg. Co.**, Cleveland, has taken a contract for sand blast equipment for the Detroit plant of the **American Car & Foundry Co.** This equipment is designed for cleaning four freight cars at a time.

The **Vervoort Ball Bearing Co.**, East Eighteenth Street, Cleveland, has taken over the **Superior Roller Bearing Co.**, formerly located in Canton, Ohio. Officers have been elected as follows: President, **J. T. Koepke**; vice-president, **J. V. Zupnik**; secretary and general manager, **Henry G. Tremmel**; treasurer, **E. W. Watson**. The company is building a new plant which will be completed in the spring.

The **Kerscher Brothers Machinery Co.**, 915 Ontario Street, Toledo, Ohio, manufacturer of hydraulic and electrically operated freight and passenger elevators, has completed plans for a one-story addition, 75 x 150 ft. **George J. Kerscher** is president.

A vocational department will be installed in the new two-story high school to be erected by the Board of Education, Westerville, Ohio, estimated to cost about \$190,000. **Glass & Austin**, Glasco Building, Columbus, Ohio, are architects.

New England

BOSTON, Feb. 6.

There is considerable machine tool prospective business in this territory, but it is maturing slowly. A week ago it was generally anticipated in local circles that a good amount of business would be booked by now, but results have been disappointing. Additional prospects have come to light since then, largely from small and unimportant interests, involving one, two or three pieces of equipment, and generally used machinery. The local trade, at least, has not lost its enthusiasm and cheerfulness, however, and believes that purchases cannot be delayed much longer.

Among sales the past week were one 16-in. x 6-ft. lathe, and one 9-in. x 3-ft. tool bought by two separate local concerns; two 9-in. x 4-ft. lathes to a greater Boston automobile service station; one 24-in. x 10 ft. lathe to Worcester interests, special grinding production equipment to **Gray & Davis**, Cambridge, Mass., lighting and starting systems; special boring machine, costing \$12,000, to another Cambridge manufacturer and a 16 in. x 10-ft. toolroom lathe to the **Hood Rubber Co.**, Watertown, Mass. Possibly 20 other lathes, including some 36-in. tools, are under negotiation. Competition for lathe business is keen, and prices naturally are in the buyer's favor.

The **H. B. Smith Co.**, Westfield, Mass., inquiry includes one 18 in., one 20 in. and 14 plan turning lathes, one 72-in. and one 30-in. planer; one No. 6 Becker vertical milling machine, one 4-ft. radial drill; one 32-in. upright drill, one 24-in. shaper, floor boring equipment, a wet tool grinder, and a keyseater. The **Lamson Co.**, Boston, is inquiring for three-piece working machines, a gate shear, double angle shear, double end punch and shear, and miscellaneous smaller equipment for its new Rochester, N. Y., plant. In both instances these concerns are planning to take at least some used equipment. The **New England Oil Refining Co.** has a small list of shop equipment needed for a Rhode Island plant. The **Boston & Albany Railroad** is inquiring for brass work lathe equipment, and a Worcester concern for shaper and lathe requirements.

One of the most encouraging features in the New England machine-tool industry is the greater activity in small tools, which generally is indicative of increased bookings on heavier equipment. At least one company reports January sales of small tools as larger than in any previous six months. Other representatives of machine tool builders note a larger movement of small equipment out of stock.

In line with this information is a decidedly better inquiry for abrasive wheels, the demand, however running more to

the smaller than the larger sizes. In contrast, it may be said that probably no branch of the machine tool industry is less active than the grinding machine. The increased call for small abrasive wheels would therefore indicate more activity in small machine shops. The market on drills and reamers is unsettled, due to the wide variety in prices for and origin of stock offered.

Excavating has begun for a one-story, 60 x 65 ft. machine shop to be erected in Nathan Place, Lynn, by George T. Covert, Spring Street.

The Fales & Jenks Machine Co., Pawtucket, R. I., has purchased land adjoining its plant on Dexter and Barton streets, on which an addition is contemplated at some future date.

The Fall River Gas Works Co., Fall River, Mass., will erect a one-story, 26 x 42 ft. boiler house. John J. Dillon, 24 Manton street, will supervise the construction.

The George Grow Tire Co., Canton, Mass., contemplates the erection of an addition to cost approximately \$25,000.

The plant occupied by Stone & Murphy, Middletown, Conn., automobile accessories, last week was badly damaged by fire. It will be rebuilt.

The R. H. Long Co., Framingham, Mass., automobiles, has leased for a long term of years, 30,000 sq. ft. of floor space at 846 Commonwealth Avenue, Boston, as a show room and service station.

Fire, Feb. 1, in the finishing and etching department of the Lamson & Goodnow Co., Shelburne Falls, Mass., maker of cutlery, burned out the upper portion of the building. Loss on building is estimated at \$10,000, which figure will be heavily increased by loss on machinery and stock, as yet undetermined. The company reports that delivery of orders will be resumed within a week. Arthur J. Rowland, superintendent, while inspecting the ruins, suffered a fall which resulted in breaking both his legs and one foot arch.

The W. F. Concannon Shear Co., 42 Depot Street, Milford, Conn., has recently been incorporated to manufacture steel shears and scissors. The capital stock is \$20,000, and the officers are: President, W. F. Concannon, Bridgeport and Edwin L. Oviatt, Milford, treasurer. It has taken over the old mill building of the Milford Grain Co. and production has been started.

The New Haven Appliance Co., New Haven, Conn., was recently incorporated to carry on a general manufacturing business. The capital stock is \$50,000 and the incorporators are H. H. Holmes, 126 Mansfield Street, H. W. McQuinn, New Haven, and R. H. Chirwin, Hamden, Conn.

A vocational department will be installed in the new junior high school to be erected by the city of Worcester. The Joseph D. Leland Co., Boston and Worcester, are architects-engineers.

The Narragansett Electric Lighting Co., 170 Westminster Street, Providence, R. I., has preliminary plans for a new power plant and mechanical works at Longfellow and Melrose streets. The power plant will be two-stories, 40 x 56 ft., and two mechanical buildings, three-stories, 100 x 222 ft., and one-story, 120 x 222 ft., respectively. The latter structure will be equipped with two electric traveling cranes. A machine shop and garage for company cars, 114 x 172 ft., will also be erected. The entire plant will approximate four acres of floor space. Bids will be asked early in March. Jenks & Ballou, 1035 Grosvenor Building, Providence, are engineers.

The Bureau of Yards and Docks, Navy Department, Washington, is taking bids until Feb. 15, under specification 4570, for a motor generator set and switchboard for use at the Connecticut submarine base of the department.

The Cumberland County Power & Light Co., Portland, Me., has awarded a contract to the Foundation Co., 120 Liberty Street, New York, for a new power plant, estimated to cost close to \$1,000,000. Two turbine generating units will be installed, with auxiliary machinery.

A portion of the power house and other departments at the plant of the Atwood Box Co., Rock Village, Mass., were destroyed by fire, Feb. 1, with loss estimated at \$30,000.

Indiana

INDIANAPOLIS, Feb. 7.

The Indiana Electric Corporation, Indianapolis, is planning for the construction of an electric generating plant on the Wabash River, in the vicinity of the Vigo County coal fields, estimated to cost close to \$6,000,000, with equipment. Application has been made for permission to issue stocks and bonds to secure funds for the project. The company has also applied for permission to acquire seven electric power companies in this district, including the Merchants' Light & Heat Co., Indianapolis, for a consolidation.

Richard Miller, care of the City Trust Co., Market and

Delaware streets, Indianapolis, is organizing a company to operate a commercial automobile service and repair plant. Plans are being prepared for a five-story and basement works, on Illinois Street, estimated to cost about \$750,000. It will have a capacity of 700 cars. Bass, Knowlton & Co., 801 Hume-Mansur Building, are architects.

A vocational department will be installed in the two-story and basement high school, 200 x 248 ft., to be erected at Goshen, Ind., estimated to cost about \$300,000. A. H. Elwood & Son, room 201, Haynes Building, Elkhart, Ind., are architects.

The Visible Pump Co., Ft. Wayne, Ind., with plant at New Haven, Ind., is planning for the immediate removal of its plant to a factory at Findlay, Ohio, where production will be increased.

The Bloomington Nash Motor Co., Bloomington, Ind., has awarded a contract to the State Construction Co., 727 Indiana Pythian Building, Indianapolis, for the erection of a two-story and basement service and repair works, 85 x 130 ft., to cost \$80,000. Walter E. Hottle is head.

The Indiana & Michigan Electric Co., South Bend, Ind., has been granted permission by the Public Service Commission to issue preferred stock to an amount of \$300,000, the proceeds to be used in part for extensions and improvements.

The South Bend Brewing Co., South Bend, Ind., is building a one-story ice-manufacturing plant, 90 x 90 ft., to cost about \$60,000, including equipment.

The Bloomington Brick & Tile Co., Bloomington, Ind., has preliminary surveys under way for its new plant, estimated to cost about \$200,000, including machinery. A. W. Beecher is president.

Baltimore

Baltimore, Feb. 6.

Fire, Jan. 30, destroyed one of the machine repair shops at the plant of the Bethlehem Steel Corporation, Sparrows Point, Baltimore, with loss estimated at about \$50,000, including equipment.

The Board of Awards, City Hall, Baltimore, P. W. Wilkinson, secretary, is taking bids until Feb. 15, for six triple-combination, gasoline-driven pumping engines, and one 3½ to 4-ton tractor.

The Cumberland Sales & Service Station, Cumberland, Md., is having plans prepared for a new automobile service and repair building, 100 x 150 ft., estimated to cost about \$100,000, including equipment. T. W. Biddle, Jr., Cumberland, is architect.

The \$300,000 expenditure to be made by the Eastern Shore Gas & Electric Co., Salisbury, Md., during the present year for plant additions and improvements, will include the construction of a new generating plant at Laurel, Del., to cost about \$160,000; installation of new equipment in the switching and transformer plant at Salisbury; new transmission lines to cost over \$100,000, between Salisbury, Laurel and Denton, and to Cambridge, Md.; and miscellaneous distributing system equipment to cost about \$30,000.

The Western Maryland Railroad Co., Baltimore, has leased its car and locomotive repair shops at Elkins, W. Va., to W. K. Hosler, contractor, who will operate the plant as a private enterprise. It has been giving employment to about 100 men, and this force will be retained.

The Bureau of Supplies and Accounts, Navy Department, Washington, is taking bids until Feb. 14, under schedule 9422, for two gasoline engines for the navy yard at Annapolis, Md.

The plant of the Hagerstown Bearing Metal Co., Hagerstown, Md., has been acquired by the Maryland Smelting & Refining Co., 28 West Antietam Street, Hagerstown, recently organized. John D. Keith and Henry H. Keedy, Jr., head the company.

The Board of Awards, City Hall, Baltimore, will take bids until Feb. 15, for furnishing and delivering steel screens for the Loch Raven Dam waterworks, as per specifications on file at the office of William A. Megraw, water engineer, City Hall.

The Northern Maryland Electric Co., Elkton, Md., has closed negotiations for the purchase of the Havre de Grace Electric Co., operating at Havre de Grace, Aberdeen and Perryville, Md., and vicinity. Extensions and improvements are planned. The Northern Maryland Company is said to be planning also for the purchase of the Glipin Falls Electric Co., operating in the same section. J. H. Ware is president.

The Superior Anthracite Coal Corporation, Pikesville, Va., is planning for the installation of electrically operated mining machinery at its property, and other equipment. The company has increased its capital to \$100,000. Charles B. Smith is president.

Fire Jan. 23, destroyed the planing mill and machinery at the plant of the Thomasville Variety Works, Thomasville, Ga., with loss estimated at about \$75,000. K. E. Mack is head.

The Buick Ice Co., Cleveland, Ga., has plans under way for the erection of a new ice-manufacturing plant with initial capacity of about 30 tons a day.

The Wilson Motor Co., High Point, N. C., has acquired adjoining property and plans the erection of a three-story repair and service building, estimated to cost about \$75,000.

The Jefferson Mfg. Co., Columbia, S. C., is planning for the establishment of a new plant to manufacture road machinery and parts, corrugated culverts, etc. Harry J. Kuhr, Columbia, is president.

The Bureau of Yards and Docks, Navy Department, Washington, is taking bids under schedule 4570, until Feb. 15, for a motor generator set and switchboard for the Hampton Roads, Va., navy yard.

The Consumers' Coal Co., Masonic Temple, Winston-Salem, N. C., will build a new ice-manufacturing plant, with daily capacity of 30 tons, which later will be more than doubled. It will cost close to \$40,000.

M. L. Himmel & Son., 107 North Frederick Street, Baltimore, manufacturers of office fixtures, etc., are preparing to move into a larger plant at Culverton Road and Hollins Street.

• Cincinnati

CINCINNATI, Feb. 6.

January was the best month in a year, from the machine tool manufacturers' standpoint, a number of fair sized orders being booked by local builders. The first week in February also showed fair activity and indications point to a steadily increasing business. During the week a local manufacturer booked an order for 10 shapers from an Eastern concern. A Michigan motor manufacturer is also understood to have placed an order for 12 grinding machines of special type in this market. A manufacturer of boring mills booked an order for three machines, and another manufacturer reports orders the past week for five drilling machines and three engine lathes. The International Nickel Co. purchased tools for its Huntington, W. Va. plant. A local planer manufacturer booked orders for two machines, one for Western shipment and another for a manufacturing plant in New York State. There are several inquiries before the trade, one of which is from the Ford Motor Co. for a large planer and another from a northern Ohio manufacturer for three gear cutting machines. The number of inquiries for single tools is also increasing steadily and a fair percentage is developing into orders. Local manufacturers see in the settlement of the Shantung problem, indications of better business with the Far East. One maker was informed by the president of a New York exporting house, which recently inquired for 15 tools for Japanese shipment, that this order and many others would probably be placed soon after the political problems in the Far East has been ironed out. Used machinery dealers report a slight falling off in the volume of business offering but there is still a fair market for what might be called bargains in used equipment.

The Hocking Valley Railroad Co. has issued a list of seven tools, including one 25 x 10 heavy geared head, a.c. motor driven engine lathe; one extra heavy double end car axle lathe with crane attachment 8 ft. between centers; one 18 x 8 heavy duty geared head a.c. motor driven engine lathe; one 24 x 8, heavy duty a.c. motor driven engine lathe; one 36 x 6, slab milling machine, motor driven; one 36 in. stroke motor driven, crank planer; one punch and shear capacity of 1-in. diameter holes 3/4-in. iron or mild steel.

The Universal Metal Box Co., Cincinnati, has been incorporated with a capitalization of \$75,000. Its plans as to location and products have not been definitely completed. D. A. Walker, president Cadillac Can Co., 835 West Sixth Street, heads the company.

Fire Dec. 22 practically destroyed the plant of the Breese Brothers Co., sheet metal manufacturer, at 2347 Reading Road, Cincinnati. The damage is estimated at \$50,000. Temporary quarters have been secured and business will be continued. Plans for the future have not been completed but it is expected that a larger building will be erected on the site of the old plant.

Reports are current that manufacturers of closely allied tools are considering the advisability of consolidating their interests to reduce manufacturing costs. This is more a subject for discussion among manufacturers who have large plants and in one instance something of this nature has already been done.

The Pacific Machinery Co., 1721 Powers Street, Cincinnati,

is in the market for one 75 to 100-kw., d.c., 220 volt, belted type generator with a speed of 600 to 1200 r.p.m. New or used equipment in good condition will be considered. It is also in the market for a number of small automatic gear cutters for cutting cotton mill spur gears from 1 1/4-in. to 10-in. diameter. Gears to be cut are 5 pitch. Rapid and accurate work is essential.

The National Cash Register Co., Dayton, Ohio, is planning the erection of a five-story factory and also will make improvements on its school house and theater. Work will commence immediately.

The Mid-West Glass Co., 406 West Fourth Street, Cincinnati, has been incorporated with a capitalization of \$300,000 to manufacture automobile accessories. It has taken over the Herschede Glass Co. and the Dacin Glass Co. and will at once commence the manufacture of glass fixtures and a gasoline gage. Albert W. Erkins is president.

The Gartland-Haswell Foundry Co., Sidney, Ohio, has been incorporated with a capitalization of \$10,000. The foundry has been operated as a partnership and the change to incorporation is made merely as a matter of business convenience. J. C. Haswell, Dayton, Ohio, is president.

The Ohmer-Fare Register Co., Dayton, Ohio, which recently went into production on the Ohmer Truck Auditor, is not contemplating immediate extensions to its plant, according to officials of the company. It is possible, however, that in the near future it will be necessary to enlarge its capacity.

The Central South

ST. LOUIS, Feb. 6.

The Board of Public Improvements, City Hall, Hannibal, Mo., has plans under way for a municipal electric light and power plant, estimated to cost about \$170,000. The Arnold Co., 105 South La Salle Street, Chicago, is engineer.

The Derby Oil Co., Wichita, Kan., has work under way on a new oil refinery to cost about \$500,000, including machinery.

The Lee Mfg. Co., Vandalia, Mo., manufacturer of automobile tire chains, has acquired property at Jefferson City, Mo., and contemplates the removal of its plant to this location. The present works will be enlarged at the new location. Ralph Knox is president.

The City Council, Parsons, Kan., will soon call for bids for a new steam-operated power plant, to be used in connection with the waterworks system. Burns & McDonnell, 402 Inter-State Building, Kansas City, Mo., are consulting engineers. F. W. Frye is city clerk.

The Arctic Dairy Products Co., 115 West Sixteenth Street, Kansas City, Mo., is arranging for the erection of a new ice-manufacturing plant, with initial capacity of about 2500 tons, estimated to cost about \$45,000.

The Crane Enameling Co., Chattanooga, Tenn., recently formed as a subsidiary of the Crane Co., 835 South Michigan Avenue, Chicago, with capital of \$1,500,000, has acquired the Cahill Iron Works and the Mutual Enameling Co. both of Chattanooga, and will merge the interests with its organization. The purchasing company will operate both plants, comprising the new factory of the Mutual company in the Alton Park section, which will be used as the principal manufacturing unit, and the Cahill plant on Chestnut Street. Employment is now given to about 400 men. R. T. Crane, Jr., head of the parent company, is president of the consolidated organization.

A vocational department will be installed in the new two-story and basement high school, 97 x 130 ft., to be erected at Preston, Kan., estimated to cost about \$85,000. The contract has been let to George E. Dalton, Junction City, Kan. H. A. Noble, 411 Reliance Building, Kansas City, Mo., is engineer.

The Common Council, Altus, Okla., is arranging for the establishment of a municipal electric power plant to cost about \$115,000.

The Standard Crate & Filler Co., Jefferson City, Mo., recently organized with a capital of \$1,500,000, has acquired the plant of the J. M. Hays Wood Products Co., and will operate it as the first unit of its works. About 50 acres has been secured and plans are being prepared for the erection of an adjoining works to manufacture strawboard and kindred products, estimated to cost about \$400,000, including machinery. A. W. Happy is general manager.

The Southern Refrigeration Co., Unika Bank Building, Johnson City, Tenn., has preliminary plans under way for a new three-story ice-manufacturing and cold storage plant, 100 x 100 ft., estimated to cost \$300,000, including machinery.

The Common Council, Hutchinson, Kan., is having plans prepared for the erection of a one-story automobile service

and repair building for municipal cars, estimated to cost about \$50,000. R. B. Lee, City Hall, is engineer in charge.

A vocational department will be installed in the new high school to be erected at Wichita, Kan., for which \$1,000,000 in bonds have been voted. Lorentz Schmidt & Co., 121 North Market Street, architects, will prepare plans. J. L. Leland is city clerk.

The American Commercial Car Co., Gratiot and French streets, Detroit, will build two additions to the building recently acquired at Knoxville, Tenn., for a branch plant, to be 62 x 125 ft. and 62 x 100 ft. respectively, estimated to cost about \$30,000. Bids will be taken at once. R. F. Graf & Sons, Knoxville, are architects and engineers.

The Board of Education, Library Building, Kansas City, Mo., has taken bids for a new four-story and basement manual training school, 110 x 117 ft., in connection with the present high school building. C. A. Smith, 602 Finance Building, is architect. J. B. Jackson is secretary of the board.

Following the approval of a bond issue for \$300,000 at a recent special election, the City Council, Lawton, Okla., will soon select an engineer to prepare plans for the proposed municipal electric power plant and extensions in the distributing system. J. M. Haynes is secretary of the council.

The American Paper Products Co., St. Louis, is in the market for a second-hand 1000-1250 or 1500 kw turbine with condenser, in good condition. Ley P. Rexford is president and general manager.

Milwaukee

Milwaukee, Feb. 6.

The machine tool trade is undergoing an appreciable revival of buying interest and while the volume is by no means large or satisfactory, nevertheless inquiry of the past 10 days has been much more encouraging than at any time since the middle of December. The automotive industries seem to be manifesting greatest interest, due doubtless to the favorable impression made upon consumers by price reductions and the effect of the midwinter expositions, which is reflected by greater activity in local automotive parts industries, this being one of the principal centers of this character in the United States. Sales of milling machines are still few and far between, the bulk of business now passing being in lathes, boring mills, drill presses and grinders. Foundries here are steadily making small increases in working forces to handle new orders, which, however, are spotty and irregular rather than on an extended contract basis, leaving vacancies off and on in operating schedules.

The Green Bay, Wis., Warehouse & Cold Storage Co. has let a contract to the L. M. Hansen Co., local contractor, for the general construction of a new cold storage warehouse and refrigerator plant estimated to cost \$300,000, at Broadway and the Chicago & Northwestern Railroad tracks. The order for refrigerating machinery and equipment will be placed within a short time. The warehouse will be occupied by Armour & Co., Chicago, and five other concerns.

The Perfect Pump & Mfg. Co., Marshfield, Wis., has been granted a charter to manufacture and repair pumps, machinery, appliances, etc. It is incorporated with \$25,000 capital stock by Vernon Berg, F. L. Grube and Hugh W. Goggins. An experimental shop has been conducted for some time and will be enlarged into a manufacturing plant.

The Eagle Mfg. Co., Appleton, Wis., manufacturer of tractors and feed cutters, at its annual meeting voted to engage in several other lines of power farm operating equipment which it is now developing. For the present only a small quantity of new tools will be required, but later larger needs are expected to appear. A. W. Priest is president, and Charles Hagen, general manager.

The Fessenden-Ellis Co., Sheboygan, Wis., has been organized with \$5,000 capital stock by Louis P. Fessenden, Harry E. Ellis and J. B. Fessenden to manufacture pressure governors and similar appliances for controlling steam, gas and air. Steps will be taken at once to provide manufacturing and assembling quarters in Sheboygan.

The Richter Mfg. Co., Highland, Wis., manufacturer of adjustable farm gates and similar agricultural specialties, will incorporate its business with \$25,000 capital, following the entrance of William Gabler and Frank Wepking as part owners. The present factory will be doubled in size early in the spring.

The Advance Auto Body Co., Milwaukee, has been incorporated with a capital stock of \$110,000 to manufacture and repair automobile bodies. The incorporators are John A. Dietrich, Julian Olds and Howard T. Foulkes, attorneys, 31 Mason Street, representing interests whose identity will not be revealed until the enterprise reaches maturity.

The Safety Traffic Light Co., Milwaukee, has been

organized by Richard F. Downey, 361 Fryer Avenue, and Walter W. Lange, president South Side Malleable Casting Co., Fourteenth and Windlake avenues, to manufacture a patented dome light of counter-balanced design. Temporary offices have been opened at 425 East Water Street.

The Purcell-Wischan Co., Madison, Wis., automobile dealer, has let the general contract to Klug & Smith, consulting engineers, Mack Block, Milwaukee, for the erection of a public garage, sales and service building, 100 x 121 ft., two stories and basement, estimated to cost \$75,000. The machine shop will occupy a space, 60 x 100 ft., and will require a miscellaneous equipment of shop tools, fixtures, etc.

The Merrill Buick Co., Merrill, Wis., has plans for a new sales and service building, 57 x 125 ft., part two stories and basement, to be ready June 1. It will cost about \$25,000 complete.

The S. W. Miller Piano Co., Sheboygan, Wis., which disposed of its factory several months ago to the Sheboygan Fibre Furniture Co., to facilitate the expansion of the latter concern, has purchased a new site at Washington Court and Niagara Avenue, 108 x 600 ft., and will start work at once on the erection of a one-story brick and concrete factory, 56 x 108 ft., as a first unit of a new plant. In the meantime it is continuing production in a part of the original plant, which must be vacated May 15.

The Lincoln Warehouse & Auction Co., 226 Fourth Street, Milwaukee, has plans by G. H. Leopold, architect, 169 Martin Street, for a six-story, reinforced concrete, brick and steel building, 120 x 160 ft., at Third and Prairie streets, to cost \$250,000. It will require fire doors, steel sash, elevators, conveyor systems, boilers, etc.

The American Metal Products Co., Milwaukee, which recently completed its new brass and bronze foundry with electric furnace equipment at Thirty-third Avenue and Burnham Street, is engaging in quantity production of a poppet valve for internal combustion engines made from Ampeco bronze, a patented process. It will continue to make bronze castings by this formula, as well as bearing metals, ingots, etc. Carl J. Zaiser is general manager.

Arthur Seldenschwartz, architect, 425 East Water Street, Milwaukee, is taking bids in behalf of an unidentified interest for the construction of a public garage and repair shop, 100 x 150 ft., part two stories and basement, at Fifth and Cherry streets. It will cost about \$50,000.

The Three Lake, Wis., Board of Education has let the general contract to Hugo V. Hertling, Inc., Manitowoc, Wis., for a new high school with manual training department, estimated to cost \$125,000. Oppenhamer & Obel, Wausau, Wis., are the architects.

The Invincible Metal Furniture Co., Manitowoc, Wis., contemplates the erection of an addition to its factory which will increase its capacity from 50 to 75 per cent by June 1. The present plant is overcrowded with orders and more room is needed at once. At the annual meeting, John Schuette was elected president to succeed Louis Schuette. I. M. Stauffacher, Monroe, Wis., was re-elected secretary; George Alter, treasurer, and P. M. Wege, vice-president.

The Board of Education, DePere, Wis., is taking sealed bids until Feb. 25, for a new \$200,000 high school, which will contain vocational training facilities. The architects are Foeller, Schober & Stephenson, Green Bay, Wis.

The Allan-Diffenbaugh Wrench Co., Baraboo, Wis., manufacturer of patented wrenches and tools for machine and automotive shops, has booked several large jobbing orders which will keep the plant busy for more than 60 days. The line is being enlarged to embrace pipe wrenches up to 4-in. capacity. The shop equipment is being increased gradually to meet new demands.

Walter S. Woods, consulting engineer, LaCrosse, Wis., is taking bids in behalf of Dr. E. C. Swartout, 904 Rose Street, LaCrosse, for the construction of a 16-ft. concrete dam, 166 ft. long, remodeling the power house, and installing new dynamos, switchboards, waterwheels, etc., at West Salem, near LaCrosse. The work will cost about \$65,000 complete.

The Little Wolf Lumber Co., Manawa, Wis., will build a new hydro-electric power plant, with auxiliary steam equipment at an estimated cost of \$25,000. The work is in charge of Thomas W. Orbison, consulting engineer, 312 College Avenue, Appleton, Wis.

The Beaver Dam, Wis., Board of Education will take bids about March 1 for a two-story fireproof high school building, L-shaped, 7 x 139 and 30 x 130 ft., designed by Parkinson & Dockendorf, architects, LaCrosse, Wis. It will cost about \$200,000. George R. Ray is superintendent of schools.

The Simplicity Engine & Mfg. Co., Port Washington, Wis., has put into production a

repairs tool combining two approved methods of fitting gas engine blocks with new pistons. It is designed principally for garage and repair shop use.

The Standard Mfg. Co., Appleton, Wis., manufacturer of wood products, has increased its capital stock from \$80,000 to \$160,000. It is building a new sawmill costing about \$75,000 with machinery and equipment. R. O. Schmidt is president and general manager.

Pittsburgh

PITTSBURGH, Feb. 6.

As far as inquiries are concerned, there is a fairly active market in machine tools in this district, but sales so far this month are not showing up much better than January, which, with most of the trade, was a disappointment. One dealer reports the sale of a 24-in. Steptoe shaper for shipment to Butler, Pa., and a 31-in. motor-driven Rockford drilling machine to go to Shreveport, La. The U. S. Electrical Tool Co. has sold a 5-hp. heavy floor grinder to the Oil Well Supply Co. for shipment to Tulsa, Okla., and three grinders to the Westinghouse Electric & Mfg. Co. for installation at its Springfield, Mass., works. All bids against the 22 tools inquired for several months ago for the Western Penitentiary have been rejected, and it is now proposed to buy the tools as they are wanted. The Wheeling Steel Corporation has a list out for about 20 tools for its new rod and wire mills being constructed at its Portsmouth, Ohio, works and is expected to issue the list soon against the tools which will be wanted in connection with the improvements now in progress at Steubenville, Ohio. The crane market is almost stagnant. There are occasional requests for prices for estimating purposes, but new inquiries are lacking. It does not seem to be a question of price on either machine tools or cranes that is blocking sales. In both classes of equipment prices named are down to actual costs, and in some instances even lower, but prospective buyers do not seem to be willing to spend money at the present time and seem to believe they will be able to save on freight charges later. The borough of Tarentum, Pa., has placed the order for a 2,000,000-gal. pumping engine with the Worthington Pump & Machinery Corporation.

H. R. Eicher, House Building, Pittsburgh, is inquiring for a crane, steam or electric, 7 to 10 tons capacity, 35 ft. boom, with clamshell bucket, $\frac{3}{4}$ to 1-yd. capacity, straight traction or caterpillar trucks, with boiler and appurtenances.

The Standard Motorcar Co., Pittsburgh, has been organized by interests connected with the Standard Steel Car Co., Frick Building, to take over the manufacture and sale of the automobile branch of the latter organization. Operations will be conducted as heretofore and general expansion is planned. Don C. McCord has been elected vice-president of the new company, in charge of finance and sales, resigning a similar position with the Bankers' Commercial Securities Co., 19 West Forty-fourth Street, New York.

The Greenwood Construction Co., Terminal Building, Pittsburgh, has awarded contract to Walker & Curley, Farmers' Bank Building, for a new one-story mechanical shop, 62 x 120 ft. and 86 x 165 ft., at Carson and Twenty-fourth streets, estimated to cost in excess of \$60,000.

The West Penn Power Co., Pittsburgh, will increase the capacity of its Windsor power plant, Beech Bottom, W. Va., with the installation of two new 30,000 kw. turbo-generators and auxiliary operating equipment, estimated to cost in excess of \$3,000,000, including line construction. The company is also planning for extensions in its Springdale power plant with new equipment to effect a combined generating capacity at all plants of close to 190,000 kw.

The Corry-Jamestown Mfg. Co., Corry, Pa., manufacturer of metal furniture, is considering plans for an addition to its plant. D. A. Hillstrom is local manager.

The Lundale Coal Co., Lundale, W. Va., is planning for the construction of a new tipple in the vicinity of Three Forks, W. Va., including the installation of electrically operated and other mining machinery. The proposed work is reported to cost in excess of \$500,000. George M. Jones, general manager, is in charge.

A vocational department will be installed in the two-story and basement high school to be erected at Wayne, W. Va., estimated to cost about \$180,000. Holmbee & Pogue, Empire Bank Building, Clarksburg, W. Va., architects, are preparing preliminary plans. Herman P. Dean is secretary of the board.

The Williamson Supply Co., Williamson, W. Va., manufacturer of mine equipment and supplies, is planning to rebuild the portion of its plant recently destroyed by fire with loss estimated at about \$100,000.

The Hancock Steel Co., Martinsburg, W. Va., is completing planning work in connection with its new plant at Hancock, Md., plans for which have been held in abeyance for some time. It is expected to call for bids at an early date of the first unit, comprising a one-story

foundry, to be followed by a machine shop. Ernest McGeorge, 1900 Euclid Building, Cleveland, is engineer. F. Vernon Aler, Martinsburg, heads the company.

The Grasselli Chemical Co., Guardian Building, Cleveland, is planning for the construction of a new pumping plant in the Lost Creek, W. Va., section to cost about \$50,000, with machinery, for service at its plants at Grasselli and Meadowbrook, W. Va.

A vocational department will be installed in the junior high school, 72 x 219 ft., to be erected at West Charleston, bids for which are being taken up to Feb. 21. It is estimated to cost about \$150,000. Tucker & Patterson, Masonic Temple, are architects.

The Guyan Machine Shops, Logan, W. Va., are making inquiries for tools and operating equipment, including a turret lathe for brass bushing work, lathe for turning steel locomotive wheels, punch and shear to handle $\frac{1}{2}$ -in. plate, chain hoists, $\frac{1}{2}$ to 2-ton capacity, a quantity of shafting, steel and nickel, from 2 to 12 in. in diameter and metal lockers and tool racks for machine shops.

The Gulf States

BIRMINGHAM, Feb. 6.

The W. L. Lemly Foundry Co., Bessemer, Ala., manufacturer of iron pipe, etc., has acquired the Columbus Foundry Co., Columbus, Ga., manufacturer of similar products, and will merge the business with its organization. The pipe works at Columbus will be removed to the Bessemer plant.

The Common Council, Hatcher, Tex., is planning for the installation of a municipal electric light and power plant to cost about \$50,000. A municipal ice manufacturing plant is also planned.

A vocational department will be installed in the new high school to be erected at Stamford, Tex., estimated to cost about \$80,000. N. S. Holland is superintendent of schools.

Fire, Jan. 27, destroyed a portion of the oil refinery of the Terrell Cotton Oil & Refining Co., Terrell, Tex., with loss estimated at about \$50,000, including equipment. It is planned to rebuild. Grover C. Fix is general manager.

The Galveston-Houston Electric Co., Houston, Tex., has arranged for a bond issue of \$1,700,000, a portion of the proceeds to be used for plant extensions and improvements.

The Edwards Mfg. Co., 529-19 Eggleston Avenue, Cincinnati, manufacturer of sheet metal products, has completed plans and will soon break ground for its proposed new branch factory at Dallas, Tex., to be three stories, 100 x 200 ft., and estimated to cost about \$60,000. James F. Agnew is manager in charge.

The Texas Utilities Light & Power Co., Lubbock, Tex., is having plans prepared for rebuilding its local electric light and power plant, recently destroyed by fire.

The Humphreys-Pure Oil Corporation, Mexia, Tex., will commence erection early in the spring of its new oil refinery at Fort Meches, Tex., to have an initial output of about 10,000 bbl. per day. Col. E. A. Humphreys is head.

The Massey Concrete Products Co., Dallas, Tex., is arranging for the erection of an addition to cost about \$200,000, including machinery. Plans will be prepared at an early date.

The Florida Mill & Planing Co., Sumter, Fla., has completed plans for a new factory to cost about \$100,000, with machinery, to replace its works recently destroyed by fire. The installation will comprise planers, saws, matchers, etc., to provide for a daily output of about 35,000 ft. of timber. W. J. Fink is manager. G. F. Hauserman is construction engineer.

The Orleans Steel Products Co., 1021 Bienville Street, New Orleans, is making inquiries for power crankshaft grinding machines and attachments, and other equipment for automotive work.

The City Council, Orlando, Fla., is completing negotiations with the Orlando Water & Light Co. for the purchase of its local plant, to be operated in the future as municipal property. Extensions and improvements will be made and new equipment installed.

The Pacific Coast

SAN FRANCISCO, Jan. 31.

The Day & Night Solar Heater Co., Monrovia, Cal., will commence the immediate erection of a new one-story plant at Shamrock Street and Pothill Boulevard, for the manufacture of heaters and heating equipment, estimated to cost about \$30,000.

Grace Brothers, Santa Rosa, Cal., are having plans prepared for a three-story, reinforced-concrete addition to their ice-manufacturing and refrigerating plant, 60 x 76 ft.

Fire, Jan. 21, destroyed a portion plant of the Los Angeles Enameling & Japanning Co., 118 East Ninth Los Angeles, with loss estimated at close to \$20,000. The works will be rebuilt.

The American Refrigerating Co., Redondo, Cal., has preliminary plans under way for a new ice-manufacturing and refrigerating plant at Anita Street and the Camino Real, estimated to cost in excess of \$50,000.

Fire, Jan. 26, destroyed the power house of the Southern California Edison Co., Los Angeles, at Los Alamitos, Cal., with loss estimated at about \$75,000. It will be rebuilt.

The City Refrigerator & Fixture Co., Los Angeles, manufacturer of refrigerators, metal fixtures, etc., has had plans prepared for a new one-story plant, 40 x 135 ft. O. M. Warner, 220 Stinson Building, is architect.

The California Motor Car Co., Richmond, Cal., manufacturer of automobiles and occupying a temporary plant, has preliminary plans under way for the first unit of its new works on about six acres, recently acquired at Martinez. A main machine will be constructed, estimated to cost about \$15,000, of which amount approximately one-half is expected for machinery.

A vocational shop building will be erected at the new group of high school buildings to be erected by the Board of Education, Whittier, Cal., estimated to cost about \$525,000. Preliminary plans are being prepared by Myron Hunt, 1107 Hibernian Building, Los Angeles, architect.

The Santa Fe Railway Co., Kerckhoff Building, Los Angeles, will commence the immediate erection of a new ice-manufacturing and railroad refrigerator car precooling plant at Riverbank, Fresno County, comprising a main building, 146 x 170 ft., with extensions, 86 x 134 ft., and a number of smaller structures. A cooling tower, 45 x 98 ft., will be constructed.

The City Council, Eugene, Ore., has tentative plans for a municipal hydroelectric generating plant on the McKenzie River.

M. F. Buchman, Seattle, care of Thompson & Thompson, Mutual Life Building, architects, is having plans prepared for a new one-story machine shop at Seventh Avenue and Broad Street, estimated to cost about \$15,000, exclusive of equipment.

James Lindsey, 438 Worcester Building, Portland, Ore., and associates are planning the erection of a hydroelectric generating plant in the Marion Lake district, near Salem, Ore., estimated to cost about \$225,000.

Canada

TORONTO, Feb. 6.

A better buying movement is steadily making its appearance in this market, some dealers having booked fair sized orders during the week. Within the past few days dealers have closed orders for a number of tools for the Durant Motors, Ltd., which is equipping its plant at Leaside, Toronto, and it is expected that further buying will be done by this concern in the early future. Big lists continue absent from the market, but there is a fairly active demand for one or two machines from buyers spread over a wide territory. Equipment makers state business is becoming stronger and several have recently added to their working staffs. The demand for small tools is also making headway and dealers handling these lines report good business.

The Ontario Creameries, London, Ont., are in the market for complete refrigeration and ice-making equipment, estimated to cost \$30,000.

Morlin, Ont., plans to spend \$28,000 on power and light distributing plant.

Walkerton, Ont., will erect a power distributing station and install equipment to cost \$40,000.

The City Council, Collingwood, Ont., is asking for prices on motor generator and storage battery, to replace a wet battery system.

Warton, Ont., plans improvement to its water pumping plant including the installation of an electrically operated pump and large gasoline engine. Prices are asked on equipment estimated to cost \$25,000.

Baker & Redden, Thomas Street, Windsor, N. S., will build a sash and door factory and are receiving prices and information regarding equipment.

The factory owned by the Leggatt & Platt Bed Spring Co., 928 McDougall Street, Windsor, Ont., was recently damaged by fire with a loss of \$12,000.

The United States Hoffman Machinery Corporation, manufacturer of sanitary steam clothes pressing machinery, with main office in New York, has a plant at Syracuse, N. Y., has been in existence for the past 13 years, first under name of T. D. Palmer Co., and later under the name United States Hoffman Co., and United States Hoffman

OFFICE CHANGES

W. E. Hopton, the Hopton Co., White Memorial Bldg., Syracuse, N. Y., with branch office at Rochester, N. Y., has been named selling agent in New York State with exception of New York City and territory south of Albany, for the Atlas Car & Mfg. Co., Cleveland, manufacturer of storage battery locomotives and trucks, electric locomotives and cars, complete equipment for industrial railroads including dryer cars, transfer cars, turntables, specially designed cars for rolling mills, mines, factories and plantations and by-product coke plant equipment.

The Chillingworth Engineering Corporation, 143 Liberty Street, New York, announces that it has associated with it Frank H. Plum, Herbert Pluemer, George E. Mellin and Harold Von Thaden, formerly of the C. W. Hunt Engineering Corporation, and with the consent and approval of the Hunt corporation will carry on a business of a character similar to that conducted by the latter.

The general offices of Pneumercator Co., Inc., have been removed from 15 Park Row, New York, to Sperry Building, 10 Flatbush Avenue Extension, Brooklyn.

On April 1 the Barrett-Cravens Co. will move to its new four-story factory recently acquired at Monroe and Throop streets, Chicago.

The Homestead Sales Corporation, 242 Lafayette Street, New York, has been appointed sole agent for New York and vicinity by the General Specialty Co., Buffalo, N. Y., in the sale of its torpedo tube cleaner and other boiler cleaning specialties. J. E. Jones, manager Homestead Sales Corporation, reports a reviving interest in the valve and steam specialty line. This company is now handling the following lines: Homestead valves, General Specialty Co.'s line of tube cleaners, Atlas valves and steam specialties.

The Rathbun Jones Engineering Co., Toledo, Ohio, has appointed the Ingersoll-Rand Co., New York, general sales agent for Rathbun gas engines. These engines are well known to the trade. They are of the vertical, multi-cylinder type and are built to operate on natural, illuminating, producer, coke oven, oil still and other forms of gases which can be successfully handled in an internal combustion engine. Sizes range from 100 brake hp. to 1450 brake hp.

Coleman-Shoemaker, Inc., Philadelphia, now occupies its new plant at Twentieth and Clearfield streets, where it has a railroad siding and overhead crane. This makes it possible to render greater service in handling machinery.

The Blairsville Iron Works has been sold to a new corporation, which will be known as the Conemaugh Iron Works Co., with general offices at Latrobe, Pa., and works at Blairsville, Pa. The company makes split ingot molds, stools and gray iron castings.

Iron Trade Products Co., Farmers Bank Building, Pittsburgh, has taken over for a period of years the exclusive sales agency for the Seanor Coal Mining Co., operating 800 acres of low volatile coal; mine known as Heckler Mine, Seanor Station, Somerset County, Pa., Pennsylvania Railroad, Group 1. This is a pool of low volatile coal.

The name of the Globe Steel Co., Mansfield, Ohio, has been changed to the Globe Iron-Crush & Shot Co.

E. F. Whitaker has become associated with Frank W. Trabold, 30 Church Street, New York, to serve as direct agent of Armstrong Bros. Tool Co., Spicer Mfg. Co., the Bronze Alumina Co. and the Cleveland Abrasive Wheel Co., Cleveland. A new safety hoist hook will be distributed.

Pittsburgh office of Briggs & Turivas, Inc., Chicago, iron and steel scrap, has been removed from 911 Union Arcade to 427 Oliver Building. T. S. Downing is manager.

Youngstown Boiler & Tank Co. Meeting

Last year the Youngstown Boiler & Tank Co., Youngstown, Ohio, operated an average of 80 per cent., shareholders were informed Jan. 26 at the annual meeting. At present operations are not in excess of 65 per cent. The company has a force of about 50 erectors in the field. It manufactures tanks and fabricates steel work.

The company now has in course of erection four 50,000-bbl. oil storage tanks in the South-West for an oil refining interest.

These directors were elected—James P. Keene, William H. Heywood and Charles R. Vogel of Youngstown; R. I. Ingalls of Birmingham, Ala. and E. D. Patterson of Dayton, Ohio. Directors elected the following officers—President, James P. Keene, vice-president, R. I. Ingalls and

IRON AND STEEL STOCKS

Prices for Grains May Have Been a Sustaining Factor

Most of the steel shares have been in better demand of late and prices for them have ruled firm. Reasons for the better demand are not clear. Quarterly earnings statements, issued recently, while indicating a turn for the better has come in the steel industry, disclose little more. Incoming business is not of sufficient volume to materially increase mill production. Nothing has been said recently regarding mergers of steel properties but what already is known. Higher prices quoted for wheat, corn and oats represent greater buying power of farmers and increased railroad earnings. Possibly there is some connection between grain and steel share quotations.

The range of prices on active iron and industrial stocks from Monday of last week to Monday of this week was as follows:

Allis-Chal., com. 41 1/2 - 46 1/2	Lackawanna .t. 45 1/2 - 47 1/2
Allis-Chal., pf. 90 1/2 - 92	Midvale Steel 28 1/2 - 30 1/2
Am. Can., com. 36 1/2 - 38 1/2	Nat. Acme 11 1/2 - 12 1/2
Am. Can., pf. 95 - 96	Nat. L. & S., com. 35 1/2 - 41 1/2
Am. C. & F., com. 144 1/2 - 146 1/2	N. Y. Air Brake 57 - 58 1/2
Am. Loco., com. 104 1/2 - 108 1/2	Nova Scotia St. 25 1/2 - 27 1/2
Am. Loco., pf. 113 1/2 - 114	Pitts Steel, pf. 63 1/2 - 65 1/2
Am. Rad., com. 82 - 83	Pressed St., com. 63 1/2 - 65 1/2
Am. St. Fd., com. 30 1/2 - 32 1/2	Pressed Steel, pf. 93 - 93
Am. St. Fd., pf. 94 - 94	Ry. St. Sp., com. 95 1/2 - 98
Bald. Loco., com. 94 1/2 - 102 1/2	Ry. St. Sp., pf. 112 - 112
Bald. Loco., pf. 106 - 106 1/2	Replote Steel 31 1/2 - 31 1/2
Beth. Steel, com. 55 - 57 1/2	Sloss, com. 41 - 41 1/2
Beth. St., Class B 59 1/2 - 62	Superior Steel 28 1/2 - 30
Beth. St., 8% pf. 106 1/2 - 108	Transue-Williams 32 1/2 - 34
Chi. Pneu. Tool 59 - 64 1/2	Un. Alloy Steel 26 1/2 - 28
Colo. Fuel 25 1/2 - 26 1/2	U. S. Pipe, com. 17 - 19 1/2
Crucible St., com. 59 1/2 - 62 1/2	U. S. Pipe, pf. 56 - 58 1/2
Crucible St., pf. 80 - 82	U. S. Steel, com. 84 1/2 - 87 1/2
Gen. Electric 142 - 148	U. S. Steel, pf. 115 1/2 - 117 1/2
Gl. No. Ore Cert. 31 1/2 - 34	Vanadium Steel 32 1/2 - 35 1/2
Gulf States Steel 66 - 74 1/2	Va. I. C. & Coke 80 - 84
Int. Har., com. 81 1/2 - 83 1/2	Westinghouse El. 50 1/2 - 52 1/2

Midvale Steel & Ordnance Co. Deficit

The Midvale Steel & Ordnance Co. reports for the quarter ended Dec. 31, last, net income after taxes of \$828,358, compared with \$688,238 in the preceding three months, and with \$4,778,127 in the final quarter of 1920. After depreciation there was a deficit of \$1,379,782, contrasted with a deficit of \$1,249,136 in the September quarter, and with a balance for dividends of \$2,056,724, equal to \$1.03 per share on the stock in the last quarter of 1920. The statement follows:

	Fourth Quarter, 1921	Third Quarter, 1921	Fourth Quarter, 1920
Net after taxes.....	\$828,358	\$688,238	\$4,778,127
Bond interest	744,848	745,048	762,128
Balance	\$83,510	*\$56,810	\$4,015,999
Depreciation res.....	1,463,292	1,192,326	1,959,276
Deficit	\$1,379,782	\$1,249,136	†\$2,056,724

*Deficit. †Balance.

Based on the quarterly reports the company for the year ended Dec. 31 last, shows net after taxes of \$2,624,697, compared with \$21,924,650 in 1920 and with \$19,345,840 in 1919. After depreciation reserve there was a deficit of \$5,313,513, contrasted with a balance of \$12,371,298, equal to \$6.18 per share in 1920, and with \$10,387,418, equal to \$5.19 per share in 1919. Comparisons follow:

	1921	1920	1919
Net after taxes.....	\$2,624,697	\$21,924,650	\$19,345,840
Bond interest	3,005,622	3,073,531	3,141,509
Deficit	\$380,925	†\$18,851,119	†\$16,204,331
Depreciation res.....	4,932,588	6,479,821	5,816,913
Deficit	\$5,313,513	†\$12,371,298	†\$10,387,418

†Balance.

Report of Newton Steel Co.

Gross sales of the Newton Steel Co., Youngstown, Ohio, in 1921, were \$2,872,866, according to the annual report submitted Feb. 1 to stockholders. Present unfilled orders are sufficient to enable normal production for 60 days, coming principally from the automobile industry. The company showed a gross profit last year of \$365,837 and a net profit of \$29,647 after all reserve charges, taxes and miscellaneous claims. After paying the annual 7 per cent dividend on \$705,000 of outstanding preferred stock the company reported a deficit of \$18,444. Average operations last year were at 60 per cent. For two months the company's plant was wholly suspended. Directors, who were re-elected, are Edward F. Clark, H. M. Steele, J. H. Fitch, Jr., W. H. B. Ward, H. A. Taylor, J. H. Fitch and George T. Fitch. Officers are Edward F.

Clark, president and general manager; H. M. Steele, vice-president in charge of operations; J. H. Fitch, Jr., vice-president in charge of sales, and R. A. Kenworthy, secretary and treasurer.

The company's plant, located on a 150-acre tract at Newton Falls, Trumbull county, consists of eight stands of roughing mills and eight stands of finishing mills. It is entirely electrically driven and so built that extensions may be efficiently made when required. The company manufactures special high grade sheets for the automobile, metal furniture and Pullman trades. It has capacity for 50,000 tons of finished product annually.

Lake Erie Bolt & Nut Co. Plans

In order to provide additional working capital stockholders of the Lake Erie Bolt & Nut Co., Cleveland, are being advised of a refinancing plan to permit the company to take advantage of a new lease on the present plant and to supply it with funds for operating purposes. It is proposed to change the present company from a Delaware to an Ohio corporation and to make the authorized capital stock 70,000 shares of new par stock, \$0.000 of which will be issued at this time. Present stockholders will receive four shares of the new stock for one share of the present preferred stock and the payment of \$42. With no cash payment the exchange will be made share for share. Holders of common stock will receive one share of new stock for each 100 shares of present common stock. A meeting of the stockholders will be held Feb. 9 to vote on the refinancing plans.

Industrial Finance

Between 98 and 99 per cent of the stockholders of the American Brass Co. have turned in their stock for the merger with the Anaconda Copper Co.

The directors of the Saco Lowell Shops, Boston, textile machinery, have recommended an increase of \$1,762,500 in the common share capitalization for the purpose of paying a stock dividend of 50 per cent to owners of common shares. Stockholders will act on the recommendation Feb. 15.

Edmund Wolfe, president First Bridgeport National Bank, and Elmer Havens, president Locomobile Co., Bridgeport, Conn., automobiles, have been made temporary receivers for the Locomobile Co.

The Kerite Insulated Wire & Cable Co., Seymour, Conn., has issued \$150,000 additional stock, bringing the capitalization up to \$350,000. The new capital will be used to raise money for working capital and to reduce current indebtedness.

The directors of the American Rolling Mill Co., Middletown, Ohio, at their January meeting took no action on the stock dividend that it has been customary to declare. Members of the board expressed the opinion that it would be inadvisable to increase the stock of the company by such a dividend at this time in view of the general unsettlement in industrial and financial conditions.

The Folsom Miller Co., Markesan, Wis., manufacturer of washing machines, has filed a voluntary petition in bankruptcy. Schedules claim assets of \$32,533 and admit liabilities of \$132,966.67, of which \$60,315 is due Guy Miller, treasurer, and \$49,153 to S. P. Folsom, president, for payment of corporation debts and money advances.

Articles of dissolution have been filed by the Oshkosh Tractor Co., Oshkosh, Wis., a Wisconsin corporation with \$1,206,000 capital stock organized a year ago to take over the business of the LaCrosse, Wis., Tractor Co.

The Brazil Trust Co., Brazil, Ind., has been appointed receiver for the Union Steel Mfg. Co., which moved its plant to Brazil from Chicago about a year ago and manufactures tools and automobile parts.

The Truscon Steel Co., Youngtown, Ohio, is now paying 17 1/2% per share quarterly on its common stock, or at the annual rate of 7 per cent, as compared with 40c, or a yearly dividend rate of 16 per cent.

Business of the William P. Pollock Co., fabricating interest of Youngstown, Ohio, was in excess of 50 per cent of capacity last year, according to statement at the annual meeting. At present the company's capacity is idle. Directors re-elected are: Porter Pollock, W. G. Wilson, John Kirby, J. H. Warne, Alexander Best, Harry Payne and Edgar J. Reilly. Directors elected these officers: President and treasurer W. G. Wilson; vice-president and general manager, J. H. Warne; vice-president and general superintendent, John Kirby and secretary, Alexander Best.

The Struthers Furnace Co., Cleveland, Ohio, operating a merchant blast furnace at Struthers, Mahoning County, Ohio, paid its quarterly preferred dividend Feb. 1 of \$1.75 per share. The company was founded in 1869 and has been under the same management for upwards of 35 years. It has no bonded debt and has never defaulted on its preferred dividend.

Current Metal Prices

On Small-Lots, Delivered from Merchants' Stocks, New York City

The following quotations are made by New York City warehouses.

As there are many consumers whose requirements are not sufficiently heavy to warrant their placing orders with manufacturers for shipment in carload lots from mills, these prices are given for their convenience.

On a number of articles the base price only is given it being impossible to name every size.

The wholesale prices at which large lots are given by manufacturers for direct shipment from mills are given in the market reports appearing in a preceding part of THE IRON AGE under the general heading of "Iron and Steel Markets" and "Non-ferrous Metals."

Iron and Soft Steel Bars and Shapes

Bars:	Per Lb
Refined bars, base price	2.53c.
Swedish bars, base price	10.00c.
Soft steel bars, base price	2.53c.
Hoops, base price	3.38c.
Bands, base price	3.13c.
Beams and channels, angles and tees	
3 in. x ¼ in. and larger, base	2.63c.
Channels, angles and tees under 3 in. x ¼ in., base	2.53c.

Merchant Steel

	Per Lb
Tire, 1½ x ½ in. and larger	2.50c.
(Smooth finish, 1 to 2½ x ¼ in. and larger)	2.70c.
Toe-calk, ½ x ¾ in. and larger	3.20c.
Cold-rolled strip, soft and quarter hard	6.25c. to 7.25c.
Open-hearth spring steel	3.55c. to 6c.
Shafting and Screw Stock:	
Rounds	3.45c.
Squares, flats and hex.	3.95c.
Standard cast steel, base price	12.00c.
Extra cast steel	17.00c.
Special cast steel	22.00c.

Tank Plates—Steel

¾ in. and heavier	2.63c.
-------------------	--------

Sheets

Blue Annealed

	Per Lb.
No. 10	3.28c. to 3.53c.
No. 12	3.33c. to 3.58c.
No. 14	3.38c. to 3.63c.
No. 16	3.48c. to 3.73c.

Box Annealed—Black

	Soft Steel C. R. One Pass Per Lb.	Blued Stove Pipe Sheet, Per Lb.
Nos. 18 to 20	3.55c. to 3.80c.	4.10c.
Nos. 22 and 24	3.60c. to 3.85c.	4.15c.
No. 26	3.65c. to 3.90c.	4.25c.
No. 28	3.75c. to 4.00c.	4.25c.
No. 30	4.00c. to 4.25c.	4.25c.
No. 28 and lighter, 36 in. wide, 10c. higher.		

Galvanized

	Per Lb.
No. 14	3.85c. to 4.10c.
No. 16	4.00c. to 4.25c.
Nos. 18 and 20	4.15c. to 4.40c.
Nos. 22 and 24	4.30c. to 4.55c.
No. 26	4.45c. to 4.70c.
No. 27	4.60c. to 4.85c.
No. 28	4.75c. to 5.00c.
No. 30	5.25c. to 5.50c.
No. 28 and lighter, 36 in. wide, 20c. higher.	

Welded Pipe

Standard Steel

	Black	Galv.
½ in. Butt.	—56	—40
¾ in. Butt.	—61	—47
1-3 in. Butt.	—63	—49
3½-6 in. Lap.	—60	—46
7-8 in. Lap.	—56	—34
9-12 in. Lap.	—55	—33

Wrought Iron

	Black	Galv.
¾ in. Butt.	—30	—13
1½ in. Butt.	—32	—15
2-in. Lap.	—27	—10
2½-6 in. Lap.	—30	—15
7-12 in. Lap.	—23	—7

Steel Wire

BASED PRICE* ON NO. 9 GAGE AND COARSER

	Per Lb.
Bright basic	3.50c. to 3.75c.
Annealed soft	3.50c. to 3.75c.
Galvanized annealed	4.25c. to 4.50c.
Coppered basic	4.00c. to 4.25c.
Timed soft Bessemer	5.50c. to 5.75c.

*Regular extras for lighter gage.

Brass Sheet, Rod, Tube and Wire

BASE PRICE

High brass sheet	17¼c. to 17½c.
High brass wire	17¼c. to 17½c.
Brass rod	14¼c. to 15 c.
Brass tube, brazed	26 c. to 27½c.
Brass tube, seamless	18½c. to 19 c.
Copper tube, seamless	21¼c.

Copper Sheets

Sheet copper, hot rolled, 24 oz., 21c. to 21½c. per lb. base.

Cold rolled, 14 oz. and heavier, 2c. per lb. advance over hot rolled.

Tin Plates

Bright Tin	Grade	Grade	Coke - 14-20	Primes	Wasters
	"AAA"	"A"	80 lb.	\$6.05	\$5.80
	Charcoal	Charcoal	90 lb.	6.15	5.99
	14x20	14x20	100 lb.	6.25	6.00
	IC.. \$10.00	\$8.50	IC..	6.40	6.15
	IX.. 11.25	10.00	IX..	7.40	7.15
	IXX.. 13.00	11.50	IXX..	8.40	8.15
	IXXX.. 14.75	13.25	IXXX..	9.40	9.15
	IXXXX.. 16.25	15.00	IXXXX..	10.40	10.15

Terne Plates

8-lb. Coating 14 x 20

100 lb.	\$7.00
IC	7.25
IX	7.50
Fire door stock	10.00

Tin

Straits, pig	35c.
Bar	40c. to 45c.

Copper

Lake ingot	16 c.
Electrolytic	15¼c.
Casting	15¼c.

Spelter and Sheet Zinc

Western spelter	6½c. to 7c.
Sheet zinc, No. 9 base, casks	10½c. open 11c.

Lead and Solder*

American pig lead	5¼c. to 6¼c.
Bar lead	6¼c. to 7 c.
Solder, ½ and ½ guaranteed	24c.
No. 1 solder	22c.
Refined solder	18c.

*Prices of solder indicated by private brand vary according to composition.

Babbitt Metal

Best grade, per lb.	75c.
Commercial grade, per lb.	85c.
Grade D, per lb.	25c.

Antimony

Asiatic	6¼c. to 6½c.
---------	--------------

Aluminum

No. 1 aluminum (guaranteed over 99 per cent pure), in ingots for remelting, per lb.	28c. to 28c.
---	--------------

Old Metals

The market is weak and business is at a standstill. Dealers' buying prices are nominally as follows:

	Cents Per Lb.
Copper, heavy crucible	11.00
Copper, heavy wire	10.25
Copper, light and bottoms	8.00
Brass, heavy	5.50
Brass, light	4.50
Heavy machine composition	7.75
No. 1 yellow brass turnings	5.25
No. 1 red brass or composition turnings	7.25
Lead, heavy	2.75
Lead, tea	2.50
Zinc	2.00

THE IRON AGE

New York, February 16, 1922

ESTABLISHED 1855

VOL. 109, No. 7

Over-all Cost of Heat-Treated Parts

Electric Current or Fuel Cost Is But a Portion of Total Cost
Percentage of Rejection Important - Cost of
Subsequent Operations an Item

BY C. I. IPSEN

IN the development of the art of steel treating the advance has been associated with a progressive change from one type of heat source to another. It has passed from the early hand forge, burning wood or charcoal, successively through the coal and coke furnace, and finally to the electric furnace. It is especially noteworthy that each change in the development has been to a fuel or heat source having a higher cost. While these progressive changes have not been univer-

sally adopted, it is believed that they have been made on a sound economic basis, since there have been no backward tendencies. As the higher priced, improved heat source has successfully withstood the competition of existing fuels, it is evident that there are other factors of greater importance in the heat treatment of steel than furnace operating costs, a fact not commonly recognized by the average furnace user. Most prominent among these other factors are reduced cost of subsequent operations, reduction in the number of rejections, increased life of products, with more satisfactory service.

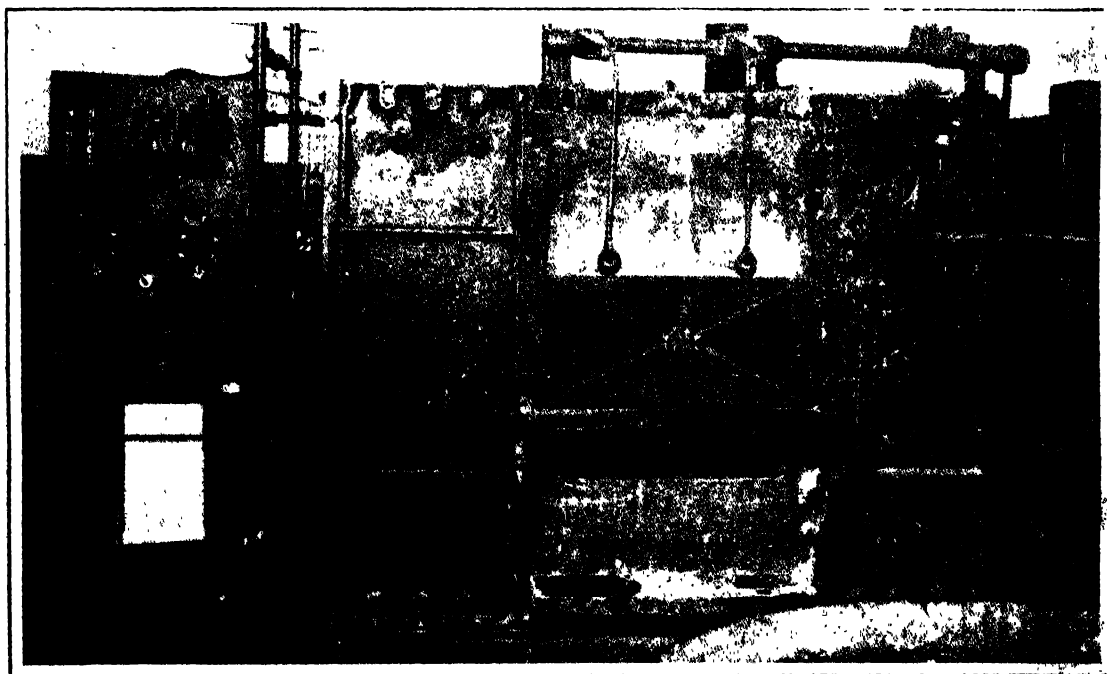
To determine to what extent these factors will over-

*Designing engineer, Industrial Heating Department, General Electric Co.

plays in the ultimate cost. The electric power rate for all items is taken at 12c. per kw. hr.

The various dies, items 1 to 6, were heated in the resistance furnace shown. A similar furnace is used for preheating, and an electrically heated oil bath is used for drawing. These furnaces, and the oil tempering bath, are maintained at constant temperature throughout the day, and the cost of the electricity thus used is apportioned among the dies treated over a certain period. If the furnaces could be operated at full capacity constantly, the cost of the electricity would be far below the values given.

This furnace has been run constantly for 25 months at a temperature of 1500 deg. Fahr. For the first nine months of the time it was run 24 hr. per day, it



Electric Resistance Furnace, with Panel and Instrument for Automatic Temperature Control

Interior of Electric Resistance
Carbonizing Furnace 36
In Wide 29 In. High
and 20 In. Deep. This
furnace requires 60
kw. 3 phase at 220
volts, to maintain a
temperature of 1700
deg. Fahr.



days a week. Since that time it has been run from
4 a. m. to 4 p. m., an automatic time clock being used

Cost Figures for Hardening and Drawing

Item	Part	Factory Cost of Parts	Cost of Heat Treating	Cost of Electricity for Heat Treating	Electricity in Per Cent of Total Cost
1	Segment combination die	\$1,380	\$13.50	\$4.16	0.3
2	Segment combination die	1,138	12.00	3.70	0.32
3	Round blanking die	638	5.03	1.50	0.23
4	Segment blanking die	782	9.15	2.92	0.37
5	Die	795	10.53	3.43	0.43
6	Die	875	8.66	2.67	0.3
7	Gear	234	13.00	3.70	1.5
8	Gear	263	15.00	4.44	1.7
9	Gear	328	21.00	6.25	1.8
10	Gear	391	26.00	7.60	1.9
11	Gear	455	30.00	9.06	2.0
12	Die block	110	1.75	0.65	0.6
13	Gear*	51	...	0.03	0.6
Totals of all above:		\$7,404	\$165.92	\$50.11	0.68

*Hardening only, without drawing.
(Estimated.)

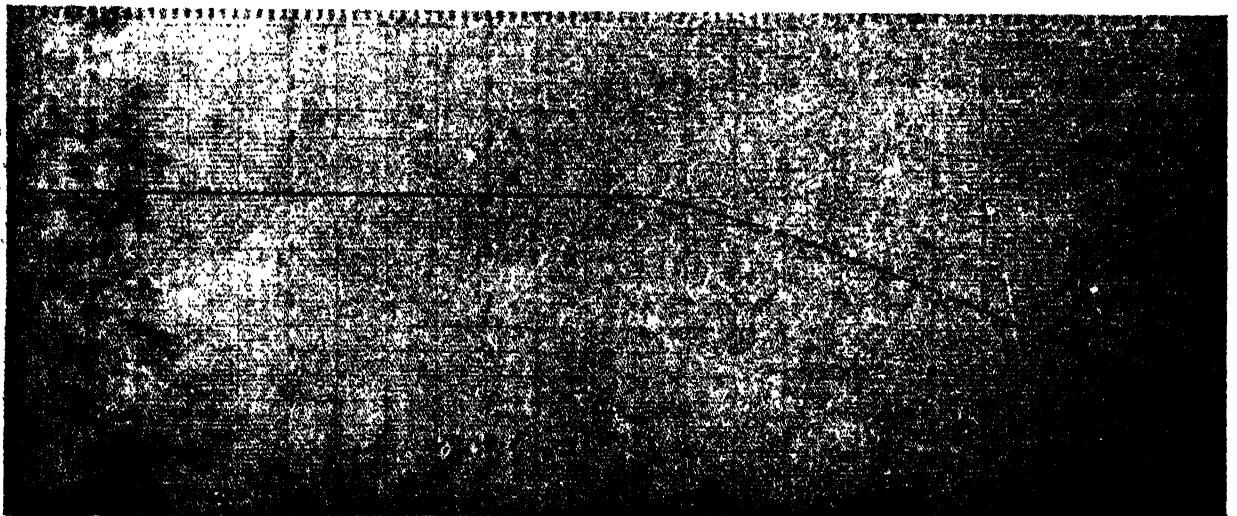
to throw the power on in the morning and off in the
afternoon.

During the 25 months of operation there has been
no interruption of service, and the only expense in-
curred has been the replacement of a relay coil on the

control panel, at a cost of less than one dollar. A
metallic resistor heating element is used, of the con-
struction shown in the interior view. No deterioration
in this resistor is apparent after the 25 months' con-
tinuous service. The only attendance necessary is occa-
sional oiling of the automatic control instrument, and
putting in a roll of record paper; the controlling of the
temperature, and the throwing on and off of the power,
being entirely automatic. Thus the electric cost, as
indicated in the table, is the only expense incurred;
there is no continuous repair bill.

Thus the total cost of electricity in heat treating
these dies amounts to 2/3 of 1 per cent of the ulti-
mate cost of the dies. Subtracting from this the cost
of other kinds of fuel will give the amount that must
be offset by the other factors, such as the reduction
of rejections, etc. In the case of this die heating
furnace, the cost of electricity is practically the same
as the cost of oil. Extensive tests were run on sim-
ilarly constructed oil and electric furnaces to determine
the policy of the General Electric Co. on future tool
treating furnace installations. The cost of operating
the oil furnace was 23c. per hr. with oil at 13c., and the
electric furnace 10c. per hr. With oil at its present
level, the costs are about equal.

In certain localities this would not be the case,
and we must then look to the other features to justify
the use of electric furnaces. In the case of these dies
the most prominent of the factors are the reduction of
rejections, lower cost of subsequent operations, and



Temperature Record from Electric Resistance Furnace Operating at 1400 Deg. Fahr., Photographed from Tape, Showing Drop
When Current Is Shut Off

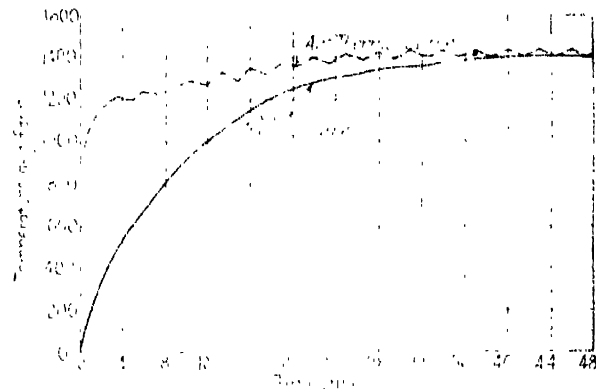
longer life of the dies. Unfortunately, accurate data are not available on these factors, but in the opinion of the foreman in charge of the work they amount to several per cent, the reduction in rejections alone being over 1 per cent, or more than the total cost of electricity.

Items 7 to 12 inclusive are at present treated in an oil furnace, the cost of the electricity having been calculated on the basis of experience with electric furnaces handling similar work. Electric furnaces are contemplated for these parts, as a cost analysis indicates that the increased cost of electricity will be more than offset by the improvement in quality.

A furnace with a rotating annular ring hearth, shown in one illustration, is used for heating gears, item 13 of the table. The cost of electricity for heating these gears is based on 30 days' operation, 9,510 gears, weighing 39,107 lb., being heated in that time. The cost of oil used in heating this same gear is approximately $\frac{1}{2}$ ¢, or about one-fifth the cost for electricity. This increased cost of electricity is offset by the reduction of rejections and lower cost of subsequent operations.

While the number of gears rejected due to warping has been greatly reduced, definite figures are not available; but it has been possible to treat the gears in an

cept where a muffle is used, the heat source or flame is several hundred degrees hotter than the work; consequently there is always the danger of overheating portions of the charge, especially parts having thin



Heating of Ring Gear in Rotary Hearth Electric Furnace

sections. This overheating results in distortion and excessive scaling.

Automatic control of temperature insures constant conditions in the furnace, and makes possible the duplication of results from day to day. A typical tempera-

Test Data of Heat Uniformity of Electric Furnace

Time	Thermocouple Temperature, Deg. Cent.					Average Temp.		Maximum Deviation from Average, Per Cent.		Rate of Change, Deg. Per Hr.
	1	2	3	4	5	Average	Temp.	Above	Below	
11:30	25	25	25	25	25	25	0	0	0	0
2:30	577	577	577	577	577	577	2.07	1.31	127	31
7:30	670	670	671	666	669	669	1.5	9.15	31	27
11:30	777	783	756	766	766	766	1.8	1.3	21	0
2:30	858	861	851	849	851	851	0.16	1.3	21	0
7:30	860	865	862	862	864	864	0.35	0.23	0	17
11:30	925	934	930	926	928	928	0.13	0.21	17	0
3:30	923	932	927	925	925	925	0.64	0.42	0	23
4:30	950	950	952	957	953	952	0.71	0.21	23	

ture control chart is shown, which indicates a maximum temperature variation of about 5 deg. Fahr., plus or minus, in the air of the furnace. This is the variation of the air temperature, and since the air changes temperature much more rapidly than the charge, it will be apparent how accurately the temperature of the charge is maintained.

Another chart shows the time temperature curve of gears treated in a rotary furnace similar to that illus-



Rotary Annular Electric Furnaces Designed for Maintaining a Temperature of 1650 Deg. Fahr. The hearth is 16 in. wide, the door opening 12 x 16 in., the furnace diameter 79 in. Three-phase current at 220 volts is used, the power requirements being 60 kw.

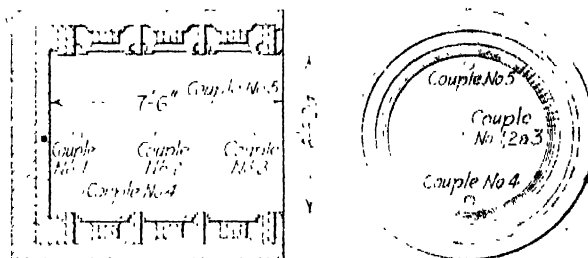
electric furnace, so as to have an eccentricity of approximately half the limits set for oil furnace practice, and limits which it is found difficult to meet with oil-treated gears. The cost of subsequent operations was reduced approximately 5¢ per gear, or an amount nearly twice the total cost of electricity for heating.

Thus the higher cost of the improved heat source, in every case cited, has been justified on the basis of the quality of the finished product. It is reflected in the reduction of rejections, lower cost of subsequent operations, and longer life of the product, any one of which will, in most cases, many times offset the increased cost of the improved heat source.

Features of the electrically heated furnace, of the metallic resistor type, which make possible this improvement in quality, are:

- (1) Low temperature of heat source.
- (2) Accurate and reliable automatic temperature control.
- (3) Uniform and unvarying temperature distribution.
- (4) Absence of severe oxidizing and corroding action, common to some fuel-fired furnaces.

The large area of the heat source permits it to operate at a temperature only slightly higher than that of the parts being heated, and renders overheating of any part impossible. In the fuel-fired furnace, ex-



Locations of the Five Thermocouples Whose Indications Are Recorded in Table

treated. Sensitive thermocouples were attached to a test gear, which was placed in the furnace among the others in regular production. The "gear" thermocouple was embedded in the body of the gear itself, and the "air" couple was located a few inches above the gear. The curve is copied direct from the chart made by recording instruments. It will be observed how accurately the temperature of the gear is held at 1400 deg. Fahr. up to the time it reaches the discharge door—also that fairly wide changes of air temperature, caused by throwing the power on and off, caused no appreciable change in the temperature of the gear.

This curve also illustrates another point, the uniform

temperature that it is possible to obtain in a furnace of the metallic resistor type. In this furnace the windings are all on one circuit, and yet it is possible to maintain, by a proper distribution of the windings, a uniform temperature up to a point directly in front of the discharge door.

This feature of the metallic resistor type of electric furnace is also shown clearly in the second table. The heating of the charge under these conditions insures uniform heating, reduce distortion and internal stresses to a minimum, and improves the quality of the heat-treated part. In the electric furnace ideal atmospheric conditions exist, that result in the heat treated parts being practically free from pitting and scaling. This reduces the cost of the subsequent operations, in cleaning the dies and gears.

MAKES COMPARISON

Chart Shows Averages of Production of Various Products and of Unfilled Tonnage

WASHINGTON, Feb. 14. The American Railway Association in its bulletin on revenue freight loaded for the week ended Jan. 21 presents a chart showing the monthly averages by years from 1913 through 1919 and the monthly total through 1920 and 1921 of production of steel ingots, production of pig iron, and the United States Steel Corporation unfilled orders, production of bituminous coal and stacks of bituminous coal and shows the relation between these movements. The production of steel ingots and of pig iron, it is pointed out, is usually accepted as a barometer of business activity throughout the country.

It is observed that in the years 1913 to 1919, inclusive, the trend of these two items of production followed in a fairly close way the unfilled orders of the Steel Corporation and was followed in turn by the production of bituminous coal. The bituminous production also quite generally followed the trend of production of ingots and pig iron in the first half of 1920, but the tremendous increase in bituminous production in the last half of 1920 did not follow any like trend of steel and iron production, but on the contrary was in the face of a declining tendency in that production and in the unfilled orders of the Steel Corporation. This, it is stated, may be mentioned as contributing to the heavy stocks of bituminous coal on hand in January, 1921.

Again, following April, 1921, and through October, there was a general tendency to increase in the production of bituminous coal, not, however, marked by any contemporaneous increase of consequence in the production of steel ingots and pig iron, and with the orders of the Steel Corporation still declining. Quite naturally, therefore, it is pointed out, the (then) latest figure of bituminous stocks, that for November, 1921, showed an increase that carried the total even beyond that of the previous Jan. 1. A survey prepared by the Department of Commerce shows that the total commercial stock of bituminous coal on Jan. 1, 1922, was estimated at 47,000,000 tons as against 48,000,000 tons on Nov. 1, 1921.

Work Stopped at Armor Plate Plant

CHARLESTON, W. VA., Feb. 13.—An echo of the disarmament conference is heard in an order received recently by Capt. F. J. Hellweg, commandant, from Secretary of the Navy Denby, to close the naval ordnance plant here and put employees on leave without pay. The order affects not only men engaged in the operation of the plant, but those doing construction work on the gun plant. Captain Hellweg was instructed to retain only enough men for the maintenance and protection of the plant. The plant was engaged in manufacturing material, some of which would have been used on ships which are to be scrapped under the holiday program.

This plant, located at South Charleston, and work on which began April 6, 1917, consists of a steel works

While these are by no means all the varieties of electric furnaces, and do not include all the processes to which such furnaces lend themselves, they are sufficiently representative to give a good idea of what can be accomplished by the electric furnace in this field.

The problem of choice of steel treating furnaces is chiefly the problem of determining the effect of the various furnaces on the overall cost of the heat-treated part. A careful analysis along the lines outlined may in many cases reveal that furnace operating costs are of secondary importance. After three years' experience in the use of electric furnaces for steel treating, it is predicted that, in the majority of cases where a high-grade product is required, the lowest overall costs will be obtained through the use of electric furnaces.

and three finishing units; a projectile plant, an armor plant and a gun plant. The projectile plant was completed and put in operation in June, 1918. The armor plant is 90 per cent finished, and the gun plant 70 per cent. In recent months about 2000 tons of ordnance steel were turned out daily. About 2200 men were employed, including nearly 1000 on construction work. The estimated monthly payroll was \$300,000.

Testing Materials Meeting

Greater prominence to technical papers is planned to mark the annual meeting of the American Society for Testing Materials to be held at Chalfonte-Haddon Hall, Atlantic City, N. J., in the week of June 26. Among the topics which are expected to be given prominence are the following: "Effect of Sulphur in Rivet Steel," "Physical Properties and Tests of Steel Castings," "Impact Testing of Materials," "Fatigue of Materials," "Specifications for Coal," "Thermometry."

The committee on corrosion of iron and steel is undergoing some reorganization. J. H. Gibboney, vice-chairman of the committee, is acting chairman in place of S. S. Voorhees, deceased. Dr. G. K. Burgess, chairman of the subcommittee on preservative metallic coatings, has resigned, and H. S. Rawdon now represents the metallurgical division of the Bureau of Standards and has been appointed chairman pro tem of the sub-committee.

In Memory of Henry H. Stambaugh

In memory of Henry H. Stambaugh, one of the founders of the Brier Hill Steel Co., Youngstown, Ohio, a large bronze tablet in bas relief has been installed in the McKinley Memorial Building at Niles, which houses an imposing collection of tablets and busts of industrial and financial leaders, as well as statesmen. Unlike other tablets which represent a likeness of the man they honor, the Stambaugh memorial shows a woman's figure, in classic robes, invoking a blessing upon a man kneeling before it, typifying Labor. The figure of a dog in the foreground depicts Mr. Stambaugh's love of nature. The replicas were largely gathered through the instrumentality of Joseph G. Butler, Jr., of Youngstown, who conceived the idea of the Memorial and carried it to fruition.

The Aragain Steel, Ltd., has been incorporated with a capital stock of \$15,000,000 to acquire and take over the plan and business of the Carbon & Alloy Steel Co., Ltd., at Niagara Falls, Ont., and to enter into the manufacture of iron, steel, metals, alloys, etc. Among the provisional directors of the new concern are Francis W. Griffiths, Arthur L. Reid, John L. Vanstone of Niagara Falls, Ont.

The Lima, Ohio, plant of the Ohio Steel Foundry Co., reopened on Jan. 16, giving employment to about 500 workers. The company has booked orders for castings for railroad equipment for the Argentine Republic and it is expected that the foundry will be kept running full time for some months.

Using Molding Machine in Job Foundry

Marked Gain in Efficiency in Making Cylinder and Piston Molds—Speed and Economy Both Served

BY PAUL R. RAMP

(Continued from page 399, Feb. 24)

FIGURE 6 is the drag half of a steam cylinder pattern, located on the pattern board. The dowel pins can be seen at *BBB*. The "center" pin is located off center, to avoid the danger of placing patterns wrongly on the board. Figure 7 is the cope half of the same pattern, located on the same pattern board, with dowel pins at *BBB*. This pattern was used for many years to produce cylinder castings by hand, at the rate of six to eight per day.

The only work connected with making an emergency molding machine job out of it was putting dowel pin plates in the cope and drag halves, and giving them a coat of shellac. On the machine, 60 castings were

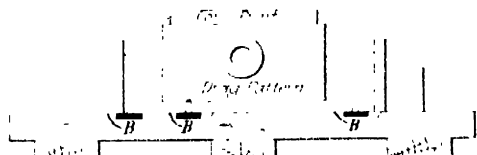


Fig. 6. Drag Half of Steam Cylinder Pattern on Pattern Board

produced daily by one finisher and two helpers, one of the helpers acting as machine operator. The quality of the castings produced by the machine was in every way superior to those made by hand, by skilled workmen.

In such cases, the advantage of the pattern board and the loose patterns can be appreciated. As the pattern board is bolted to the machine, it requires no more attention than brushing or blowing off after each mold is rammed. All patterns being loose, they must be placed on the board every time a new mold is made, hence the shape of the pattern does not matter. It requires only a moment to pick it up and drop it over the dowel pins on the board, and proceed.

This plan enabled us to make a decided saving in the cost of molding, when it was thought impossible to

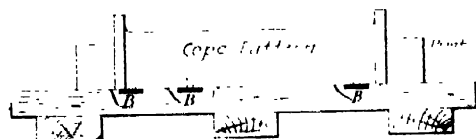


Fig. 7. Cope Half of Same Pattern on Same Pattern Board

do so, on account of the small number of parts to be made, and the very poor condition of the patterns. I believe that there are many foundries to-day that could adopt this plan, and secure very gratifying results.

The plan here described develops many unusual stunts in molding and core making. The fact that a standard size flask must be used, thus limiting the size of the pattern to be molded, makes it necessary for the foundryman to devise ways and means for molding pieces in these flasks, that in the past were molded in much larger flasks.

An illustration of this development is shown in Figure 8, which is a cross section of a mold for three

10-in. pistons. Owing to the use of the standard flask, only one 10-in. and one 8-in. piston could be molded together in the regular way. As it was desired to confine the production to one size of casting for each mold, the plan illustrated worked out very satisfactorily. The standard flask, while not having great enough length, did have an excess of depth, which was utilized by molding the pistons on edge, three in a flask, as shown in the sketch, at a 66 2/3 per cent increase in production per hour. The quality of the new castings was superior to those made in the old way.

Figure 8 shows the method used to gate these molds with a gate core. The core was placed on the pattern, and rammed up in the flask when the drag was being made. The gate proved very efficient, and produced

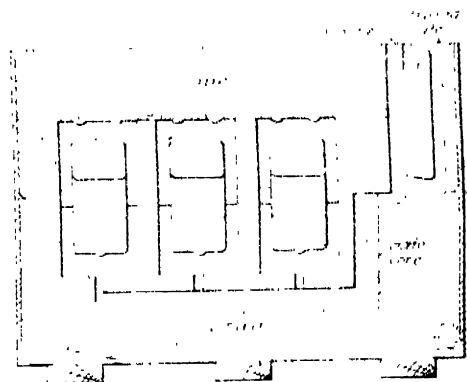


Fig. 8. Cross Section of Mold for Three 10-in. Pistons

castings free from sand and slag holes. The idea was to arrange the gate so the metal would enter the molds directly under the main cores, and thus act as a safeguard, by providing that, in case any objectionable matter should enter the mold with the metal, it would be carried up to the core and would lodge where it would do no harm.

There was a question as to whether or not the upper edge of the piston, that represented the highest point of the mold in the cope, would shrink. To help reduce this danger, the grooves for the piston rings were par-

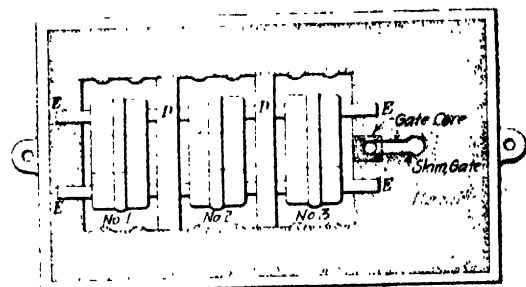


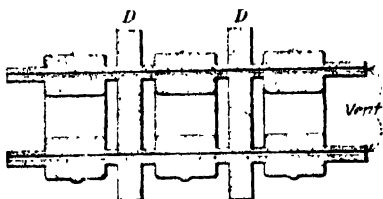
Fig. 9. Drag Mold for Three Pistons with Core in Place

tially formed in the rough castings; but it was found later that this precaution was not necessary, as all of the castings came out solid at this point. Figure 9 is

another view of the 10-in. piston mold, with the main core in place. This sketch shows also the locations of the gate core and of the skim gate.

One complete core is all that was required to produce three castings. The slab parts of the core, marked *DD*, represent the division between pistons No. 1 and No. 2, and the division between No. 2 and No. 3. As the slabs also act as supports for the main cores, they make chaplets unnecessary. Only two holes on either

Fig. 10. Section of the Gang Core Used in Making Three Pistons in One Mold



side of these pistons were formed, in providing the vent passages, instead of the three, necessary when the pistons are molded with the flat surface up. These holes must be drilled, tapped and plugged. The gas escaped from the core through the passages marked *EEEE*.

This job worked very smoothly on the jolt roll-over molding machine, in the standard flasks, and no delay was experienced in changing from other jobs to this one.

Figure 10 is a cross section of the gang core used to make the three pistons. This core was made in halves and pasted together. The time required was not more than one-fifth greater than that required to produce a core for a single piston. In this case, as in many others, the very fact that something radically

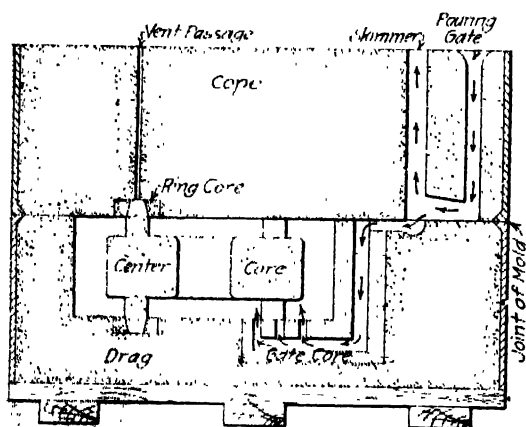


Fig. 11. Cross Section of 12-In. Piston Mold on Standard Pattern Board

different had to be done, to enable the foundryman to use his equipment, developed a decided saving.

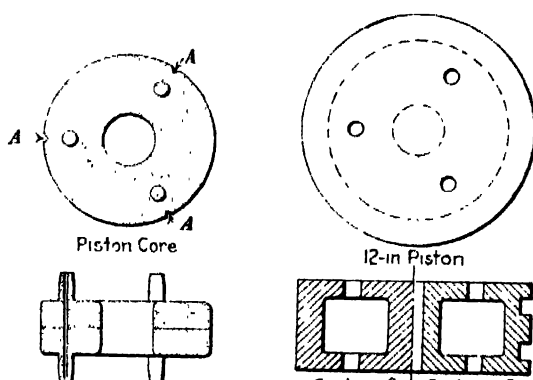
Figure 11 is a cross section of a 12-in. piston mold, made on the standard pattern board with a jolt roll-over machine. In this case the piston was molded in the usual manner, instead of being molded on edge. The main objection to making this casting on the machine was the fact that, in order to carry off the vents from the main core, it had been the practice to place the main core in the mold and place the cope on the drag, thus securing on the cope an impression that could be used as a guide, to locate the vent passages through the cope after it was lifted off again.

This plan made it necessary to try on every cope, and interfered very materially with progress in molding machine work. To overcome this objection, the part of the core that normally came flush with the joint, and was touched when the cope was tried on, was made longer, so it would extend into the cope. Three extra pin holes were properly located in the standard pattern board, to take care of the core prints when the

cofes were rammed. These three prints were located directly in line with the corresponding core prints on the drag side of the pattern.

When either the cope or the drag was rammed, a small ring core was dropped over the core prints, to insure against crushes, etc. Figure 11 shows the ring core in place in both the cope and the drag. The special gate core mentioned before was also used, as shown in the sketch, being placed on the pattern and rammed up with the mold, the same as the ring cores. When the drag was made, the pattern, being provided with the three standard dowel pin hole plates, was very nicely located on the board in its proper place. When the cope was rammed, the three small prints were located on the pattern board by the three special dowel pin holes. This arrangement insured a perfect match, so far as the cope and drag core prints were concerned.

The next important question was to locate the print part of both sides of the core, so they would match the prints in the mold. Figure 12 gives two views of this



Cross Section of Piston Core
Fig. 12. Notch Method of Making Two Halves of Core Register in Mold

Section of Rough Casting
Section of Casting Machined
Fig. 13. Piston Casting, Left Half Rough, Right Half Machined

core, which was made in halves and joined at the center. The plan used to make the prints register correctly is shown here. The three notches marked *AAA*, opposite each print part of the core, were provided in each half of the box, and acted as the guide when the cores were pasted. With the core made in this manner, and the old pattern provided with three extra core prints for the cope, the old piston pattern was converted into a molding machine job. It was not necessary to try the cope on the drag in order to find the proper place to produce the vent passage; the prints in the cope did this. This job was run at the rate of 10 to 20 per day, with other work, very successfully both as to quality and quantity.

Figure 13 is a cross section of the casting described here, showing one-half rough and the other machined. These two piston jobs are instances where something a little out of the regular plan had to be done to machine mold with the old patterns. But even the cost of the extra core prints for the cope, the three notches in the core box and the three small pin holes in the board, would not in any way compare with the cost of rigging this job up in the best manner for the best production on a machine.

This kind of molding machine practice is not recommended except in such cases as mentioned above; but I know that there are numerous places where this plan can be worked very successfully, though the operators may now consider it impossible.

The Erie railroad has awarded a contract to the Youngstown Equipment Co. for operation of the car shops at Brier Hill in Youngstown, Ohio, and the locomotive roundhouses at Brier Hill and Kent. This company, formed by Youngstown capital, recently took over operation of the Erie car shops at Kent, Ohio.

Leaves from a Steel Melter's Note Book—III

Experiences in Casting Steel Ingots in Cans—How Cracks Were Prevented—Causes of Hard Spots in Forging Ingots

BY HENRY D. HIBBARD

AT the first steel works at which I was employed, in New England, steel ingots for forging purposes larger than 12 x 12 in. square were generally cast in cans made of wrought iron sheets. This included all the tire ingots or "cheeses," as they were called, for tires for locomotive drivers which were short cylinders, as well as cylindrical ingots varying from 16 to 28 in. or even more in diameter, and weighing from 2000 to 28,000 lb. each. We had a 10-ton hammer, as large as any in the country in those days. It had a 10-ton tup and was double-acting that is, steam was admitted on top of the piston to increase the downward velocity of the ram and so the power of the hammer. The anvil weighed but 90 tons, which was far too light for such a hammer. The die block was broken and patched. This hammer was employed in breaking down tire ingots as well as in making all the largest forgings, but we had smaller hammers for the lighter ones. The largest forgings made were of 10 tons weight finished, which called for the largest size of ingots that we could make, taking a whole extra large heat of 28,000 lb. from our 10-ton open-hearth furnace.

Preparing the "Cheese" Containers

For each cheese a can was made of a single sheet of iron of No. 22 gage rolled into a cylinder with the joint riveted with five or six rivets about 3/16 in. in diameter. The edges at both ends were bent inward so as to give a rounded edge to the cheese of about 1/2 in. radius. The bent edges also helped to preserve the true cylindrical shape of the can in handling and setting for casting. These tire ingots were bottom cast in groups of four on one bottom plate provided with a central runner from which the steel was distributed to the molds through runner bricks in the usual manner. A can was placed over each runner opening and around it was set a cylinder of boiler iron 1/2 in. thick, about 4 in. larger in diameter and 3 or 4 in. taller than the can. The space between the can and surrounding cylinder was filled with dry sand level with the top of the can. On each can was placed a heavy cast iron disc having a rising conical central hub containing a riser cavity about 10 in. high, which served also as an air vent. These discs were clamped down to resist the upward pressure of the steel against them.

We knew little of pipes and nothing at all of segregation at that time but the method of subsequent manufacture practiced—the punching out of a cake of metal from the center—removed some of the unsound central metal around the pipe which each ingot must have had, and the remainder, lying in use against the wheel center where it was not subjected to wear, did no particular harm. The best metal was on the outside where it was wanted to take the wear on the tread of the wheel. The riser cast on had a thickness of 2 in. tapering to 1 in. which was not large enough to feed the solidifying ingot as it settled. It was broken off by a blow with a sledge and thrown into the scrap for remelting.

Flexibility in Ingot Weights

The great advantage of this method was that ingots of any weight could be made as desired, which was important because one ingot made one tire. They weighed from 900 to 1200 lb. each. The size of the can was made to suit, while everything else about the casting apparatus was unchanged. In those days iron was cheaper than steel, so the can in being wasted in heating and forging replaced so much steel without adding to the cost. The fusion point of the iron can being higher than that of steel, the can would remain solid even after being filled with molten steel which welded

to it nearly all over. At that time, at one other plant located in the West, cast iron cylindrical molds were used for casting single tire ingots. Several sizes of different diameters were kept on hand with top plates to suit. The exact weights were obtained by adjusting the height of the cast iron top plate, which was of a size to fit loosely inside the mold.

For general forging purposes long cylindrical ingots were made, the cans in which they were cast being made of sheet iron of No. 16 gage. Such ingots under 18 in. in diameter had no visible structural defects and were smooth and satisfactory, though of course it is now clear that they had concealed pipes. In the larger sizes, with diameters of from 24 to 28 in. and lengths of from 10 to 12 ft., the cans wrinkled longitudinally but irregularly in casting and the ingots were likely to develop cracks under and along some of the wrinkles in the forging operation. The wrinkles were formed by the expansion of the can itself when heated by the molten steel, as it could not enlarge, its circumference being firmly imbedded in the incompressible sand and therefore forced to buckle, so that the wrinkles resulted. Why a crack should develop under and along a wrinkle was not understood, but the fact of their presence was indisputable.

Preventing Wrinkles and Cracks

The can-maker was an ingenious man and he one day conceived the idea of making a can with a longitudinal slip joint to take up the expansion of the can and so prevent the formation of wrinkles. The first ingot cast in such a can had fewer and shallower wrinkles than any previously made and showed that the cure had been found, as in ingots without wrinkles there were no cracks. A number of kinds of slip joints were tried and one finally adopted as standard. In that joint the usual rivets of the longitudinal joint were replaced by short stove bolts which could be tightened as much as was desired to hold the parts by friction and yet allow them to slip past one another when expansion took place. These bolts were spaced about 3 in. apart. In one edge of the joint horizontal slotted holes were cut in the sheet, which allowed a motion of 1 1/2 in. The other edge was punched to receive the stove bolts, registering of course with the slots. Then on this other edge from end to end of the can a cover strip or plate of the same sheet iron was riveted on to keep the sand out of the opening between the edges 1 1/2 in. wide as well as the slots, the slotted edge lying between the two. This cover strip was hammered into a shallow Z cross-section to allow space between it and the can for the slotted edge to slide. That strip was about 5 in. wide and was of course punched for the stove bolts to pass through. All this was expensive but nevertheless it paid because of the time it saved at the hammer where in former practice each crack had to be cut out after having been isolated on a raised lump by hammering down the metal around it. Some smaller cracks were only removed by rough-turning the forging. The cans were later fitted with an expansion joint at the top end made on the same principle to take up the longitudinal or vertical expansion of the can. Ingots so cast were beautifully smooth and gave full satisfaction in the forge as far as cracks were concerned.

Method for Forging Ingots

As in the case of the tire ingots a forging can was placed within a strong cylinder and the space between the two was filled with dry sand. For the larger sizes old boiler shells which came in the scrap were used for outer casings. For smaller sizes we had a lot of heavy

wrought iron rings which had been reinforcing rings around the breeches of Parrott rifled guns in the Civil War. Small forging ingots were bottom cast and large ones, weighing 10 tons or more, were partly filled from the bottom and the remainder from the top. If wholly top-poured the can would be in danger of being cut or washed away, somewhere, as the force of the stream of steel falling 20 ft. in extreme cases was very great. In fact, we lost one 12-ton ingot in that way, the can being cut through and the sand mixing with the steel. The method of first bottom-pouring and then top-pouring in sequence is still followed in teeming large ingots.

To handle the ingots we had a jib hydraulic crane rated at 15 tons capacity, but the accumulator did not give enough pressure to lift a 28,000-lb. ingot. To lift such a weight the accumulator was shut off and the pump made to discharge directly into the crane line, which gave the pressure required. Hauling such an ingot to the forge shop was quite a feat, requiring a team of eight heavy draft horses. On the snow in the winter time a heavy sled, built for the purpose, was used, but when the ground was bare of snow the ingot was carried on a heavy truck. No railroad track could be used, though there were tracks in the yard.

The great advantage of this method of casting in cans lies in its adaptability for making any weight or shape of ingot desired by the use of a can of the proper size. Otherwise an assortment of large cast iron molds would have been needed.

Little Knowledge of Pipe Prevention

Many large forgings for those days were made from ingots cast as described. Though they were readily made, they were not always satisfactory in use because of inadequate knowledge, at that plant at least, of piping and means for dealing with it, segregation, annealing and heat treatment and particularly because of faulty design on the part of the customers. A riser was cast on the upper end of each of the larger ingots to afford means of clamping on the porter bar and handles for manipulating the ingot during forging, giving the ingot the shape of a bottle. This riser was much too small to feed properly the settling steel and every one of the ingots must have had a large pipe cavity and unsound region at the top under the riser. I remember one short ingot about 3 ft. in diameter for a gun jacket for the Government. The machinist who bored it (there were no hollow forgings in those days) told me that a lot of the steel had fallen out in pieces from the center, which in my ignorance of pipe and gas holes I found hard to believe. I was chemist of the works at the time and naturally thought that I knew much more than I did. He spoke truly, however, for the ingot must have had a large pipe with surrounding unsound metal which in forging must have been broken up. The silicon was not high enough to cause a perfect pipe to be formed.

Our forging steel was usually of a grade which would stand, neither rising nor settling much. When we put in as much as 0.15 per cent of silicon, as we did for some special work, we called the product silicon steel. We never did anything to obliterate or lessen pipe. However, at that time we made most of the large steel forgings for this country and perhaps knew as much about making them as any plant this side of the ocean, though in Europe, I believe, from what I have since learned, they knew much more than we did.

Still, one might say the whole art of making good large forgings has been learned since then. Pieces in stock cut off the bottoms of large forgings made from ingots which were too large for the purpose were perfectly clean and sound, with no seams or other defects, and excited the admiration and curiosity of a visiting friend employed in one of the great plants of the country where "tonnage" steel was made. To his inquiry as to how we did it, I could only mention the great pressure under which it was cast due to the head of metal above it, casually adding that of course the steel was properly made.

Cracks in Ingots Cast in Iron Molds

When large cylindrical ingots were made in cast iron molds they were very liable to be cracked lengthwise,

particularly near the bottom. This was due to the ferrostatic pressure which forced the first skin of steel to freeze as solidification began, out against the heating and consequently expanding mold. The frozen skin, of course, was cooling and contracting at the same time. Now, freezing steel passes through a mushy stage at which it has but slight coherence, and at that stage the freezing skin was liable to be torn apart in places, the tears forming cracks. Clean, well-made steels will crack less than impure, dirty, underdone steels but any steel is liable to be cracked when cast in a large cylindrical cast iron mold. A cylinder does not admit of increase of volume without stretching its circumference. Because of this tendency to crack, other cross-sections of ingots were adopted in after years varying from polygons to coarsely corrugated contours. The polygons now usually made have slightly concaved sides and rounded corners. Any of these newer shapes allowed the frozen skin of the still fluid ingot to follow and adapt itself to the mold without being torn apart or cracked. Ingots cast in cans are not liable to have cracks due to pressure, as the mold does not expand but tends rather to contract, due to the expansion of the sand as it is heated.

There is another great advantage beyond that of preventing cracks, from having an ingot polygonal, six or eight-sided. A cylindrical ingot, unless hammered or forged with grooved dies, which prevent undue lateral spreading of the metal, is likely to be torn apart within, along or near the central axis, which defect is sometimes called a pipe, though it is of quite different origin from the pipe caused in casting by the settling of the freezing metal. The two kinds of pipe, when greatly drawn out by forging or rolling, may be much alike and justify the designation by the same name. The central tearing may be done to a perfectly sound ingot. The danger of it is greatly lessened if the ingot is polygonal, as the flat surfaces enable the metal to be worked more uniformly and to the center. A round ingot should be forged first into a polygonal shape, four, six or eight-sided for this reason, but it is advantageous to start with the ingot polygonal.

Hard Spots in Forgings

Another trouble that we had with our large forgings was that occasionally in turning them in the lathe hard spots in the metal were encountered which sometimes would break or crush the cutting edge of the turning tool. The machinist would stop his machine and cut them out with a cold or cape chisel, losing, of course, considerable time. The cause and cure of these hard spots we never learned, at least while I was there. Sometimes there were a few in a scattered group and in other cases dozens in a larger group, extending perhaps 2 or 3 ft. along the forging. They occurred in steel which had been thoroughly melted and in which no pieces of unmelted charge could have remained. Others who have found hard spots to be higher in carbon and manganese than the remainder of the metal have ascribed them to unmelted spiegel, which of course is extremely hard, but ours were certainly not due to that cause. One thing I noticed was that in forgings which had been worked by the hammer less than usual, say to one-half of the diameter or one-quarter of the area of cross-section, many of the hard spots adjoined and formed a part of the wall of gas holes not wholly closed by the hot-working given the piece. This indicated that they were formed by a sort of local segregation, as were the gas holes. Since then further knowledge of the structure of ingot steel leads one to suppose that there may be local segregation between the pine tree crystals or dendrites which form in slowly freezing steel. In those days we knew little about casting temperature, simply aiming to have the steel hot enough to cast cleanly into the molds. The steel-making methods used (pig and scrap bath with hot blooms added) automatically regulated the degree of heat, so that no precautions were taken to prevent the charge temperature rising too high. Since working by other methods where the charge temperature required to be carefully controlled, I have imagined that those hard spots were perhaps in steel cast too hot, which in a can surrounded by sand cooled so slowly that there was

excessive segregation of nonferrous elements between the crystals. This explanation does not account, however, for the occurrence of hard spots in groups, and not over the whole ingot, or even over the whole horizon or level when they did occur.

As a cast iron ingot mold usually weighs as much as the ingot it will hold or more, a steel plant making large forging ingots has necessarily a large investment in its assortments of molds, which require great space for their storage. Casting in cans obviates most of the expenditure and space required.

In recent years the method has been reinvented, sheet iron being used in forming the risers on large ingots, some of them many times greater than the largest we made at the old New England plant. When the mold for the riser or hot top of such an ingot is

formed of loam, sand or other refractory, the heating by the inflowing steel will cause its inner surface material to expand, which may make it crack and spall off in places, the loose pieces falling into the liquid steel below. This the sheet iron casing prevents.

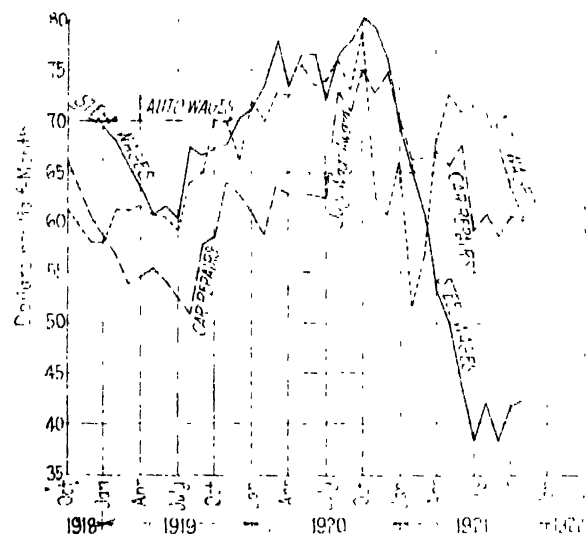
The method of casting ingots in cans was patented by W. Dougherty, of Philadelphia, in 1873 (Patent No. 139778), the single claim of his patent reading: "The method of casting steel in wrought iron or other metallic cases when the latter is of such thickness as to admit of the heat of the melted steel completely welding the case to it, substantially as and for the purpose above set forth."

The patent was not well drawn and did not cover the case very well, as the welding of the can to the ingot was never complete

1918 to 1922 Course of Metal Workers' Wages

Pay Envelopes of Iron and Steel Workers, Car Repair Shops and Automobile Plant Operatives

DURING the past three years there have been numerous changes in rates of wages of men employed in metal-working plants. Figures of the United States Bureau of Labor Statistics show that in October, 1918, the average semi-monthly wage in iron and steel plants averaged \$71.67 per man. This figure dropped grad-



Course of Wages in Steel Mills, Automobile Factories and Car Building and Repairing Shops

ually until in July, 1919, it was \$60.35. After this a more or less steady increase brought the figure for October, 1920, to \$80.24. Since that date the decline has been well sustained, reaching low points in July and September, 1921, with a slight recovery to \$42.56 in November.

The course of these changes in average wage, month by month, is shown on the chart.

Similar figures for men engaged in the building and repairing of railroad cars show a trend quite different from that of iron and steel workers. This is due to the fact that many of these men, being employed directly by the railroads, have come within the wage scales and other regulations put forward by the Government, and hence have not felt to the same extent either the law of supply and demand or the contraction of business of the past year.

In October, 1918, these men were receiving an average of \$66.56 per half month, which figure dropped gradually until in August, 1919, it was \$51.05. After that there was a well sustained rise so that, during the early months of 1920, the figure was between \$62 and \$63. There was a sudden rise from the \$62.43 of July to \$72.85 in August, due, of course, to the heavy wage increase allowed by the Railroad Labor Board at that time. The figure held between \$70 and \$75 per half

month through January, 1921, after which date it has fallen, due partly to the cutting out of some of the so-called national agreements, until in November it stood at \$60.26. This figure is 42 per cent higher than the pay of the iron and steel workers.

Changes in the pay of automobile workers have followed to some extent the corresponding figures for iron and steel men, reaching a maximum in the same month and responding more closely to the law of supply and demand than in the case of the car builders. Automobile workers are paid by the week, but the figures, translated into semi-monthly totals by multiplying by 2 1/6, are as follows:

In October, 1918, the amount was \$61.45, which is substantially lower than either the iron and steel worker or the car builder was receiving. With minor fluctuations this figure was maintained until the summer of 1919, being \$63.85 during August. A higher range of pay then set in, fluctuating with conditions, but being consistently more than \$65 per half month, until finally it reached \$79.51 in October, 1920. With the collapse of the automobile market at that time, wages fell heavily, going as low as \$51.78 in February, 1921. They have since gone up again, reaching \$72.62 in May, but have again fallen to \$60.45 in November. This is also 42 per cent higher than the steel worker's November wage.

In all the foregoing it is to be remembered that the unit figures are the quotients of total payrolls divided by the number of men employed. They, therefore, take into account overtime employment in some periods and short time employment in others, being thus not direct indications of wage rates at different times.

The proceedings of a conference of the National Association of Office Managers held in October has been printed for distribution at \$1 per copy. Among other things the booklet describes at length the methods of increasing office production through standardization, and there is a detailed analysis of the office manager's job. A copy of the pamphlet, which has 56 pages, may be obtained by applying to the secretary of the association, F. L. Rowland, Gilbert & Barker Mfg. Co., Springfield, Mass.

Business is picking up in Bridgeport Conn. The Challenge Cultery Co. is to double its working force, the Union Metallic Cartridge Co. is to go on a five day per week schedule, the Bridgeport Metal Goods Co. on a five and one-half days schedule, and other industries other than the machine tool report better business. The Bridgeport Metal Goods Co. received more business in January than it did during the first six months of 1921.

Welding Rods for Oxy-Acetylene Welding

Their Selection and Composition as a Factor in Successful Results on Steel—Welding Cast Iron—Copper and Brass Welding

BY J. R. DAWSON

UNTIL very recent years little scientific welding research has been done and, although much has of late been accomplished toward improvement in welding rods and the welding art, there remains great opportunity for advancement, especially in the direction of the design of rods best suited to various requirements.

It has been my privilege to conduct in collaboration with my associates and to closely observe a considerable number of tests in connection with certain investigations of standard commercial welding rods, as well as of experimental rods of various compositions, and this paper is based on information thus obtained.

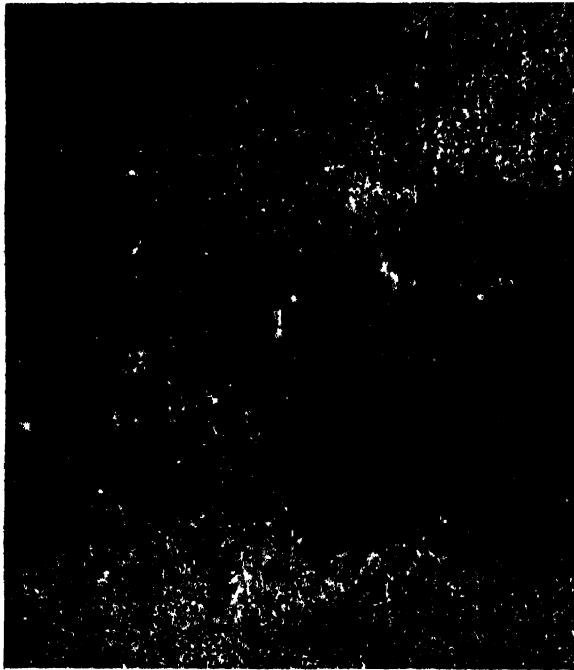


Fig. 1—A Macrograph Shows Filled in Weld Metal, and Its Junction with the Original Steel Plate. Humphrey's cupric chloride etching reagent was used, and the weld metal was made darker by this treatment.

Great strides have been made in perfecting the apparatus used in this industry and in improving the quality of the gases and the facilities for their economical distribution. These higher quality welding materials enable the operator to obtain correct mixtures of the gases and to maintain a close control of the flame. This feature is important, because variations in the intensity of the flame or the use of incorrect gas mixtures lowers the quality of the weld.

It is only recently that the importance of the correct selection of the welding rod has received any considerable share of the recognition that it merits, and that researches have been carried out for the improvement of existing rods and the development of new rods.

Consideration in the Selection of Rods

Unfortunately, in oxy-acetylene welding the practice has too often been to fill a steel weld with whatever steel rod happened to be at hand, or to weld copper with a plain copper wire, the general character of

the metal in each instance determining the most convenient filler at hand, without reference to scientific balance of component elements. The results of such methods have frequently been disappointing.

A better procedure is to use a rod that will produce a joint as good as, or better than, the original or base metal. The metals joined are usually in the rolled or forged condition, while the metal deposited from the welding rod is in the cast condition. Very often a metal is of such composition as to possess excellent properties after forging and heat treatment but in the form of the casting is of little value.

This is well illustrated by the comparison of chrome-vanadium steel. After forging and careful heat treatment these steels have a tensile strength of about 150,000 or even 200,000 lb. per sq. in. and are highly resistant to shocks and alternating stresses. In the cast condition the tensile strength is very little better than that of unalloyed steel of the same carbon content.

The welding operation frequently causes a change in the chemical composition as the metal of the rod is fused into the weld. For example, an 11 to 13 per cent manganese steel is widely used where resistance to wear and shock is required. A welding rod of this composition will yield welded steel containing 9 per cent to 10 per cent manganese, which is so brittle as to be without value. The solution is to use a rod containing at least 14 per cent manganese, which will yield weld metal of the correct 12 per cent manganese content.

Hard to Obtain a High-Grade Weld

To obtain a high grade weld it is necessary to fuse the edges of the base metal and the welding rod at the same time and to obtain an intermingling of the two metals. The product of this mixing may be entirely different from either of the original metals. This may be illustrated by attempts that have been made to weld cast iron with steel rods. The mixture of the metals at the junction is weak, brittle, hard to machine, and lacking in the good qualities of either steel or cast iron. However, when the product is not required to stand severe strains or shocks there are certain instances when steel may be welded to cast iron.

The composition of the rod should be such that during welding the metal is not so liquid as to run easily over the unfused metal, thereby covering up improperly fused and oxidized surfaces, nor should the melted metal be so viscous as to pile up and cause difficulty in obtaining a weld that is homogeneous and smooth at the surface. A satisfactory rod will be sufficiently free from impurities and of such composition that the slag formed by welding will fuse and float readily to the surface of the molten pool. A very thin slag has the advantage of protecting the metal surfaces from oxidation, and when present in small amount is not readily entrapped in the weld.

Manipulation is easier and attended with greater success when the melting points of the rod and the metal being welded are approximately the same. Where there is considerable difference, the low-melting-point metal is overheated and damaged before the higher-melting-point metal is fused.

This rate of fusion also makes important the exercise of care in choosing the size of rod and welding head for a given weld. The heat supplied should be sufficient to keep a small pool of molten metal in the weld and to melt in additional metal from the rod. If the rod is too large it will tend to chill the molten bath and may sufficiently lower the temperature to retard or virtually stop fusion of the rod metal into the weld. On the other hand, if the rod is too small it will not

*From a paper read before the annual convention of the International Acetylene Association in October, 1921. The author is one of the technical staff of the Union Carbide and Research Laboratories, Inc., Long Island City, N. Y.

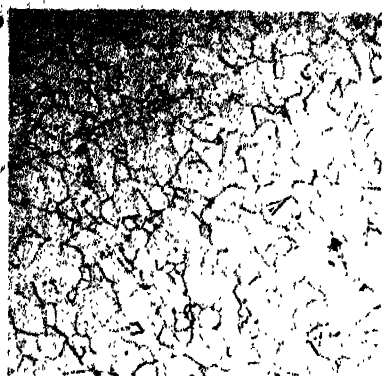


Fig. 2—This Specimen Contains Less Than 0.5 Per Cent Carbon. The field is made up of ferrite and small inclusions of oxides which are frequently found in very soft steel. ($\times 100$)



Fig. 3 Weld Made from a Very Low Carbon Rod, Containing Large Irregular Ferrite Grains. The scattered black dots are iron oxide. This impurity is less frequently found in welds made from a slightly higher carbon rod. ($\times 100$)



Fig. 4 (Unetched). Show Impurities in 0.02 Per Cent Carbon Steel Rod. Most of these inclusions are aluminum oxide. Upon welding with this rod a granular appearing slag, formed on the surface of the melted metal, made it difficult to obtain a clean weld. ($\times 100$)

absorb the heat of the flame and pool rapidly enough, and the excess heat which results in the weld will burn the metal.

The usual method of manipulation is to melt a small pool of the base metal and then insert the rod in the molten pool. Then the rod absorbs the heat necessary to melt it down and at the same time prevents the temperature of the molten pool from rising

clean weld, because it keeps the melting metal covered by the pool, prevents any oxidation below the surface, and makes it improbable that any oxidation or foreign matter will be carried to the interior of the weld. Furthermore, the neutral gases, when directed at the weld adjacent to the rod, envelope both the rod and the bath in such a manner as to exclude atmospheric oxygen from the weld, so that excessive oxidation cannot occur

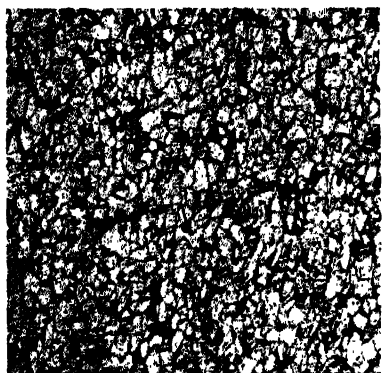


Fig. 5 (Left) Structure of Steel Rod Containing 0.20 Per Cent Carbon. Dark areas are pearlite, the carbon carrying constituent, and light areas ferrite. ($\times 100$)

Fig. 6 (Right) - Weld Made from 0.35 Per Cent Carbon Steel Rod. The Widmanstatten-like structure is characteristic of medium carbon steel that has cooled undisturbed from a high temperature. A weld showing this structure is frequently stronger than the low carbon weld previously shown, but its ductility is seldom as good. ($\times 100$)



far above its melting point. The principle is the same that governs the temperature of water containing ice. It cannot be heated to a temperature higher than that of melting ice until the last of the ice is melted.

The torch is moved gradually along the weld and all slag is floated to the surface. Laps or cold shuts are melted out, the rod being kept constantly in the pool to supply metal for filling.

The covering of unfused surfaces would produce the difficulty commonly called lamination, which is similar to the seams that sometimes occur in the rolling or forging of steel. This method of holding the rod suspended in the molten pool aids in the production of a

when the filling rod and the blowpipe are manipulated properly.

Welding Rod Materials and Their Composition

The most important of the welding rods, if we judge by the quantity consumed, is Norway iron which, though really a steel, approaches closely to pure iron. A weld made properly with this rod will have a tensile strength of over 50,000 lb. per sq. in. and an elongation of from 25 to 30 per cent in 2 in., thus combining high strength and excellent ductility.

The next in importance is the mild steel rod which contains 0.20 per cent carbon and other elements in the

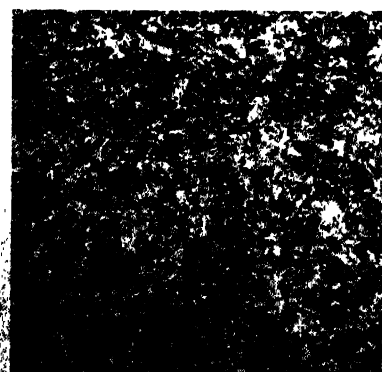


Fig. 7 (Left) - A 0.90 Per Cent Carbon Steel. This eutectoid steel contains just enough carbon so that neither free ferrite nor free cementite is formed. ($\times 100$)

Fig. 8 (Right) - Structure of Weld Made from Rod Shown in Fig. 7. The grains are quite large and the steel in this case is largely sorbitic. This weld is relatively hard and resistant to wear, but is of lower tensile strength than lower carbon steel welds. ($\times 100$)





Fig. 9 (Left) Cold Drawn Nickel Steel Rod. Carbon, 0.24 per cent, nickel, 3.50 per cent. The elongated grains are due to the deformation set up by the reduction during the drawing operation. ($\times 100$)



Fig. 10 (Right) Weld Metal obtained from Nickel Steel Rod. One small slag inclusion is shown, otherwise the weld is quite clean and free from defects. ($\times 100$)

usual percentage. Norway iron and this material may be used interchangeably, depending largely on the operator's preference. The mild steel rod ordinarily gives a weld of higher tensile strength, but of slightly lower ductility.

The following table illustrates the tensile properties of welds made by a properly trained operator using

Welds have been obtained that have a Brinell hardness higher than 400, which is too hard to machine. However, any hardness in the range from a very mild steel of Brinell number below 100 up to the highest value can be obtained by the selection of a rod of suitable chemical composition.

Steel which has been subjected to mechanical work,



Fig. 12 - This Photograph at Two Diameters Shows a Section of Cast Iron as Welded with the Oxy acetylene Torch. The weld is free from blowholes or slag inclusions and a perfect intermingling of the weld metal and plate metal has been obtained

the mild steel filling rod. Note the practical uniformity in the results of the successive welds:

Sample No.	Yield Point, lb. per Sq. In.	Ultimate Tensile Strength, lb. per Sq. In.	Elongation in 2 In., Per Cent	Contraction of Area, Per Cent	Fracture
1	36,000	51,150	13.0	18.6	Fine crystals
2	34,500	51,100	14.0	20.6	Silky
3	36,120	56,700	16.0	16.0	Silky
4	35,150	55,100	12.0	14.4	Fine crystals
5	37,150	53,200	10.0	18.6	Silky
Average	35,800	51,850	12.1	17.6	

These values were obtained in testing welds in ship plate of 60,000 lb. per sq. in. tensile strength. They are merely good average welds. The specimens were machined over all to make it possible to secure accurate measurements.

High carbon welding rods are employed for building up worn shafting and for many other common uses where metal is required of sufficient hardness to resist wear and tough enough to resist shocks and other stresses. The carbon content of these rods may vary over a rather wide range, depending on the requirements of the finished welds.

as in rolling or forging, is strengthened by increasing the carbon content, but an increase of carbon in steel welding rods does not greatly increase the tensile strength of the resulting weld because the weld is essentially a casting, and the weld metal forms in larger and weaker grains as the carbon content is increased, and to the added fact that welders have greater difficulty in obtaining sound welds with the higher carbon steels.

Nickel Steel Rods

There are a few very skillful welders who have obtained excellent success with nickel steel welding rods containing 0.20 to 0.25 per cent carbon and 3.0 to 3.50 per cent nickel. Many other welders obtain poor results with this steel owing to cracks that form in a weld while it is red hot. The tendency to crack is due to the brittleness of nicked steel at high temperature. This property is illustrated by the difficulties so frequently encountered in forging nickel steel and by high temperature tensile tests.

Operators who are sufficiently skilled in handling nickel steel rods can make welds having a tensile strength as high as 60,000 lb. per sq. in. This strength is greater than that of low carbon steel plate, such as

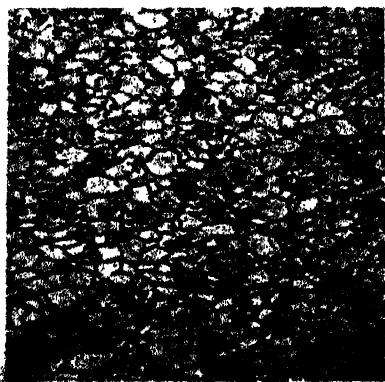


Fig. 11 (Left)---Manganese Steel Rod. Magnification 125 diameters. The small high colored grains are austenite, which is a rather unstable constituent. Relatively low temperature heating will cause it to break down into martensite, which is hard and brittle. Mechanical working as machining or filing has a somewhat similar effect, after the first cut is taken the portion adjacent to the cut becomes unmachinable. ($\times 425$)

Fig. 12 (Right)---Manganese Steel Weld Metal. Here the austenite grains have partially disintegrated and martensitic structure is observed. This material is shown in the welded condition before being heat treated. Surrounding the grains can be observed thin white lines of carbide. This material is present in such small amount as to be without value for strengthening the metal, but serves as a weak binder between the grains. Correct heat treatment will change this metal to the desirable austenitic condition. ($\times 100$)





Fig. 14 (Left) —Gray Cast Iron, Unetched. Large plates of graphite tend to weaken the metal. ($\times 100$)

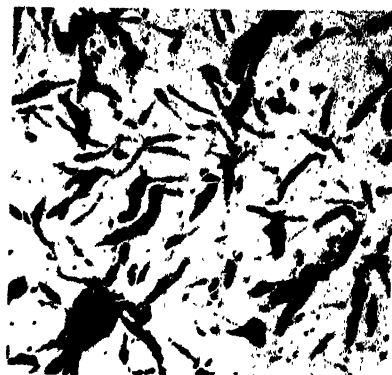


Fig. 15 (Right) —Gray Cast Iron Weld Metal, Unetched. Here the graphite flakes are of smaller size and the metal is even stronger than the casting, because the continuity of the metal is greater. ($\times 100$)

boiler plate, and, when tensile tests are made, the break does not occur in the weld but generally several inches away in the plate metal.

High-speed steel rods are used rather widely for making tipped tools. The high-speed steel is melted into a slot, cut from the end of a low carbon steel shank. After correct heat treatment the cutting qualities of the high-speed steel deposited by the oxy-acetylene welder are as good as the high grade commercial brands of high-speed steel. The melting causes very little change in the chemical composition, usually a slight reduction of the contained silicon and manganese, so the rods used should have about the same composition as a standard high-speed steel. A wide variety of shapes and sizes of tools are thus made available without tying up an appreciable amount of money in costly material, as is the case when solid high-speed steel is used. The requisite for success here, as with every high-speed steel, is correct heat treatment.

Manganese rods are employed in the repair of machinery used for grinding and for other service where great resistance to abrasion is required. Special precautions are necessary in welding this steel. The part to be welded should be supported so that the heated portion will be under as little strain as possible; it should be preheated to redness before the welding is begun and kept red hot during the operation. In this steel the favorable properties of great resistance to shock and abrasion are brought out by quenching in water from a temperature of about 1800 deg. Fahr. To obtain the best results after welding, the quenching practice employed in manufacture should be followed closely.

Welding Cast Iron

One of the commonest of oxy-acetylene welding operations is the welding of cast iron. The expenditure of a few dollars for welding in this field may easily result in the salvage of a casting worth several hundred dollars.

The composition of the rods used for this work is that of ordinary gray cast iron, the silicon content of which should be relatively high and the percentage of sulphur low. Excepting for certain special uses, gray cast iron is standard. Increasing the silicon content reduces the amount of carbon retained in solution during cooling, resulting in the decomposition of a larger portion of it in thin graphite flakes throughout the cast

iron. It is this structure which gives the fracture of gray iron its characteristic appearance.

When rods of correct composition are used, the weld metal obtained is usually as strong as the original casting. The tensile strength of a cast iron weld is about 18,000 to 20,000 lb. per sq. in. and the transverse test of 1-in. square section, using a 12-in. beam, loaded at the center, is from 2000 to 2500 lb. with a deflection of 0.1 to 0.15 in.

Copper and Brass Welding

Rods used for filling welds in copper are made of copper to which has been added a small amount of phosphorus as a deoxidizer. Very encouraging results are being obtained in the tensile strength of the welded metal. Until recently only about 14,000 lb. per sq. in. tensile strength was obtained in copper welds, but improvements in rods have made possible the production of welds testing over 22,000 lb. per sq. in.

Brass is successfully welded, rods of the usual brass compositions being satisfactory for this use. There is some loss of the zinc content, about 2 or 3 per cent escaping as fumes. A suitable flux is always used in welding on brass or bronze. The flux forms a thin slag, coating over the weld and preventing oxidation and at the same time dissolving impurities and floating them to the surface of the weld. The most popular bronze welding rods are the manganese and Tobin bronzes.

Aluminum welding and soldering by the oxy-acetylene flame has a widespread use both in manufacturing and in the repair of broken parts. The welding of broken crank cases is one of the regular services offered by most up-to-date automobile repair shops. Rods of pure aluminum, as well as special rods of aluminum with zinc or copper additions, are widely used and have met with much success.

Quality of the Rods

Even though they may be of correct chemical composition, experience has shown that some rods are unsuited for welding. Any one of the manufacturing operations of melting, casting, rolling, cold drawing, etc., may not have been correctly handled, resulting in a faulty product.

Investigation of several curious failures of welding materials has focused attention on certain factors that

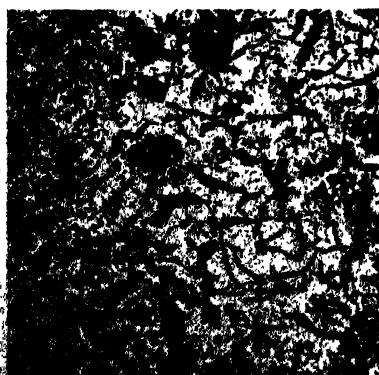


Fig. 16 (Left) —Gray Cast Iron Weld Junction, with weld metal on left and original cast iron on the right. Much smaller graphite plates in weld metal. Good fusion of the two metals and no impurities or hard spots can be observed. ($\times 50$)

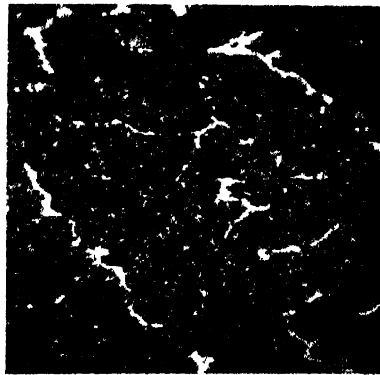


Fig. 17 (Right) —High-Speed Steel Weld Metal. This material has been correctly heat treated and has proved to be an extra good tool as shown by service tests. Most of the carbides have been absorbed during the heat treatment. The ground mass is martensitic with outlines of the original austenitic grains still remaining. ($\times 425$)

as yet remain somewhat obscure. Welding rods are encountered occasionally that are not satisfactory in their welding properties, even though chemical analysis of the material show that the proportions of the elements usually specified are correct. This trouble has not been found alone in rods but in certain lots of sheet metal, as was recently demonstrated in an investigation of sheet metal that did not meet the requirements of a certain manufacturer for welding. The rod was satisfactory, the equipment and welding procedure all that could be desired, and still it was not possible to make a satisfactory weld. Here again even most careful metallographic examination failed to reveal conclusive evidence of the cause of non-weldability. A simple test, in which none of the factors of torch operation or gas fusion entered, proved that it was impossible to melt the given steel and obtain a solid fusion free from blowholes and sponginess.

This example is mentioned to illustrate that as yet we do not know all there is to be known of the physico-chemical reactions taking place when the melting of a welding metal occurs. The steel-maker and foundryman share with the welder some of the responsibility and should work with him in solving the problem of making better welds.

Physical Tests of Welds

Until very recently there was no recognized standard for the testing of welds. Leaders in the industry have recognized the need for a uniform practice in testing, so that a greater knowledge of the properties of welds will be available through the exchange and

assembling of information and test data. This need of standardization has been met by the American Bureau of Welding with carefully prepared specifications for testing welds, such that entirely comparable results will be obtained by experimenters who follow these specified methods of testing. The tests included are tensile, bending, fatigue, impact and metallographic.

Examination by X-rays is a new method of studying welds that of late has received considerable attention. Any slag inclusions, blowholes, or interface in metal, up to 2 in. in thickness, may be detected by this radiographic examination.

Microscopic Examination

The microscope is almost an unfailing aid when a study of the physical properties of a metal is undertaken. The examination of the entire surface of a large metal section at high magnification is very tedious and points of greatest importance might frequently be missed. The study of macrostructure has been developed to help in avoiding these difficulties.

The grains in the weld are coarser than those of the parent metal. There is no undesirable sharp demarcation at the point of junction between the two metals, but by the thorough fusion of the metals a gradual change of structure takes place in passing from the weld to the plate material.

The accompanying photomicrographs have been prepared to illustrate characteristic examples of various welding metals. Some show impurities or defects that should be avoided. All were etched with 5 per cent solution of nitric acid in alcohol.

PRESIDENT FARRELL'S CALL

Ninth National Foreign Trade Convention to Be Held in Philadelphia in May

James A. Farrell, chairman of the National Foreign Trade Council and president of the United States Steel Corporation, has called the foreign traders of the whole country to meet in Philadelphia, on May 10, 11, 12. In issuing the call for this convention Mr. Farrell said:

"Energetic efforts in the past year have been directed towards that restoration of stable economic conditions in international commerce, which must be accomplished if the world is to return to normal activity and prosperity. During the year the foreign trade and the domestic trade of all countries have suffered alike, although in varying degree in different countries.

"The severe and prolonged decline in prices everywhere resulted inevitably in a slowing down of commerce and industry, due to uncertainty as to ultimate values. The continued recession in prices and accompanying reduction in producing costs, has permitted a degree of competition for business in certain commodities in the world's markets, while the approach of prices to pre-war levels, or to the cost of production, has stimulated renewed buying and substantially increased the world's buying power.

"So far as the United States is concerned, the turn of the tide is apparently here, and despite the sharp decrease in values, the volume of our foreign trade is materially greater than before the war, and in many lines has increased notably in recent months. In certain directions, however, the meeting of foreign competition, reinforced by subnormal costs of production arising from depreciated currency, continues an important question for discussion and solution.

"The financial and production problems of Europe, also, are still unsolved and until solved the lessened consuming power of markets which have been large buyers of American products will continue to retard the natural expansion of our trade.

"A general survey of the world's merchant marine now in operation would indicate that ocean freight rates are now below the cost of carrying. The effect of this situation in its various aspects on the American Merchant Marine demands earnest consideration of all interested in the perpetuation of our foreign trade and shipping.

"To study the means of promoting the necessary restoration of the power of production and consumption in all the great markets of the world; to examine the conditions confronting our international commerce; and to obtain the judgment of experienced business men on many matters of vital importance to all the American people, the National Foreign Trade Council will hold the ninth national foreign trade convention in Philadelphia, on Wednesday, Thursday and Friday, May 10, 11 and 12, 1922.

"The Financing and Expanding of Our Foreign Trade" will be the central theme of the Convention.

"Americans engaged in foreign trade and connected with any factor of our international commerce, agricultural, commercial, industrial, financial or transportation; all chambers of commerce, boards of trade, national and State associations and other commercial and industrial organizations, as well as firms and individuals, are cordially invited to participate individually or by appointment of delegates.

"Your co-operation in the effort, through the ninth national foreign trade convention, to make more effective the national services rendered by foreign trade, is earnestly invited."

Mining Exhibit at Brazilian Exposition

The work of the various bureaus of the Interior Department in promoting the mining industry of the United States will be shown at the exhibit of the United States Government at the Brazilian Centennial Exposition at Rio de Janeiro in September of this year. The Secretary of the Interior has designated Thomas T. Read, Chief of the Information Service of the Bureau of Mines, as the representative of the Interior Department on the executive committee which is to cooperate with the Commissioner General, Col. D. C. Collier, in making arrangements for a suitable exposition of the activities of the Government of the United States.

The Greendale Mfg. Co., screens, and the business of John F. Murphy, dies, both of Worcester, Mass., are to be taken over by a new company, the Murphy Die Co., recently incorporated, and will specialize in dies for gaskets. John F. Murphy is president of the new concern, John W. Murphy, vice-president, and W. L. Hubbard, secretary and treasurer.

UNION LABOR ATTITUDE

Extreme Position Taken in Hearing Before Interstate Commerce Commission

WASHINGTON, Feb. 14.—Determination of organized labor to contest strongly reductions in rail labor was made clearly evident by testimony given before the Interstate Commerce Commission last Friday and Saturday, in connection with the general rate investigation, by Frank J. Warne, when he spoke for practically all of the railroad unions, the railway department of the American Federation of Labor, and other organized labor groups. Their counsel, Attorney Glen E. Plumb, conducted the direct examination of Mr. Warne.

In the face of the obvious fact, emphasized not alone by railroad executives, shippers, and the public generally, that general reductions in railroad rates cannot be made unless wages have been deflated, Mr. Warne made the remarkable contention that there is no economic law that establishes any relation whatsoever between rates as such for transportation, and rates of wages for services performed. Employees, said Mr. Warne, "believe this is an economically sound document, the observance of which cannot lead this commission astray from the facts of the situation which now confront it in this hearing."

It was evident that organized labor was pleased that it was given two days to present its views in this important hearing, and the press agent, speaking for Mr. Warne, who in turn claimed to represent labor organizations comprising 1,750,000 employees on all the railroads of the country, declared that "the appearance of Mr. Warne was said to be the first time in the 34 years of the existence of the commission," when these railway labor organizations were a party of a rate case.

"It is considered as significant of a striking tendency in the industrial development of the country as regards the widening gulf between employers and employees and the increasing magnitude of the stage upon which the issues between them are to be fought out."

This belligerent note was sounded throughout the testimony of Mr. Warne and was taken as an indication that organized labor, at least, was prepared to take a militant attitude against reductions in wages, though there are those who believe such an attitude is largely an outward manifestation rather than one that would be carried to extremes.

It was interesting to observe that out of the large list of organizations for which Mr. Warne spoke, the Brotherhood of Railway Trainmen was not included. It was stated that the exclusion of this organization was deliberate. W. G. Lee, president of the Brotherhood of Railway Trainmen, it will be recalled, disagreed with other labor leaders in the threat to strike last October, and apparently there still is a rift between this organization and the others. This has led to the belief that organized labor groups do not possess the solidarity which they pretend, though there is no denying that if they went to the extent of striking before submitting to rail reductions they could at least temporarily paralyze transportation in the United States. Mr. Warne attempted to bring in considerable extraneous matter which was ruled out by the commission.

Unemployment in Pennsylvania

HARRISBURG, PA., Feb. 14.—The metal trades of Pennsylvania are in the most stagnant condition of Pennsylvania industries, according to the semi-monthly report for the last half of January, just submitted on unemployment conditions in the State to Clifford B. Connelley, commissioner of the State Department of Labor and Industry.

Little activity is reported in any of the 10 districts of the State. The Altoona office reports that work is practically at a standstill. Erie declared that at a meeting of the Employment Managers' Association of Erie it was the opinion of those present that their forces would not be increased during February. Mead reported a slight improvement, but Harrisburg, Johnstown and Pittsburgh announced no better-

ment. Philadelphia said that the Baldwin Locomotive Works, which has a total force of about 6000 men at its Spring Garden and Eddystone plants, has cut operations from three to two days a week, while all the machine shop trades are dull.

Unemployment, as a whole, decreased during this period, although Philadelphia, Altoona, Erie and Harrisburg reported an increased number of men out of work. The reports showed a total of 313,835 unemployed in the various districts on Feb. 1 as compared with 315,860 on Jan. 15, and 321,893 on Jan. 1.

Labor Clash at Yorkville Plant

WHEELING, W. VA., Feb. 14.—Although the Wheeling Steel Corporation has succeeded in resuming operations at its Yorkville, Ohio, works, a tin plate plant of 24 hot mills, which has been idle since last June as a result of the refusal of the company to renew its agreement with the Amalgamated Association of Iron, Steel and Tin Workers, the effort is meeting with some resistance, and on the night of Feb. 7, a clash between mill guards and picketing strikers resulted in the death of one of the strikers and the wounding of another. This is the only flareup that has occurred, but the situation still is tense as members of the Amalgamated association, aided by union miners, have formed a cordon of pickets around the plant and are making a strong effort to prevent the return of the plant to its status as an "open shop," as it was prior to the war, and which the management probably would have maintained had it not been for political pressure exerted at the time from Washington.

In explanation for the refusal to renew its agreement with the Amalgamated association last June, the Wheeling Steel Corporation officials claimed that the labor organization, at its annual convention in Hamilton, Ont., had passed a resolution demanding that the Wheeling Steel Corporation sign an agreement as a unit and thus embrace all its units, some of which, notably LaBelle Iron Works, had been "open shop" works. Amalgamated officials denied such a resolution and that they were merely trying to get the Wheeling Steel & Iron Co., one of the Wheeling Steel Corporation subsidiaries, to renew the agreement which they claimed it had previously broken.

None of the companies of the Wheeling Steel Corporation was represented at the wage conference between independent sheet and tin plate manufacturers and the Amalgamated association at Atlantic City last June, nor at Columbus, Ohio, where a fresh conference was held; following the failure to reach an agreement at Atlantic City. The company posted notices of its intention to deal direct with its employees, but since most of them were affiliated with the union they withdrew when the agreement expired by limitation June 30, last, and the Yorkville plant suspended operations.

About 10 days ago the company announced its intention of starting up Feb. 7, and invited former employees to go to work, offering wages somewhat above the current scales in union mills, but upon the basis of dealing direct with the men and the non-recognition of the union. Three mills were started and have since continued in operation.

In the Field of Labor

The Government's curtailment in naval construction work has resulted in 1000 men being laid off at the Fore River Works, Bethlehem Shipbuilding Corporation, Quincy, Mass., leaving 1800 men at work there, contrasted with 6500 a year ago and 18,000 during the war. Work on the superdreadnought Massachusetts and the battle cruiser Lexington has been suspended. The Massachusetts is 11 per cent completed, and the Lexington 35 per cent. Work on two scout cruisers and 16 submarines has not been discontinued.

The Bay State Foundry Co., Katherine Street, Westfield, Mass., closed for more than a year, will shortly resume operations, having secured a large contract from Cleveland manufacturers and others. Heretofore the plant was engaged almost exclusively in work for the Brien Heater Co.

New Socket and Ratchet Wrench Set

The socket and ratchet wrench set shown in the illustration has been placed on the market recently by the Eastern Machine Screw Corporation, New Haven.

There are ten sockets to the set, fitting 7/16 to 1 in. hexagon nuts. The method of manufacturing the sockets is a feature emphasized, the hexagon openings being made by drilling the hole to a diameter corresponding to the diagonals and drawing in the metal to form the hexagon. The result of this process is said to be a compressing and toughening of the metal permitting a reduction of the usual heavy wall to a thinness which permits the socket to fit where a thicker socket could not. It is also said to result in a socket



SOCKET ARE MADE BY DRILLING HOLE AND DRAWING IN THE METAL TO FORM THE HEXAGON

one third stronger than usual. Another improvement featured is the provision of strong hexagon head for the socket, all of the wrench parts fitting over this head for turning. The sockets are heat treated and hardened by three processes which involve carbonizing, refining and final hardening.

The T-handle has a cross bar which is adjustable for use in the central position or in the position for maximum leverage. The ratchet is set for either right or left hand use by raising or reversing the position of a ball-head pin. An extension piece is used between the T-handle and the socket either to turn nuts difficult to reach or to bring the handle into a more favorable position. A universal joint milled from bar stock is provided for turning nuts located at difficult angles.

The set includes two screw driver blades which fit any of the wrench attachments. The box wrench has a hexagon hole to fit any of the sockets and is used to get at nuts when the space above the socket is limited. This is a drop forging and is hardened by the cyanide process. The female part of the wrench attachments is provided with a split screw made from spring steel, which provides the necessary friction to hold the different parts together while in use. The tool box is strongly made of wood.

Fluorspar in Japan

WASHINGTON, Feb. 11.—Fluorspar is produced in small quantities in Ise province and also at Hotatsusan province, Japan, Acting Commercial Attache Halleck A. Butts, Tokyo, says in a report to the Bureau of Foreign and Domestic Commerce, but the domestic product is of such poor quality that the greater part of the demand is supplied from foreign sources. The principal sources of supply are Korea, Manchuria and South China. So far as it was possible to ascertain, none is imported from the United States.

The total amount of fluorspar used in the Japanese steel industry during 1920 amounted to 285 metric tons.

The present open-hearth capacity of Japanese steel works is given as 2471 tons. There are 105 furnaces.

Because of the small amount imported, fluorspar is not listed separately in any of the Japanese trade statistics, the report says, nor has it been possible to secure this information in any other way.

It is pointed out that there do not seem to be encouraging prospects for the importation of the American product. The Japanese steel industry, it is explained, is not in a flourishing condition, and in addition will be still further depressed by the putting into operation of provisions of the Washington conference relating to limitation of armaments. In addition, it is stated, American producers will have to meet the competition of nearby producers who are much more favorably situated with regard to transportation costs.

Navy Yard Workers Laid Off

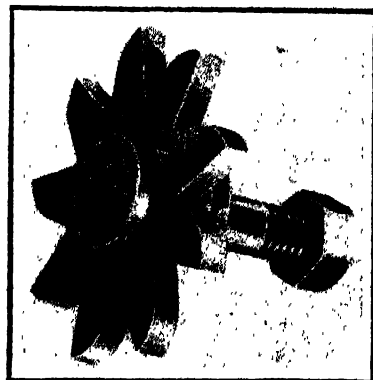
WASHINGTON, Feb. 14.—The effect of the conference on the limitation of armaments became pronounced upon workers in Government navy yards last Thursday, when, without previous notice, they claimed, they were "furloughed" without pay. The Washington Navy Yard dismissed 1350 employees and several thousand others were "temporarily" laid off at the Philadelphia, Norfolk, and Mare Island, Cal., yards, while the Naval Ordnance plant at South Charleston was ordered by Secretary of the Navy Denby to close at once and to lay off without pay, until June 30, all employees except those necessary to maintain and protect the plant.

The action of the Government has caused the different unions representing the trades affected by the order to organize a campaign to have the Government turn the navy yards over to the production of peacetime material as well as ordnance work being done at private plants. While considerable demonstration is being made in connection with this move, it is evident that it is considered impracticable and that it will not avail anything.

It was stated that most of the steel for naval vessels, which is to be scrapped under the provisions of the conference on the limitation of armaments, has been shipped, except the armor. But contracts for both steel and armor, as well as electric power equipment, etc., intended for the ships, have been held up and ultimately will be cancelled if the treaties are ratified. This will be followed by work of making readjustments with the private contracting firms.

Tool to Prevent Clogging Metal Saw Teeth

Much of the breakage of metal-saw teeth has been caused by chips from the cut clogging the gullets of the teeth, putting strain on the teeth and often causing them to crack and break. An automatic device intended to eliminate this trouble has been placed on



Device to Prevent Breakage of Metal Saw Teeth Caused by Chips Clogging the Gullets of the Teeth

the market by Henry Disston & Sons, Inc., Philadelphia. The tool shown is called the Disston chip remover. It consists of a special sprocket wheel, made to fit any type of saw, and a stud to carry the wheel.

If the saw teeth and gullets are free from chips, the saw will cut easier and smoother, and on this basis it is claimed that a saw equipped with the new chip remover can be run faster and at a little heavier feed. Chips from the cut often stick to the sides and points of the saw teeth, scoring the work and resulting in a rough, uneven cut. In keeping all parts of the saw teeth free from chips the chip remover is said to produce a smoother, cleaner job. These difficulties have been particularly noticeable when cutting soft stock or in the case of unusually large stock.

The European Steel Industry To-day

American Engineer's Comparison with British and German Pre-War Conditions -- Keen Interest in Plant Reconstruction

AN extended study of European steel conditions has just been completed by a prominent American blast furnace engineer. Last July, H. J. Freyn, president Freyn, Brassert & Co., Chicago, left this country for a three-months' business trip to England, Belgium, Holland, Germany and other countries, with which was to be combined a study of the general situation. The field was so large and the opportunities so diversified that the time was extended to seven months. Mr. Freyn returned last Sunday on the George Washington and granted an interview in New York to a representative of THE IRON AGE. Only some of the more important facts which naturally were developed by such a thorough contact with the iron and steel industries of those countries are possible of reproduction here. The value of the knowledge gained may be partly judged by the statement that Mr. Freyn talked, in many cases for hours at a time, with about 300 different persons in the iron and steel industry in the various countries.

Among the results of the business phase of the trip was the establishing of two European branches or connections of this blast furnace engineering firm. A British company has been organized in London under the name of Freyn, Brassert & Co., Ltd. In Germany connections have been established with the German company, Gutehoffnungs Hütte, at Oberhausen. The former branch will cover the British field while the German connection will look after the interests of the Chicago company in continental European and other foreign countries. Not only will the adaptation of American blast furnace and other steel equipment to European practice be a feature of this business but the introduction of the McKune open-hearth furnace will also be advocated. The Chicago company recently secured the American and foreign rights to this Canadian invention.

In commenting on the trip in general, Mr. Freyn stated that his outstanding impression is the "great kindness and truly extraordinary hospitality with which I was received everywhere I went. I made the acquaintance of nearly 300 people engaged in the iron and steel industries of England, Germany, Belgium, Holland, Austria and Czechoslovakia, all of whom showed me the most friendly consideration and facilitated my work by their kindly interest. I owe all these men a debt of deep gratitude which it is a pleasure and privilege to acknowledge."

Keen Interest in American Methods

The interest in American methods of making pig iron and steel was everywhere an outstanding impression of Mr. Freyn—due largely to the changed economic and industrial conditions following the war. In his opinion post-war conditions in Europe are comparable with those which existed in America even before the war; the general plane of living of the working classes has been raised, labor is much more independent and less efficient. The 48-hr., and in certain countries the 45-hr., week has been legally established. "I have met not one person who claims that these conditions are the temporary result of the general upheaval caused by the war and that conditions will come back to the pre-war level." On the contrary, the conviction prevails that a new era is dawning, said Mr. Freyn, and that he who is unable to adjust himself to the new order cannot expect to survive.

About half of Mr. Freyn's journey was in England and the other half on the continent, particularly Germany. Business exigencies necessitated his going back and forth a number of times from one country to another, so that unusual opportunities were afforded to observe the changes which took place from time to time, thus insuring a more careful study of conditions

and not making it necessary to generalize and possibly create wrong impressions, as is often done by some newspaper and magazine writers.

Conditions in the British Industry

After describing the prostration of the British steel industry in July and later when the price of coke and labor was so high that economic production was impossible and when continental iron was being sold, f.o.b. Antwerp, at prices several pounds sterling below the cost of production in English blast furnaces, Mr. Freyn said that conditions gradually improved so that some furnaces which had been damped down as long as nine months, were again blown in until, at the time of his leaving England early in February, perhaps 25 per cent of the furnaces were in operation. Everywhere he was told that the British industry was in a distressed condition which must continue until the greatly increased cost of raw materials and labor as well as the high taxes and transportation charges are removed.

Much has been accomplished in the last few months in revising wages downward, but Mr. Freyn was told that no steel plant in Great Britain is able to-day to produce at a profit, for iron and steel products are being sold in small volume only and at prices considerably below cost of production, entailing great financial losses which must be covered by reserve funds accumulated during war prosperity.

The Wage Situation in England

"Several British plants are being operated in only one or two departments a few days each week," said Mr. Freyn, "for the following reasons. The managements desire to keep their workmen in food and shelter without abandoning them to the demoralizing effects of becoming recipients of the government unemployment dole. This is a commendable altruistic viewpoint, not dictated by law—as is the case in Germany—but is entirely voluntary. It is thus possible to take full advantage of the opportunity provided by wage agreements with the unions to bring down wages to a reasonable level compatible with the general deflation which has been under way for some time. Wages are paid on a sliding scale based on the ascertained price of certain steel products; when sales are made below manufacturing costs, a readjustment of wages takes place and it is greatly to the credit of the British workmen and to the spirit of fairness, justice and honesty that these reductions are being made almost without opposition."

"That a further curtailment of wages alone will be entirely insufficient to reduce costs to a level where competition will be possible at present world market prices is best shown, pointed out Mr. Freyn, by the statement of one prominent producer that he could not manufacture at a profit even though the entire labor costs in his plant were eliminated. Hence the cry for a quick lowering of taxes and for a radical cut in freight charges which, before the recent small reduction, were said to be three times as high as in the United States.

Future of British Steel Industry

Mr. Freyn, after stating that it was the consensus of opinion that no lasting improvement in the British iron and steel industry can be expected as long as the rate of exchange on continental countries, particularly Germany, remains as unstable and vacillating as it is, said that he heard much speculation concerning the future. There are those who take an extremely pessimistic view of the outlook. Ultimate prosperity is expected, however, though it may be some time in coming. Pointing out that England has wonderful coal and ore

resources and an energetic and fair-minded people with the training and experience of centuries, Mr. Freyn feels that this last asset cannot be over-rated. "It is this political and industrial high level which she has attained that accounts for her success in the past," said Mr. Freyn. "This will undoubtedly be duplicated in the future because the aftermath of the war has begun to break down the one factor which enlightened Englishmen themselves pointed out to me as a serious handicap, i.e. conservatism. There are signs on every hand to prove this assertion; they can be found in every day business and social life as well as in the more specialized field of the iron and steel industry. The British iron and steel master knows exactly where the shoe pinches and it is superfluous to point out to him that some of his plants and especially his blast furnaces are obsolete and inefficient. Plans for reconstruction and modernization are being made everywhere and lack of the necessary capital is the only reason why they are not being carried out. The English steel maker has quickly recognized that a revolutionary change has taken place in economic conditions. I think that no country needs reconstruction of plant as urgently as England. Many existing old hand-filled blast furnaces, some of which date back scores of years and which produce such very small daily tonnages even on rich ores and good coke must either be abandoned or remodeled. The tendency in England, as well as on the continent for that matter, must henceforth be in the direction of larger producing units and the elimination of labor wherever possible."

German Industry Busy

The German steel industry is very busy, said Mr. Freyn, and many changes are apparent. Plants are working day and night on three 8-hr. shifts. It is noticeable that there is small difference in the wages between skilled and unskilled labor which is true of all countries except England, where compensation is on a tonnage basis.

One of the most interesting developments, said Mr. Freyn, is the "Wärmewirtschaft" at Düsseldorf which is an organization engaged in studying fuel economy from every angle. It serves 250 plants and some remarkable results have been attained. Each plant has a heat department or "Wärmestelle" and in one case an expenditure of 10,000,000 marks resulted in the saving of 40,000,000 marks. Electric locomotives in plants and waste heat boilers are more numerous and even gas engines have waste heat boilers installed.

In blast furnaces, Germany is using less and less minette ore, but is smelting larger quantities of Swedish ore, which is now being crushed in Sweden. This has resulted in a larger output, one German furnace having averaged 700 tons per day and one or two days made as high as 811 and 844 tons, the scrap charge being only 12 per cent. In reply to a question, Mr. Freyn said that German steel practice was turning gradually more to open-hearth as compared with basic Bessemer.

In gas producers, Mr. Freyn reported that the rotary kiln was being largely used—a kiln developed during the war to make lubricating oil from tar, based on the principle of the low temperature distillation of coal. There have also been developed 4-cylinder gas engines, having a gas cylinder diameter of 59 in. and 6000 hp.

Electric Cleaning of Furnace Gas

Much interest has developed in both England and Germany in the cleaning of blast furnace gas by electric precipitation. Wet washing in Germany is, however, widely used, particularly where there is plenty of water; the Dorr thickener also excited much interest. Mr. Freyn said that a new German electric precipitation process was mentioned which had a velocity of 13 ft. of gas per second and which was small in size, but details were not available. German regulation of gas pressure has also been widely developed so that constant pressure can be depended upon and the study of powdered coal for metallurgical purposes was being carefully pursued, so poor is Germany in good coal. Mr. Freyn reported also the development of a boiler which efficiently burns brown coal containing 50 per cent of moisture.

Everywhere great interest, both in Germany and England, was awakened in the claims for the McKune furnace of greater steel production at a lower cost.

As an instance of the present state of activity in Germany, Mr. Freyn reported the case of an interview with one German manager at 10:15 p. m., and also the fact that 2000 Germans attended the November meeting of the German Iron and Steel Institute at Düsseldorf, where he witnessed unusual enthusiasm. "Financially, however, Germany is a house of cards and a collapse is expected sooner or later."

Asked as to whether coke-oven gas and tar were being used extensively on British or German open-hearth furnaces, Mr. Freyn replied that this practice was the exception. But he was emphatic in the opinion that American by-product coke practice is far ahead of even German methods. In too many cases in both countries, such plants are located at the collieries instead of at steel plants and the results are not comparable to those in this country. More regularity in operation and uniformity in materials are necessary, he said. The heavy construction of German blast furnaces, their complicated machinery and large ore bins were a striking impression, as contrasted with the simpler construction and mechanism of our larger American furnaces.

Holland's American Blast Furnaces

Holland will have a modern American blast furnace plant in the near future, said Mr. Freyn. His company is building two blast furnaces at Ijmuiden, near Haarlem, Holland, on the coast, one of 250 tons daily capacity and the other of 300 tons. The first will be ready late this year. The name of the Dutch company is Koninklijke Nederlandsche Hoogovens en Staal-fabriken, with offices at the Hague. The total cost of the plant will be between \$7,000,000 and \$8,000,000. Imported ores are to be used but fair coking coals from the Limburg province will be coked in the company's own coke-ovens. The pig iron will be exported.

The Belgian and Czechoslovakian Industries

The situation in Czechoslovakia was described by Mr. Freyn as at present hopeless. The industry there consists of about 80 per cent of that of the former Austro-Hungarian Empire and the population of the new country is only 13,000,000 against 40,000,000, for the whole steel industry before the war. With a 30 per cent tax on coke and with a labor element radically inclined, very little could be expected, although the industry is now busier because orders which German mills cannot take are going to Czechoslovakia.

The Belgian industry was not regarded as prosperous or on a sound basis, according to Mr. Freyn. The attitude of labor is a deterrent factor. It is less efficient than in the other countries and is prone to take advantage of the government unemployment compensation and even migrate to France to spend it. Plants generally are not operating as in other countries. In Germany labor is really better off than before the war and although the cost of living may be 25 per cent higher than in 1914, wages are perhaps 30 per cent higher. But in all those countries it is the middle class that is suffering, even to the point of actual destitution in many instances, labor being much better off.

Consolidations of British and of German Companies

Consolidation of interests in Germany and in England is a marked tendency, said Mr. Freyn. In Germany combinations are now becoming horizontal instead of vertical in the steel industry and in England family ownership and the close control of directors are gradually to disappear in his opinion.

That there is a thorough change in the European viewpoint of steel-making operations and conditions, and that there is a broad opportunity for any one to suggest the application of new ideas to present processes, Mr. Freyn is enthusiastically convinced; not that the transference of an American blast furnace or mill to Europe will solve their problems but the adaptation of some of our principles to their problems will be eagerly and respectfully listened to and even sought.

Steel Corporations Unfilled Orders Declined in January

The unfilled business on the books of the United States Steel Corporation as of Jan. 31, last, amounted to 4,241,678 tons, or 26,736 tons less than reported on the books, Dec. 31, 1921. In December, the unfilled tonnage increased 17,872 tons; in November and October, decreased 35,287 and 273,841 tons, respectively, and in September increased 28,744 tons, while from August, 1920, to August, 1921, there was a decrease each succeeding month. A year ago the unfilled business amounted to 7,573,164 tons, or 3,331,486 tons more than on the books Jan. 31, last. The monthly unfilled tonnage since January, 1920, compares as follows:

	1922	1921	1920	1919
Jan. 31	4,241,678	7,573,164	9,285,111	9,684,268
Feb. 28	6,933,867	9,502,081	6,010,787	
Mar. 3	6,281,765	9,892,075	5,430,572	
Apr. 30	5,816,224	10,359,747	4,800,635	
May 31	5,482,487	10,940,465	4,282,310	
June 30	5,117,868	10,978,817	4,892,815	
July 31	4,830,324	11,118,468	5,578,661	
Aug. 31	4,531,926	10,805,038	6,109,103	
Sept. 30	4,560,670	10,374,804	6,284,638	
Oct. 31	4,286,829	9,836,852	6,172,668	
Nov. 30	4,250,542	9,021,451	7,128,330	
Dec. 31	4,268,414	8,148,122	8,265,366	

The largest total of unfilled orders was on April 30, 1917, when it was 12,183,083 tons. The lowest was on Dec. 31, 1910, at 2,605,747 tons.

Chicago Industrial Engineers Meet

The Chicago chapter of the Society of Industrial Engineers held the second meeting of a series of eight on the "Stabilization of Industry" at the Auditorium Hotel, Chicago, Tuesday evening, Feb. 14. Discussion at this session was confined to "The Wastes of Uneven Production." F. G. Becker, general manager, Hubbard Steel Foundry Co., Chicago, acted as chairman, while the speakers on the program included C. E. Knoepfel, president C. E. Knoepfel & Co., Inc., industrial engineer, New York, and H. S. Gilbertson, secretary market committee, Chicago Federation of Clothing Manufacturers. The third meeting of the series will be held at the same place on March 14, and the subject of discussion will be "Effects of Modern Sales and Advertising Methods Upon Stabilization."

Boiler Makers Meeting

PITTSBURGH, Feb. 13.—The winter meeting of the American Boiler Manufacturers Association, held here to-day in the assembly room of Fort Pitt Hotel, brought together more than two-thirds of the membership of the organization. The program as outlined in THE IRON AGE, Feb. 9, was carried out in full and there was also a brief talk near the conclusion of the session by David J. Champion, president Champion Rivet Co., Cleveland, on the materials situation. A. G. Pratt, Babcock & Wilcox Co., New York, president of the association, presided. Members were asked to send in suggestions as to the place of the spring meeting.

New Ruling in Cost-Reporting Case

WASHINGTON, Feb. 14.—Justice Bailey of the Supreme Court of the District of Columbia, last week announced that a date will be set for argument upon the motion of attorneys representing the Claire Furnace Co., and other iron and steel makers to strike out the amended answer of the Federal Trade Commission in the so-called cost reporting case. The other motion of attorneys for the plaintiff to strike out parts of the amended answer was overruled "without prejudice to the right of the plaintiff on the further hearing on the second motion to raise objections to matters not properly pleaded."

Permits were issued in Chicago in January for 457 buildings, fronting 14,968 ft. and involving a cost of \$7,991,550, as against 166 structures for the same month last year, involving a frontage of 6,215 ft., and a cost of \$4,119,000. Thus there was an increase of 210 buildings, 8,753 ft. of frontage and \$3,872,650.

BRITISH FOREIGN TRADE

Steel Exports Again Increased in December—Imports Declining—Year's Total Small

The upward swing in British steel exports, which has characterized recent months, was continued in December, according to official data just made public. The total was 211,314 gross tons; excluding iron ore and including scrap. This compares with 202,059 tons in November and is second only to January, 1921, with 233,114 tons. A year ago, or in December, 1920, the exports were 191,057 tons.

The total exports for last year were 1,738,616 tons, or less than the 1920 exports by 1,557,231 tons. In 1919 these exports were 2,262,232 tons.

Iron and steel imports in December were 132,463 tons and the total for the year was 1,832,808 tons, which compares with 1,543,299 tons in 1921. The December imports have gradually declined from the peak of 229,391 tons in September. The following table shows comparative data:

British Steel Exports and Imports, Gross Tons

	Exports	Imports
Average per month first quarter, 1921	183,373	186,040
Average per month second quarter, 1921	109,670	96,320
Average per month third quarter, 1921	93,804	160,727
Average per month, fourth quarter, 1921	191,685	168,687
October, 1921	161,683	189,536
November, 1921	202,059	184,064
December, 1921	211,314	132,463
Average per month, 1919	188,519	50,801
Average per month, 1920	274,881	128,685
Average per month, 1921	114,885	152,734
Average per month, 1913	420,757	195,264

The trend of some of the principal exports is shown by the following data:

Principal British Exports, Gross Tons

	Average per Month		December	
	1913	1920	1920	1921
Pig iron	78,771	38,505	15,549	12,251
Steel rails	41,676	11,213	10,827	27,829
Steel plates	11,162	16,571	16,701	4,953
Galvanized sheets	63,506	31,244	15,694	45,086
Steel bars	20,921	30,322	19,780	10,563
Tin plates	41,208	29,418	20,910	30,425
Black plates	5,679	3,026	1,744	2,836
Steel sheets			4,717	7,933

Exports of steel rails, galvanized sheets and tin plates have shown the most marked recovery in the above products.

Imports of pig iron in December were 54,767 tons and for the year they were 255,030 tons against only 152,464 tons in 1920. These have been a feature of the 1921 imports.

Iron ore imports in December were 144,669 tons against 528,628 tons in December, 1920. The year's total was only 1,887,574 tons as compared with 6,449,551 tons in 1920. Last year's imports were the smallest in many years.

Manganese ore imports for 1921 were small at 172,856 tons or the lowest in over 10 years. In 1920 they were 452,612 tons.

Ore Rates Hearing

Hearings on upper lake ore rates before an examiner of the Interstate Commerce Commission will be resumed at the Great Northern Hotel, Chicago, in the near future, March 6, being the date tentatively set for the first day's session. These hearings were interrupted owing to the necessity of the railroad witnesses to appear before the commission at Washington during January and February. The taking of testimony has proceeded to the point where practically all that remains is the offering of rebuttal by the shippers.

The first open meeting and informal dinner of the recently organized Pittsburgh Chapter of the Society of Industrial Engineers will be held at the Fort Pitt Hotel, Pittsburgh, Friday evening, Feb. 17. C. E. Knoepfel, president, C. E. Knoepfel & Co., Inc., will be the speaker, his subject being Waste or Wages—Which?

HOBGING SPROCKET TEETH

New Universal Hob Replaces Sets of Cutters
Formerly Used—Problems Met in Hobbing
Sprocket Teeth

BY G. M. BARTLETT

THE principle of generating the teeth of interchangeable involute gears by reference to a rack with straight sided teeth is well known, and the application of this principle to the hobbing of such teeth is also well established. Sprocket teeth, however, are still cut almost entirely by the ordinary rotary cutter, it being generally supposed that the range of teeth which could be correctly cut by a single hob is necessarily limited, and that a large number of expensive hobs would be required to properly equip a shop for sprocket cutting by this means.

A set of hobs each of which is capable of cutting any number of sprocket teeth of a given pitch and roller diameter has been developed by the engineering department of the Diamond Chain & Mfg. Co., Indianapolis. One of these hobs is shown in Fig. 1. They effect a considerable saving in cutter equipment wherever hobbing machines are in use, since a single hob will do the work that has hitherto required a set of from six to nine cutters. There is also a further saving due to the greater rapidity with which an entire sprocket can be cut on a hobbing machine, and a still further advantage due to the assurance of accurate indexing which is characteristic of such machines.

The hobs are designed to cut sprocket teeth in conformity with the specifications for the new American standard tooth form which has been approved by the principal manufacturers of roller transmissions in the United States, and by the Society of Automotive Engineers, the American Society of Mechanical

number of teeth, and is less than the circular pitch of the sprocket for all under that number. The imaginary circle which rolls upon the theoretical pitch line of the rack is sometimes larger and sometimes smaller than the pitch circle of the sprocket.

The effect of making the pitch of the hob either less or greater than the circular pitch of the sprocket is shown in Figs. 2, 3 and 4. In all three cases, the same hob was used, and the pitch of the sprockets was altered by changing the diameter of the pitch circle. Figs. 3 and 4 show that if the hob pitch is less than the circular pitch of the sprocket the tooth curves tend to be more convex, the angle of the tooth space tends to be greater, and the teeth are more pointed at the ends;

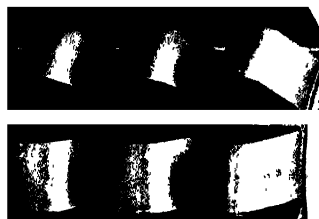


Fig. 1 Universal Hob for Cutting Sprocket Teeth

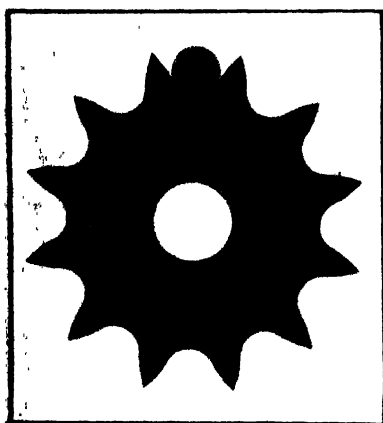


Fig. 2

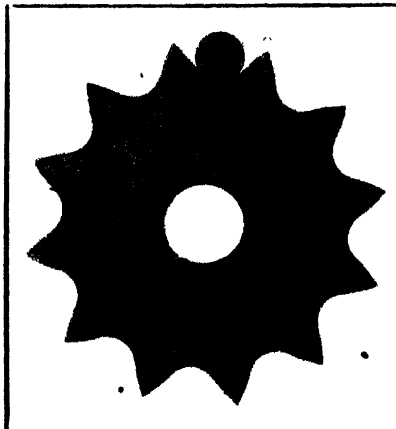


Fig. 3

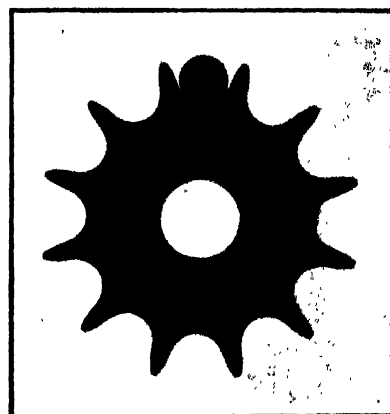


Fig. 4

Figs. 2, 3 and 4 Show Effect of Making the Pitch of the Hob Either Less or Greater Than the Circular Pitch of the Sprocket

Engineers and the American Gear Manufacturers Association. This tooth form is peculiarly adapted to the hobbing method, since it neither requires a constant "space angle," as in the British system, nor a constant tooth angle as in some systems in use in this country. Its space angle gradually decreases as the number of teeth increases, and its tooth angle, and hence its pressure angle, gradually increases. The generating action of a hob tends to produce these same changes, although not at the same rate.

The hobbing of sprocket teeth and of gear teeth presents problems which differ in several respects. With spur gears the circular pitch is constant for all numbers of teeth, but with sprockets the circular pitch decreases as the number of teeth increases. The curvature of the teeth of spur gears becomes sharper as we approach the base circle. With sprockets it is desirable to increase the radius of curvature as we approach the lower, or acting part of the tooth, and finally to change the curve from convex to concave. The pitch of the hob for spur gears is always equal to the circular pitch of the wheel, while with sprockets it is greater than

while if the hob pitch is greater than the circular pitch of the sprocket, the reverse conditions are true.

Where the hob pitch is properly determined and the tooth contour properly designed, the entire range of tooth numbers from size to infinity can be cut without varying from the prescribed shape as much as the various teeth do within the range of any one rotary cutter of the ordinary type.

Hobs made to cut sprocket teeth of the American standard tooth form were supplied by the Brown & Sharpe Mfg. Co., Providence, R. I., the Illinois Tool Works Co., Chicago., and the Union Twist Drill Co., Athol, Mass.

W. C. and Arthur A. Schrage and Clyde P. Crane, of Detroit, have organized the Crane-Schrage Steel Co., of Detroit, to sell cold-finished steel products in that territory. R. L. Linder will be associated with the company as sales representative. All were long identified with the Pittsburgh Shaffing Co.

The Philadelphia and Reading Coal and Iron Co. repair shops in Pottsville, Pa., will be operated five days

Collection of Price Information Is Legal

Correspondence Between Secretaries Hoover and Daugherty Results in Pronouncement as to Activities of Trade Associations

WASHINGTON, Feb. 15.—As a result of prolonged consideration of activities of trade associations as affected by the recent so-called Hardwood decision by the Supreme Court, it has been decided not to issue a formal statement but to publish the correspondence between Secretary of Commerce Hoover and Attorney General Daugherty.

Secretary Hoover, in a long letter dated Feb. 3 wrote to Attorney General Daugherty, discussing trade associations in a general way and expressing the opinion very earnestly that trade associations can have a lawful form of organization and be extremely useful. Without making any reference to the Supreme Court decision, Secretary Hoover expressed a desire for informal expressions as to the following activities on the part of trade associations and their members wherein neither the form of the association nor the activity, which appear perfectly fair and lawful on the surface, is used to hide or conceal some contract, combination, conspiracy, agreement, or understanding, secret or otherwise, on the part of the association, the membership, or any part thereof to actually restrain trade or otherwise violate the Sherman act:

Secretary Hoover's Questions

(1) May a trade association provide for its members a standard or uniform system of cost accounting and recommend its use, provided that the costs so arrived at by the uniform method are not furnished by the members to each other or by the members to the association and by the latter to the individual members?

(2) May a trade association advocate and provide for uniformity in the use of trade phrases and trade names by its respective members for the purpose of ending confusion in trade expressions and for harmony of construction as to the meaning of trade phrases, names, and terms?

(3) May a trade association, in co-operation with its members, advocate and provide for the standardization of quality and grades of product of such members, to the end that the buying public may know what it is to receive when a particular grade or quality is specified; and may such association, after standardizing quality and grade, provide standard form of contract for the purpose of correctly designating the standards of quality and grades of product; and may it standardize technical and scientific terms, its processes in production, and its machinery; and may the association co-operate with its members in determining means for the elimination of wasteful processes in production and distribution and for the raising of ethical standards in trade for the prevention of dishonest practices?

(4) May a trade association collect credit information as to the financial responsibility, business reputation, and standing of those using the products of the industry; and may the association furnish such information to individual members upon request therefor, provided such information is not used by the association or the members for the purpose of unlawfully establishing so-called "blacklists."

(5) May a trade association arrange for the handling of the insurance of its members, including fire, industrial, indemnity, or group insurance. In other words, can the members of an industry, through the agency of a trade association, arrange for or place all of the insurance of the members?

Co-operative Advertising

(6) May a trade association, in co-operation with its members, engage in co-operative advertising for the promotion of trade of the members of that association engaged in the particular industry; and may the asso-

ciation engage in such form of promotion by furnishing trade labels, designs, and trade-marks for the use of its individual members?

(7) May a trade association, for and in behalf of its members, engage in the promotion of welfare work in the plants or organizations of its members, which welfare work includes sick benefits and unemployment insurance for employees, uniform arrangements for apprenticeship in trade education, the prevention of accident and the establishment of an employment department or bureau for co-operation with employees?

(8) May a trade association, in co-operation with its members and acting for and in behalf of its members, handle all legislative questions that may affect the particular industry, regarding factories, trades, tariff, taxes, transportation, employers' liability and workmen's compensation, as well as the handling of rate litigation and railroad transportation questions?

(9) May a trade association, in co-operation with its members and acting for and in their behalf undertake the promotion of closer relations between the particular industry and the Federal and the State departments of Government which may have administration of laws affecting the particular industry in any form?

(10)-A. May a trade association collect statistics from each member showing his volume of production, his capacity to produce, the wages paid, the consumption of his product in domestic or foreign trade, and his distribution thereof, specifying the volume of distribution by districts, together with his stock, wholesale or retail?

B. And may such trade association, on receipt of the individual reports of each member, compile the information in each report into a consolidated statement which shows the total volume of production of the membership, its capacity to produce by districts of production, which, in some instances, include a state or less area, the wages by districts of production, the consumption in foreign or domestic trade by districts, the volume of distribution by districts, and the stocks on hand, wholesale and retail, by districts?

Filing with Secretary of Commerce

C. And if, after compiling the information as aforesaid, the information received from the members as well as the combined information is not given by the association to any other person, may it then file the combined statement with the Secretary of Commerce for distribution by him to the members of the association through the public press or otherwise and to the public generally and to all persons who may be in any way interested in the product of the industry, it being understood that the individual reports for the members should cover either weekly, monthly, quarterly, or longer periods as may be deemed desirable by the members, and, when a period is adopted, the report for each member shall cover that period, and the combined report shall be for that period?

(11)-A. May a trade association, at the time it collects the production and distribution statistics above outlined, at the same time have its members report the prices they have received for the products they have sold during the period taken, specifying the volume of each grade, brand, size, style, or quality, as the case may be, and the price received for the volume so sold in each of the respective districts where the product is sold?

B. And may the association, without making known to any person the individual price reports of any member, consolidate all of the reports into one, and show the average price received for the total volume of each, grade, brand, size, style, or quality, as the case may be, distributed in each district covered by the distribu-

tion statistics for the period covered by each individual report?

General Distribution

C. And may the association, after making such compilation, send the compiled report as to average price, as aforesaid, to the Secretary of Commerce, to be by him distributed to the public and to any or all persons who may be interested in the particular industry making the reports.

In conclusion, Secretary Hoover said:

"In order to avoid repeating this question in connection with each one of the activities outlined in the eleven preceding questions, may trade associations engage in any or all of the activities named without violating the law, provided the organization and the activity engaged in are not for the purpose of hiding or concealing some agreement, contract, etc., to actually restrain trade or otherwise violate the anti-trust laws?"

"As stated in the beginning, I do not ask you to express your views in a formal opinion, but it is my hope that you may see your way clear to give me the advice that will enable me to adopt the proper administrative action in undertaking the duties imposed upon the Secretary of Commerce by the organic act creating the department. It is unnecessary for me to say that the general, unsettled condition regarding the proper provinces of trade associations justifies as early a reply to these inquiries as your other numerous official duties will permit."

Attorney General's Reply

Attorney General Daugherty's reply is as follows:
Feb. 8, 1922.

My dear Mr. Secretary:

Your communication of the 3rd instant relating to the practices in which trade association may lawfully engage was received. I recognize the force of your able discussion of the subject, and after careful consideration of the several activities which you suggest can be exercised lawfully, I beg to say:

With reference to the first paragraph, there is no apparent objection to a standard system of cost accounting, but I think associations should be warned to guard against uniform cost as to any item of expense. For illustration, a strong effort has been made by some lumber associations to take as a basis for estimating costs of production a uniform charge for stumpage. Of course the cost of the timber in the tree to the different manufacturers who own their timber in the woods greatly varies; and as to each it should be charged at its actual cost. It is as clearly a violation of the law to agree upon the cost of an item that constitutes a substantial part of the total cost price when its cost actually varies, as to agree upon the sales price, because the sales price is substantially affected by such agreement. It has been ascertained that the members of one association go so far as to fix a uniform cost price, leaving to each member to determine what per cent profit he will add, thus eliminating entirely competition in so far as affected by the cost of production.

Furthermore, I have serious doubts about the advisability of the latter part of the sixth paragraph. I can see no objection to co-operative advertising designed to extend the markets of the particular article produced or handled by the members of an association, but when the several producers or dealers use uniform trade labels, designs and trademarks it seems to me the inevitable result would be a uniformity of price. Where two competing articles are advertised in precisely the same way and bear exactly the same label or trademark, it certainly would be difficult for one to be sold at a higher price than the other, although its quality may be superior. In a way this is illustrated in the cement industry. There a standard of quality has been adopted. That is, it is necessary for all cement to comply with a certain standard, but in practice no manufacturer undertakes to make, or at least no one advertises that he does make, a grade of cement superior to that standard. The result is that there is no competition in the sale of cement so far as quality is concerned. It seems to me therefore that it would be well to eliminate the latter clause in paragraph six, to wit, "and may the association engage in such form

of promotion by furnishing trade labels, designs and trade-marks for the use of its individual members?"

I can now see nothing illegal in the exercise of the other activities mentioned, *provided always* that whatever is done is not used as a scheme or device to curtail production or enhance prices, and does not have the effect of suppressing competition. It is impossible to determine in advance just what the effect of a plan when put into actual operation may be. This is especially true with reference to trade associations, whose members are vitally interested in advancing or, as they term it, stabilizing prices, and who through the medium of the associations are brought into personal contact with each other. Therefore the expression of the view that the things enumerated by you, with the exceptions stated, may be done lawfully is only tentative; and if in the actual practice of any of them it shall develop that competition is suppressed or prices are materially enhanced, this department must treat such a practice as it treats any other one which is violative of the anti-trust act.

Yours sincerely,

H. M. DAUGHERTY,
Attorney General.

Hon. Herbert Hoover, Secretary of Commerce, Washington.

Secretary Hoover's Second Letter

The last letter of the series is from Secretary Hoover and is as follows:

Feb. 9, 1922.

My dear Mr. Attorney General:

I have your letter of the eighth instant, in reply to my letter to you of Feb. 3, 1922, in which I made informal inquiry as to the legality of certain activities of trade associations enumerated in 11 questions. It is very pleasing to me to note that our views regarding these matters are in such close harmony.

Your observations regarding the last clause in question (6) in my letter are wholly sound, based on the language of that clause. It was not, however, my idea that each constituent member of a trade association would use a community trade-mark on his product, i. e., the same trade-mark that was used by every other member of the association, and, therefore, the last clause in that question was unhappily worded. The question really relates to trade promotion through co-operative advertising, in which certain trade slogans are used, such as, "Made in Grand Rapids," which was adopted by the furniture manufacturers at that furniture center. Generally, activities covered in question (6) are conducted by a trade association in a given local community. An organization at Chicago advertises for its entire membership, which includes every line of commercial endeavor in Chicago, that the city is the great central market. It is co-operative advertising of this class that tends to promote trade extension in given lines or collected lines of industry. Certain of the trade associations, however, do devise trade-marks, not for use by all members, but for individual members. It is a well-known fact that when some manufacturer or producer is fortunate enough to select a trade-mark that appeals to the public, it becomes a great aid in selling his commodity and, as a result, it is well advertised until it becomes a household word. Other producers or manufacturers of the same kind of an article, in order to take advantage of this situation, will devise a trade-name or trade-mark as near to that of the successful competitor as he thinks he can go and still escape suit under the trade-mark or unfair competition laws. The activities of a trade association regarding trade-marks to which I referred in my letter of the third relate to the straightening out of instances of unfair competition or infringement as between the members, by undertaking to design trade-marks for the individual members of the association making the same product, that would absolutely prevent confusion on the part of the public as to the producer or manufacturer of the given article and, at the same time, remove all claim of infringement or unfair competition. In other words, the trade-mark activity referred to was that of making the trade-marks of each individual member distinctive instead of common. You may, therefore, consider the part of my question (6) referred to in your letter as eliminated from the question, and that the question was really intended to cover the matters stated herein. With this explanation, I feel sure you will agree with me that our views on the matters presented are in complete accord.

Yours faithfully,

HERBERT H. C.

Secretary

Honorable Harry M. Daugherty,
Attorney General, Washington, D. C.

BASING POINT HEARING

Examination of Witnesses by Federal Trade Commission Continues at Milwaukee

MILWAUKEE, WIS., Feb. 14.—At the close of the second week of the Milwaukee hearing, the first of a series of hearings scheduled to be held on the complaint of the Federal Trade Commission against the United States Steel Corporation, seeking the abolition of the alleged Pittsburgh basing point practice, from 12 to 14 witnesses remained to be called, indicating that a third week will be required to complete the Milwaukee hearing before the commission moves on to Minneapolis for the second of the series.

The monotony of the hearings was interrupted on Friday, Feb. 11, when M. W. Torkelson, chief bridge engineer Wisconsin State Highway Commission, and Arthur Peabody, state architect of Wisconsin, were called as witnesses. Their testimony was introduced by the reading into the record of the proceedings of a joint resolution adopted by the Wisconsin Legislature at its biennial session a year ago, seeking the abolition of the Pittsburgh basing point practice and declaring in effect that the State and people of Wisconsin were prevented from receiving the benefits of the close proximity of this state to the vast iron ore deposits of Northern Wisconsin, Upper Michigan and Northern Minnesota, by the alleged discriminatory effect of such practice.

Karl E. Steinhauer, attorney for the Federal Trade Commission, introduced the resolution and called the two State officials as witnesses, he said, to illustrate the attitude of the public toward the alleged discriminatory practice. W. W. Corlett, general solicitor of the Steel Corporation, objected on the ground that public interest was not an issue in the present action, inasmuch as the commission itself had brought the complaint at the instance of a certain group or groups of manufacturers whose interest has not been shown to be the public interest so far. The objection, however, was overruled by John W. Bennett, trial examiner.

Mr. Torkelson testified that he has been for 14 years State bridge engineer of Wisconsin. In the last seven years, he said, 25,087 tons of steel have been consumed in the construction of steel and concrete highway

bridges, while an estimate of the probable consumption in the next 20 years is 200,000 tons, based on the expectancy of the construction of 30,000 highway bridges in the same period.

Mr. Peabody, State architect, testified that 1323 tons of steel have been consumed in the construction of State buildings in the past five years, and that similar work in the next four years as projected would require 1495 tons.

The testimony of Messrs. Torkelson and Peabody agreed on the point that all of this steel had been purchased by contracting companies, numerous officials of which have appeared as witnesses at this hearing, upon whose testimony written into the record they based a belief that public work cost the taxpayers of Wisconsin an excessive amount due to the alleged discriminatory effect of the Pittsburgh basing point.

Testimony of other witnesses called during the past week developed approximately the same evidence as that of witnesses testifying during the first week of the hearing in Milwaukee. In a general way, witnesses invariably admitted that their invoices showed that material was billed to them f.o.b. Milwaukee, but they insisted that analysis of prices showed that the sales were made on a Pittsburgh base and freight from Pittsburgh to Milwaukee was added, regardless of the location of the mill from which the material was actually shipped. THE IRON AGE usually was quoted as authority for quotations upon which fabricators based their contention that they paid a Pittsburgh base price.

Witnesses examined during the past week included the following: Henry M. Merz, vice-president Milwaukee Bridge Co.; Eugene W. Krueger, Worden-Allen Co.; W. D. Johnson, president Milwaukee Boiler Mfg. Co.; John F. Henry, president Milwaukee Structural Steel Co.; C. E. Stone, Chalm Bolt Co.; O. E. Lindemann and A. T. Fish, of A. J. Lindemann-Hoverson Co.

Witnesses who appeared Monday at the beginning of the third week of the hearing were: A. T. Fish of A. J. Lindemann-Hoverson Co., manufacturer of hot air furnaces, stovepipe and similar goods and Edwin D. Bartlett, secretary and H. H. Marvin, purchasing agent, Milwaukee Stamping Co. Their testimony was largely a reiteration of that by previous witnesses in these lines.

Complaint of Columbia Steel Co. Dismissed

WASHINGTON, Feb. 14.—The Interstate Commerce Commission has dismissed the complaint of the Columbia Steel Co. against the Elgin, Joliet & Eastern Railroad, et. al., holding that rates on fire brick from transcontinental groups A, D, E and J, to San Francisco, Oakland, Emeryville, Pittsburgh and Anderson, Cal., all within the description of California terminals, are not unduly prejudicial against the points named in comparison with northeast terminals, although they are higher and the mileage is about the same. The dismissal also applies to complaints of the Judson Mfg. Co., and the Afterthought Copper Co. The commission, however, orders the transcontinental lines to revise their rates so as to bring them into harmony with the revised fourth section, forbidding rates at intermediate points higher than rates at the more distant points for no greater mileage.

Suits Against Carbon Steel Co. Discontinued

Two suits, filed in United States district court, Pittsburgh, naming the Carbon Steel Co. defendant, were discontinued Feb. 9 after Judge Thomson signed orders dismissing the bills of complaint. One suit was brought by the State of New Jersey to recover \$38,918.66 as taxes, damages and court costs. The taxes, according to the bill, were imposed on the company for the years of 1898, 1894 and 1895, when the Carbon Steel Co. was a corporation operating under the laws of New Jersey. On April 4, 1913, in a suit of the State of New Jersey against the Carbon Steel Co., the New Jersey Supreme Court gave judgment in favor of the

State in the amount of \$38,918.06, representing \$12,000 debt, \$26,880 damages for detention of debt and \$38.66 court costs. The company was later incorporated under the laws of West Virginia and the State of New Jersey attempted to collect the amount through the Federal Court in Pittsburgh. The motion filed by the steel company, Jan. 20, 1919, asked that the bill be dismissed, giving as reasons that the court had no jurisdiction and that the bill on its face was bad for want of equity. The other suit was brought by the Churchward International Steel Co., Wilmington, Del., alleging that the Carbon Steel Co. infringed on a patent regarding the self-hardening of alloy or iron and steel and alloyed steel. Both parties consented to the dismissal of the suit.

Frick Coke Co. Exonerated

UNIONTOWN, PA., Feb. 14.—Coroner's jury investigating the death of 25 miners who lost their lives in the Gates mine disaster at the Gates plant of the H. C. Frick Coke Company found that their deaths were accidental and resulted from a blown out shot, exonerating the Frick company.

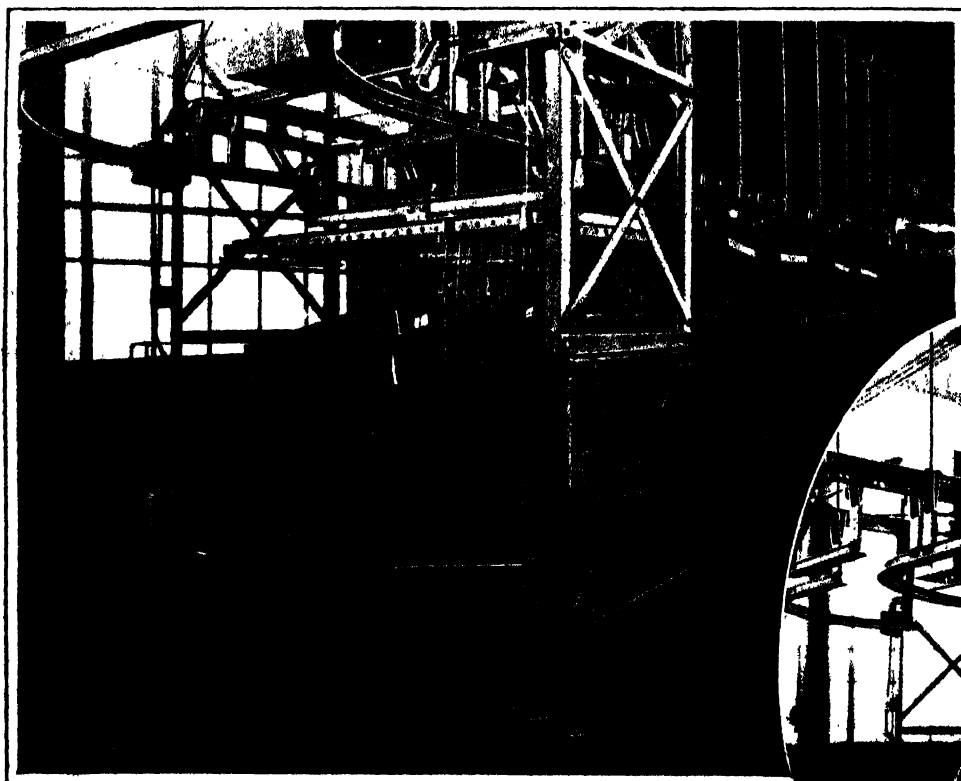
A new wire rod, wire and wire nail plant has been practically completed by the Minnesota Steel Co. at Duluth. All the necessary buildings have been erected and most of the equipment has been installed, with the prospect that operations will commence by June 1. The plant will have a capacity of about 300 tons per day, or 100,000 tons per annum of various wire products. The output will be sold by the American Steel & Wire Co.

Conveyors for Painting and Baking

Manual Handling Avoided in Finishing Bulky Sheet Metal Parts in a Cleveland Plant—Overhead Tramrail and Suspended Racks Used

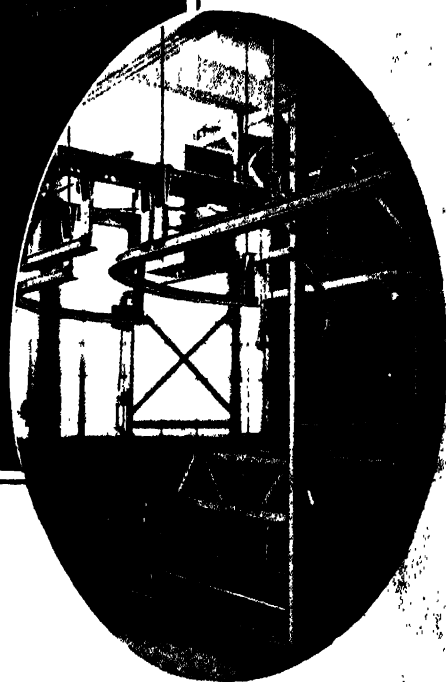
A CONVEYING system has recently been installed in the plant of the E. F. Hauserman Co., Cleveland, which is unique in that two operations, painting the material that is being conveyed and later baking it in an oven, are performed while the work is on the conveyor. Conveying systems that include carrying the work through an oven for baking after enamel or other coating is applied are not uncommon, but using the same conveying equipment in connection

As the tramrail is suspended from the roof, no special construction is required for supporting the hangers that carry the rails. The rack is moved lengthways on a single tramrail track until it reaches the painting department. Here a switch is provided at a 90-deg. turn in the track. The rack, instead of making this right angle turn, passes from the switch on to a double track tramrail with one of its carriers on each track and the position of the rack which had been



Elevator Lowered and Parts Submerged in the Paint Vat

Elevator After Lifting Parts from Paint Vat. Beyond are the dripping platform and loaded racks the latter ready to go to the baking oven at the extreme right.



with the painting operation is the development of increased usefulness for an overhead shop transportation system and means the reduction of production costs.

The Hauserman company manufactures steel bins, shelving, partitions and kindred steel products that might come under the classification of shop furniture. The work is painted after stamping, either in single parts or after a certain amount of assembling. Some parts are given a second coat of paint after assembling operations. Parts painted range in weight from a few ounces to 80 lb.

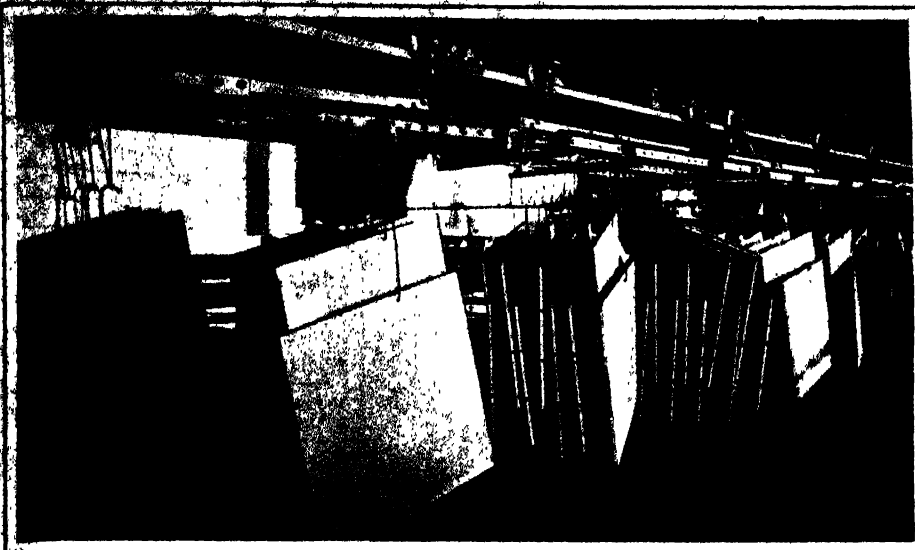
The conveying equipment consists of a tramrail system supplied by the Cleveland Crane & Engineering Co., Wickliffe, Ohio, equipped with this company's standard hand-operated carriers to which are attached steel frame racks, each rack being suspended from two carriers. The racks are 80 in. long and 25 in. wide, and are of a special design for handling the work which is suspended on wire hooks from cross-bars on the racks.

The tramrail system is 338 ft. long. It extends in a circuit around the plant from the sheet metal stamping department, through the painting department, the drying oven and on into the assembling department. From here the carriers and racks, after being unloaded, complete their circuit back for reloading.

lengthways in respect to the track becomes crossways.

The double track passes through a steel frame elevator shaft over a paint vat located in the floor. A short connecting section of the track is attached to a 1-ton electric hoist at the top of the elevator frame. After the loaded rack is pushed on the track above the paint tank a button is pressed and the hoist lowers its load into the paint, where it remains a few seconds. Then the elevator automatically reverses itself and raises the load to its former position. Then the carrier is pushed off the elevator and over the dripping pan located back of the elevator. The rack is rotated from the center of a bar that connects the two carriers so that the rack can be swung either way 4 in., giving it a 12-in. incline from one end to the other, this tilting position being desirable for dripping. A locking device is provided for holding the rack in the tilting position.

After dripping, the racks are pushed a short distance into the baking oven, which holds all racks at a time. Near the discharge end of the oven switches are



Carriers Loaded with Unusual Shaped Metal Parts Ready to Go to the Paint Vat

provided similar to those in front of the paint vat and the racks are switched back on to a single tramrail track on which they move to the assembling department. To prevent loss of heat, a door section or cover is suspended from hinges above the oven doors, filling the space from the tramrail track to the top of the oven. When a carrier is pushed out of the oven the wheels lift this cover, which falls back in place when the carrier is out of the way.

The company finds that with the tramrail system it is saving 50 per cent or more in labor costs, now doing with five men work that formerly required 10 or 11 employees. With the old method of loading the oven by hand it took four or five men to carry the work in and out of the oven. Then, owing to the time taken for loading and to the delays in waiting for the oven to cool sufficiently for the men to enter it, only three or four lots were baked in the oven during the day. Now it is possible to bake nine or ten lots during a day. The usual maximum load is about 900 lb., although the conveyor has a 1-ton capacity. It is stated that with the use of the tramrail parts that formerly cost 35c. each to paint now are painted for 14c. and parts that cost 15c. to paint now are painted for 4c.

Opposes Transportation Commissioner

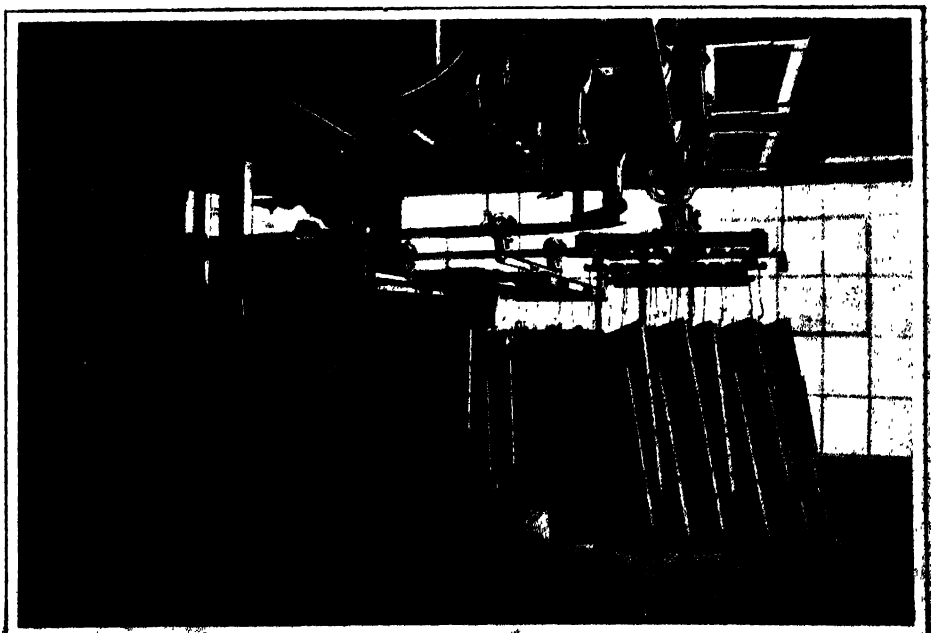
WASHINGTON, Feb. 14.—The National Council of the Chamber of Commerce of the United States at its

meeting here last week went on record as being opposed at this time to the creation of an office of a Federal commissioner general of transportation and to the taking of a referendum on the question of compulsory adoption of the metric system in the United States. Regarding the former subject the council in a resolution held that the time is inopportune for the establishing of a Government agency in charge of a commissioner general of transportation to present to the public interest in railroad questions. A recommendation by the Chamber's railroad committee that such a proposal be submitted to a referendum was disapproved by the council. The council, however, gave its endorsement to the recent action of Secretary of Commerce Hoover in appearing before the Interstate Commerce Commission as the representative of the public.

Hog Island Surplus Steel to Be Sold

WASHINGTON, Feb. 14.—Bids in writing for the purchase at private competitive sale of approximately 105,000 net tons of fabricated steel at Hog Island, Pa., will be received by the United States Shipping Board, Emergency Fleet Corporation, until noon, Feb. 15, at its office in the Navy Building, Washington. This is the last sizable lot of surplus steel the shipping board has to sell. The entire quantity of steel at Hog Island is physically separated by railroad tracks into seven lots, and may be sold either in its entirety or separately by lots as may appear most advantageous.

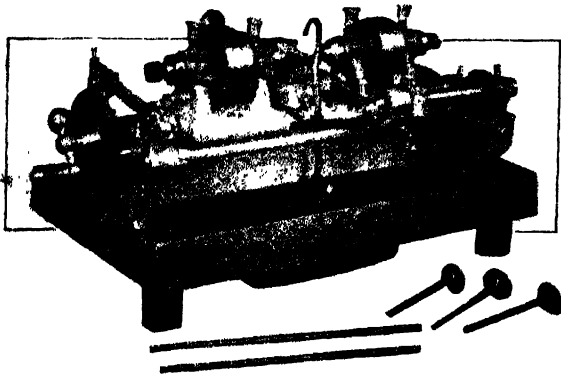
Tramrail Track Arrangement at Discharge Side of the Oven, illustrating the Way the Carriers Leave the Oven. The racks run at right angles to the two rails that extend through the oven and by means of switches pass on to a single rail track and in doing so change their position in respect to the rail, the rack again moving in a lengthwise position along the rail as it approaches being switched to the paint vat.



Duplex Valve Stem Milling Machine

A duplex valve stem milling machine, designed primarily for the quantity slotting of valve stems, has been put on the market by the Dale Machinery Co., Chicago and New York. Slots up to $\frac{1}{2}$ -in. wide by $\frac{1}{2}$ -in. long may be milled in valve stems $\frac{3}{8}$ -in. in diameter and smaller. By changing the work-holding vise, square, hexagonal and other shapes may be slotted and although designed for valve stems, the machine can be adapted to slotting small parts for a wide range of purposes.

In slotting valve stems it is usually the practice first to drill a hole and then to broach out to the desired



Although Designed for Valve Stems, the Machine Can Be Used to Slot a Wide Range of Other Small Parts

shape. The new duplex miller is intended to do this work in one instead of two operations and with greater speed. The work is held on a V-shaped vise as shown in the illustration, so that valve stems of any diameter within the capacity of the machine may be handled without using a different work-holder. The vise rests on a cross-slide which is operated by a connecting rod attached to a crank with an adjustable stroke. The crank is run from a pinion which engages a worm gear operated by pulley from a countershaft. A three-step cone pulley permits operation at three speeds. The length of the travel of the slide is controlled by adjusting the throw of the connecting rod.

The slots in the valve stems are milled out by tools working toward each other from opposite sides of the work slide. The tools are held in collets which are inserted in the ends of spindles, driven by pulleys from the same countershaft which drives the gearing operating the work slide. The spindle carriages are driven in opposite directions by cams, the camshaft being operated by a ratchet wheel. The rotation of the ratchet wheel is accomplished by a pawl driven by a crank on a shaft, which in turn is actuated by a cam mounted on the shaft operating the cross-slide connecting rod. Thus the feed of the tools and the travel of the work slide are co-ordinated. At the conclusion of each revolution of the crank driving the cross-slide, the dog engaging the cam is released, thereby disengaging the pawl from the ratchet wheel and stopping the camshaft which controls the travel of the spindle carriages.

Prior to starting the machine, the carriages are set by hand so that the tools barely fail to touch. When the mills are fed into the work by the cams, one carriage is released before the other, one cam being of slightly different contour than the other. This arrangement prevents the mills from striking each other and at the same time permits one tool to complete the cut.

A self-contained oil system is provided. The machine is furnished with countershaft.

Pat Dwyer, associate editor, the *Foundry*, will be the speaker at the regular monthly meeting of the Pittsburgh Foundrymen's Association at the General Forbes Hotel, Pittsburgh, Monday evening, Feb. 20.

Feb. 4 marked the seventieth anniversary of the founding of LaBelle Iron Works, Steubenville, Ohio, and Wheeling, W. Va.

Monolithic Roof for Mill Buildings

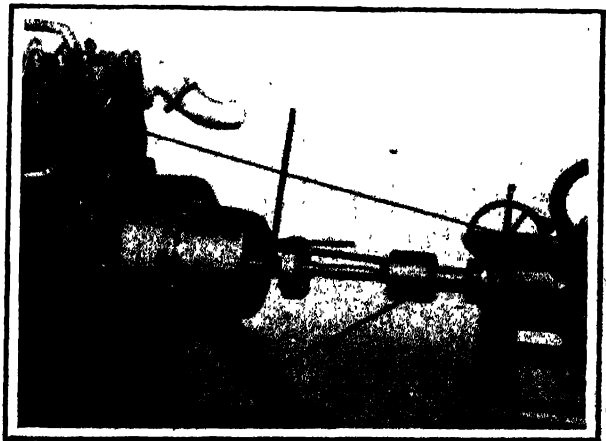
To push commercially a new monolithic roof for mill and industrial buildings, H. E. Marks, formerly president of the National Steel Fabric Co., which was taken over a few months ago by the Pittsburgh Steel Co., and previously vice-president and manager of sales of the H. H. Robertson Co. Pittsburgh, has opened offices in the Empire building, Pittsburgh.

The roofing system consists of steel T's supported on roof purlins, gypsum board panels, wire mesh reinforcements and a cast-in-place gypsum or concrete slab. Two sizes of T's are used. The main T's span from purlin to purlin, spaced 2 ft. 8 in. apart. The small or auxiliary T's are all 2 ft. 8 in. long and are simply laid (not fastened) in the main T's, to support the ends of the gypsum board at 3-ft. intervals. As the auxiliary T's are laid, the standard sized 2 ft. 8 in. x 3 ft. gypsum board panels are placed in position. After a row of panels has been placed, the reinforcing fabric of proper width, and cut to the exact length of the roof, is laid over the T's. The forms are then ready for the aggregate, which is poured into place, forming, with the wire fabric, a solid monolithic reinforced slab, of which the gypsum board and T's become an integral part. A light dead load, high load-bearing capacity, heat insulation value and a saving in steel in the trusses and general construction are emphasized as advantages.

Hydraulic Clutch for Heavy Duty

A hydraulic clutch intended to provide a means of applying automotive engine power to driven parts of the transmission with a smoothness of "take-up" closely approximating that of the steam engine has been placed on the market recently by the Williamson Hydraulic Clutch Co. Mt. Vernon, Ohio. This is accomplished through the use of oil as the power-absorbing agent.

The clutch has few bearing surfaces and all such are flooded with lubricant. No small or fragile parts are subjected to load pressure. Any setting of the control lever gives a constant reduction ratio through the clutch and there is effected a gradual absorption of en-



Hydraulic Clutch Attached to Minerva Engine with Dynamometer Shown at the Right

gine power, avoiding a lowering of engine r.p.m. At the same time, it is claimed, the power impulse is delivered steadily and evenly to the gear-reduction unit, rear axle and other driven members. There is no need for devices to prevent a too sudden grip; and lag, it is said, is automatically impossible. From this it may be inferred that the factor of power loss through transmission is materially reduced.

The new clutch is said to have been thoroughly tested over a long period of time and to have proven successful in passenger-car, heavy motor-truck, farm-tractor and machine-tool service.

The Acme Wire Co., New Haven, Conn., has received an order from the Ford Motor Car Co., Detroit, for 150,000 coils of wire. This order will require about six weeks to complete.

CONTENTS

February 16, 1922

Over-All Cost of Heat Treated Parts	459
Electric Current or Fuel Cost Only a Portion of Total— Percentage of Rejection Important— Cost of Subsequent Operations an Item	

Using Molding Machine in Job Foundry	463
Gain in Efficiency in Making Cylinder and Piston Molds Speed and Economy Both Served	

Leaves from a Steel Melter's Notebook—III	465
Experience in Casting Steel Ingots in Cans—How Cracks Were Prevented— Causes of Hard Spots in Forging Ingots	

Welding Rods for Oxy-Acetylene Welding	468
Their Selection and Composition as a Factor in Successful Results on Steel Welding Cast Iron—Copper and Brass Welding	

The European Steel Industry To-day	475
American Engineer's Comparison with British and German Pre-War Conditions —Keen Interest in Plant Reconstruction	

Collection of Price Information Is Legal	479
Correspondence Between Secretaries Hoover and Daugherty Results in Pronouncement as to Activities of Trade Associations	

Conveyors for Painting and Baking	482
Manual Handling Avoided in Finishing Bulky Sheet Metal Parts Overhead Tramrail and Suspended Racks Used	

Testing Materials Meeting.....	462	Pittsburgh Basing Point Hearings.....	481
Railway Association Charts of Production Averages	462	Duplex Valve Stem Milling Machine.....	484
In Memory of H. H. Stambaugh.....	462	Hydraulic Clutch for Heavy Duty.....	484
Metal Workers' Wages	467	Monolithic Roof for Mill Buildings.....	484
Call for National Foreign Trade Convention	472	Editorials	486
Brazilian Mining Exhibit	472	Trade Association Activities —The Bonus Bill—Measuring the Steel Demand— What Were Pre-War Conditions?	
Labor Notes	473, 474	New England Iron and Hardware Association Dinner	489
Socket and Ratchet Wrench Set.....	474	British Iron and Steel Output for January.....	502
Preventing Clogging of Metal Saw Teeth.....	474	Manganiferous Iron Ore Leaflets.....	504
Fluorspar in Japan	474	Industrial Finance	508
Steel Corporation's Unfilled Orders.....	477	Foreign Trade Conditions.....	509
British Steel Exports	477	Stocks of Coal	509
Hearing on Ore Rates.....	477	Blast Furnace Notes	509
Hobbing Sprocket Teeth	478		

Iron and Steel Markets	490
Comparison of Prices	491
Non-Ferrous Metal Market	504
Prices Finished Iron and Steel f. o. b. Pittsburgh	505
Personal Notes	506
Obituary Notes	506
Machinery Markets and News of the Works	511
New York Jobbers' Prices	518

ESTABLISHED 1856

THE IRON AGE

EDITORS:

A. I. FINLEY

WILLIAM W. MACON

GEORGE SMART

CHARLES S. BAUR, *Advertising Manager*

Member of the Audit Bureau of Circulations and of
Associated Business Papers, Inc.

Published every Thursday by the IRON AGE PUBLISHING CO., 239 West 39th Street, New York

F. J. Frank, *President*

PRINTED IN U. S. A.

George H. Griffiths, *Secretary*

Owned by the United Publishers Corporation, 213 West 30th
Street, New York. H. M. Swedlund, *Pres.*, Charles O. Phillips,
Vice Pres., A. C. Pentecost, *Treas.*, F. J. Frank, *Secy.*

BRANCH OFFICES: Chicago, Oils Building; Pittsburgh;
Park Building; Boston, 119 Centre Building; Philadelphia;
1420 14 1/2 Walnut Building; Cleveland, Guardian Building.

Detroit: 317 West Fort St. Cincinnati: Mercantile Library
Bldg. Buffalo: Ellicott Square Building. Washington: 516
Fifteenth St., N. W. San Francisco: 320 Market St.
London, Eng.: 11 Haymarket, S.W.1.
Subscription Price: United States and Possessions, Mexico,
Cuba, Shanghai, \$6.00; Canada, \$8.50; Foreign, \$12.00 per
year. Single copy 50 cents.

Entered as second class matter, June 18, 1879, at the Post Office at New York, New York, under the Act
of March 3, 1879

Trade Association Activities

The long-expected announcement as to the policy of the Government in regard to trade associations has come in the form of correspondence between Secretary of Commerce Hoover and Attorney-General Daugherty. One of the causes for the delay was probably a desire not to seem to be over officious or discourteous to the Supreme Court in interpreting one of its decisions. This has been averted by not referring to the Hardwood decision or making the pronouncement formal, but the declaration of opinion by the Attorney-General, answering the detailed questions of the Secretary of Commerce, will have much weight and will go far toward clearing up prevailing uncertainties.

Little doubt could have existed as to the legality of many of the activities mentioned by Secretary Hoover in his letter, but the all important question of prices is not dodged. The Secretary asks squarely whether trade associations may collect information as to prices received, specifying volume, grade, brand or quality, as the case may be, without making known individual price reports, and he inquires whether the compiled reports as to prices may be submitted to the Secretary of Commerce and by him distributed to the public, or to all persons interested.

The Attorney-General's reply in the last paragraph of his letter states that he sees nothing illegal in the activities described, provided this privilege is not used as a scheme or device to curtail production or enhance prices, and does not have the effect of suppressing competition. The Attorney-General naturally qualifies his declaration by pointing out the difficulty of determining in advance what the effect of the plan, when put into actual operation, may be, and he says that the expression of the view that the things enumerated may be lawful is only tentative, and if the actual practices result in curtailing competition or materially enhancing prices, the department must treat such practices as it treats any other which is violative of the anti-trust act.

This is a wise reservation, but Attorney-General Daugherty has not been guilty of any reckless proceedings and can be depended upon to act

with deliberation. Both he and the Secretary of Commerce are to be congratulated upon the termination of their many conferences, for they have thrown new light on important questions and it is now possible for many associations to know with reasonable certainty how they can legally carry on their operations.

The Bonus Bill

The proposed soldiers' bonus, whether viewed from the standpoint of patriotism or business, is indefensible. If considered from the economic standpoint, the statement of Secretary Mellon, showing how disastrous the payment of billions of dollars to the soldiers would be to the business interests of the country when it is imperative to do everything that can be done to hasten the return of prosperity, should have had immediate and final effect in stopping the passage of the bill, but politicians are still of the opinion that they will further their own interests by catering to the American Legion, or rather to that part of it which is clamoring for the bill. If further evidence of the folly of enacting the so-called adjusted compensation were needed, it is furnished by the evidence that is being presented that any and all of the forms of taxation or bond issuing proposed to meet the cost will interfere with recovery from the industrial depression.

There is, however, higher ground on which to base the opposition to the plan to compensate the soldiers. If it were possible to compensate them, it would and should be done, no matter how much business might be retarded, but the very thought of paying the soldiers for their great service and sacrifice is repulsive to any one who has the finer feelings about the matter. Probably no one has seen more of the heroism, the courage and all the magnificent record of the soldiers of the great war than has the distinguished war correspondent, Frederick Palmer. He shows the impossibility of adjusting the compensation of the soldier, who had greater reward than did the civilian who worked for a wage and was paid in full. Mr. Palmer says that by far the higher compensation lay in the honor accorded him and we would add that

ever greater comfort is found in the soldier's consciousness of having done his full duty to his country. Mr. Palmer states the whole matter in a nutshell as follows:

The truly patriotic soldier stands on a higher level than the ordinary citizen. The American Legion is proposing to sell that level for cash. Considering the vast difference between the two conditions, it is surprising that they are willing to sell out for so small a price per head. If the bonus bill passes, the button of the American Legion will show not the man who risked his life for his country, but will advertise its wearer as the man who sold his halo.

Opposition to the bonus does not, however, mean that the people of the United States are unwilling to take care of the disabled soldiers and sailors. The people of this country never have failed to be liberal in ministering to those who were wounded or overcome by sickness as a result of service in the army or navy. Although more has been undertaken in the way of vocational training and in the establishing of hospitals than after any other war, the service is yet woefully inadequate, and the nation demands that all the men who are weak in mind or body shall receive the best attention that skill can give them.

Appropriations for the disabled have increased from \$179,287,800 in 1918 to \$330,250,400 this year, and no patriotic citizen begrudges one penny of that amount. A bill passed last Saturday provided \$406,000,000 for 1923 and Senator Borah estimates that \$500,000,000 must be appropriated for every year from now on. Even those great figures do not stagger the country, nor does the statement that within ten years we will be appropriating \$1,500,000,000 a year for the disabled soldiers and sailors, and that the ultimate cost will be \$75,000,000,000. The country will gladly foot the tremendous bill, but it positively objects to putting patriotism on a commercial basis.

There has been all too much of a supine submission to assertions that the bonus measure was certain of passing. In the last few days a backward sweep of the tide seems imminent and if business would properly express its own force in legislative influence the tidal movement would be of no uncertain power. Sometimes it has seemed that business must all but storm Washington to drown the noise of the minority and convince the vote seekers that their proposed legislation would act as a boomerang in the November elections.

At one time constructive substitution, such as writing a law to conscript everybody, non-combatants as well as combatants, in another national emergency, might have been regarded as the way to fight the bonus movement, but the time has arrived to drown it. Every business man—every man who can see the taxes beyond the temporary spending of a bonus distribution—needs to act immediately to convince his political representative that the thinking electorate is now against the bonus.

Although the depression last year was naturally communicated to the American ferromanganese and spiegeleisen industry, an analysis of the out-

put of these alloys, found elsewhere in this issue, shows that the ferromanganese production was only about 21,000 tons under that of 1913. The marked difference between 1921 and 1913 exists in the sharp decline in imports of the British alloy, which last year were only 755 tons per month against 10,672 tons per month in 1913. This would seem to indicate that the foreign alloy is by no means the factor that it used to be. The spiegeleisen production was less than 50 per cent of that of 1913 and the lowest in many years; none indeed was produced in the last half of 1921. While this does not reflect a corresponding decline in Bessemer steel, there was a sharper falling off in this kind of steel than of the open-hearth. Compared with the remarkable showing of the American manganese industry in 1918, the 1921 record looks insignificant, being less than one-fourth of the war stimulated production. The record last year indicates that American producers are able to take care of American needs, for in 1913 over half the consumption was of British origin.

Measuring the Steel Demand

Already definite evidence has appeared supporting the argument made in these columns a fortnight ago that 1922 may reasonably be expected to show a considerably larger production of steel than 1921, even without the aid of any material improvement in the general fundamental conditions of finance and industry. Already at this early date, with the advent of spring more than a month away by the calendar, the rate of steel production is at least equal to that of last autumn.

The particularly small production of steel ingots last year, about 19,500,000 tons, was due in part to liquidation of stocks of steel in the hands of distributors and manufacturing consumers and of various wares made from steel. The most pronounced symptom of such liquidation being in progress was the dip in steel production in July to a rate of only about 11,000,000 tons a year. In well-informed quarters it was held that the liquidation, except in a few cases, was practically completed by Oct. 1, and in October and November the rate of production was all of 23,000,000 tons a year. Then came December with an average rate under 20,000,000 tons and a rate in the last week of probably not more than 16,000,000 or 17,000,000 tons, the dip being incidental to the season.

The January ingot output of the 30 steel companies that report their total through the American Iron and Steel Institute indicates that the steel industry as a whole produced ingots in that month at an average rate of about 23,000,000 tons a year, and when this average rate for a month followed the low rate at the end of December, it is evident that there was a progressive and rapid increase, so that the rate this week is presumably well above 23,000,000 tons and may easily be 25,000,000 tons.

Yet the spring demand cannot be assumed to have worked its way, thus far, into the ingot production rate. The full spring demand has not

yet come, for buyers hold off as long as possible. When they do make up their minds they insist upon prompt shipment and the mills are in position to comply with their wishes. Thus the production of ingots facilely moves up and down according to the demand for mill products.

The reasonable prospect is that the spring demand will bring an ingot production rate between 25,000,000 and 30,000,000 tons a year, comparing with a rate of 23,000,000 tons last autumn and an actual production in 1921 of 19,500,000 tons. The crest of each wave is higher.

The fundamental conditions are without doubt improving continuously, the improvement being plainly seen when comparison is made between dates a few months distant from each other. The ultimate consuming demand for steel and products of steel can be measured closely by observing the rate of steel ingot production, since the liquidation of stocks that characterized last spring and summer is out of the way. No basis can be found for assuming that when we have the plain prospect of a steel demand this spring, such as is mentioned above, there will not be as good a demand, and presumably a better demand still, next autumn. The summer, of course, is likely to be quiet. There is no reason to suspect that those who are buying steel now are making a mistake and will later regret their action, or will not have occasion to repeat their orders from time to time through the year. Capacity operation for the steel mills is not to be thought of for the near future, but it is already reasonably plain that steel production in 1922 will be much better, say one-third or one-half greater, than the production of 1921.

What Were Pre-War Conditions?

Sometimes a question breaks in abruptly and makes us look at things from a new angle—which is never a bad thing. For more than a year we have been talking about "returning to pre-war conditions" and "getting back to normalcy." Now, when we talk along that line, have we any definite conception present in the mind of precisely what the pre-war conditions were? Or are we simply thinking in general terms of "the good old days" or the flesh pots of Egypt, forgetting the toil of the good old days, as the Israelites apparently forgot about the work that was much more conspicuous in their life in Egypt than the flesh pots?

As a matter of fact, in the twelvemonth and more preceding the outbreak of the world war, we were rather busy discussing business and economic questions, where we were in the business cycle, and whether a panic had been due and had been averted or a crisis had come and had not been recognized.

The best opinion seemed to be that we did not have either a panic or a crisis, but that we did have an industrial depression. Conditions had just begun to improve when the war broke out and the question was left unsettled whether the improvement represented a false start or the beginning of a general movement, for the war changed everything.

Just to give ourselves a little jab so that we

may sit up and pay attention, the production of pig iron by the steel works in July, 1914, the last month before the war, was 45,027 tons a day. Production last month was 42,130 tons a day. The difference is 6 or 7 per cent—not much to have a discussion about.

A strong argument was made in some quarters that conditions were all set for our having a panic or crisis in 1913, in rhythm with those of 1893 and 1873, but that the situation was so well understood and so many warnings had been issued that men set their houses in order and thus the panic or crisis was averted because foreseen, but an industrial depression is a different thing, and can come without a panic preceding. That something did occur is evident from the fact that the rate of pig iron production decreased by 32 per cent from February, 1913, to June, 1914.

It is characteristic of the business cycle that, in what is considered the depressed area, men become content to work harder and business men accept smaller margins of profit. Everything is liquidated and efficiency becomes the rule. By hard work and thrift, a buying power is built up. That was true in 1873-8 and in 1893-8. Those were periods of low prices and low wage rates, but by no means were they throughout periods of work not being done. In 1897 and 1898 men were working hard, and as efficiently as they knew how.

Perhaps there was no major depression due in 1913 or shortly afterward, but certainly no one felt during an entire twelvemonth or more before the outbreak of the war that we were in first-class shape economically and socially. That was by no means the pre-war condition, and we are dissipating our energy when we talk about getting back to pre-war conditions without reflecting just what those conditions were. The best of the pre-war conditions is one thing and the immediate pre-war conditions an entirely different thing.

If we purpose selecting the best of the pre-war times and returning to them, then we must do now what we had done then to obtain those conditions. The periods of good times before the war came as a result of hard work, careful planning, thrift, economy and invention. The war opened up no new road to prosperity and advancement. We must traverse the narrow path decreed by economic laws, just as we have always had to do.

Two impressive facts are emphasized by British steel export data, analyzed elsewhere in this issue. One is the continued expansion until December was second only to January of 1921. The recovery since July has outstripped American exports, which at that time were in excess of the British. The second noteworthy fact is that this recovery is almost exclusively in galvanized sheets, tin plates and rails. In December alone the gain in each of these three products over December, a year ago, was nearly three-fold, while in the case of American exports the December decline from the same month in 1920 was over 50 per cent in tin plate, nearly 70 per cent in rails and about 80 per cent in galvanized sheets. American steel exports fell last year to a figure less than 50 per

cent of the 1920 outgo; British steel exports in 1921 were 52 per cent of those in 1920. In 1913, rails, galvanized sheets and tin plate constituted, next to pig iron, the bulk of the British foreign sales, a business which the British are apparently rapidly regaining.

Relief for the patent office seems near at hand. The Lampert bill passed the House of Representatives by a vote of 305 to 44, and it has been favorably reported to the Senate by that body's patents committee. It may be well, however, for the industrial elements of the country to make its voice heard as strongly as possible by writing to senators. The bill provides more than sufficient funds for the increase of expenditures necessary, by increasing the filing fees for applications for patents by \$5, and it is therefore not dependent for success on any appropriation measure. That the American Engineering Council regards the bill as of fundamental importance should carry weight, seeing that that organization has studied the question and is non-political and non-commercial in its attitudes.

Practicing Engineers to Meet in Chicago

What is called the first annual conference of practicing engineers will be held in Congress Hotel, Chicago, Feb. 22. The program announces the following papers:

"Publicity for Practicing Engineers," by M. W. Lee, vice-president Frank D. Chase, Inc. "How to Uphold the Standards of Services and Fees," by Gardner S. Williams, consulting engineer, Ann Arbor, Mich. "Experiences of the Practicing Engineer with Licensing," by C. S. Hammatt, president National Council of Engineering Examiners. "How to Sell Engineering Services," by Paul E. Green, consulting engineer, Chicago. "Cost Accounting for Engineering Services," by Arthur L. Mullergren, consulting engineer, Kansas City. "Computing the Practicing Engineer's Income Tax," by Clarence W. Hubbell, city engineer, Detroit.

Warren Foundry Company Elects Officers

At a director's meeting of the Warren Foundry & Machine Co., Easton, Pa. last week the following officers and directors of the company were elected: William H. Hulick, president and treasurer; A. D. Chidsey, vice-president and assistant treasurer; directors, E. J. Fox, president Easton Trust Co.; Chester Snyder, president First National Bank, Easton, Pa.; W. Clayton Hackett, president Easton National Bank; Lee S. Clymer, president Riegelsville Bank, Riegelsville, Pa.; and W. H. Walters, attorney, Phillipsburg, Pa.

Francis B. Foley, metallurgist Minneapolis station of the Bureau of Mines, will present a paper on "The Annealing and Hardening of Steel" before the Washington Chapter of the American Society for Steel Treating, at Washington, on Friday evening, Feb. 17. He will discuss his own investigations into the effect of the methods of heat treatment as applied to various materials.

C. A. How, purchasing agent of the Missouri Pacific Railroad, is preparing to place contracts for more than 5000 tons of 90-lb. steel rails. The exact amount or the allocation of the order has not been definitely decided upon, and is being held up pending the return to St. Louis of B. F. Bush, president of the railroad, who is ill in the South.

WHERE IS PROSPERITY?

This and Other Questions Considered at Dinner of New England Iron and Hardware Association

The New England Iron and Hardware Association held its twenty-ninth annual dinner on Tuesday evening, Feb. 7, at Hotel Somerset, Boston, more than 200 members and guests attending. Fred L. Avery, Boston, president, presided. Hon. Samuel L. Powers was toastmaster. The guests of the evening included Hon. Channing Cox, Governor of Massachusetts; Hon. Samuel E. Winslow, Congressman from Massachusetts; W. Irving Bullard, vice president Merchants' National Bank, Boston, and Austin H. Decatur, president National Hardware Association.

Mr. Decatur, in his address, took an entirely different view of the business outlook than he did a year ago when he spoke before the same association. He believes that business and industry have adjusted inventories sufficiently so that we may look forward with confidence. Mr. Decatur characterized business as still on the sick list, but he is confident its 1922 showing will be considerably better than the 1921, and that in succeeding years we may anticipate a gradual recovery of normal or better profits.

The subject of Mr. Bullard's address was, Where Is Prosperity? It took the form of a sketch of a recent trip abroad for the purpose of studying financial and industrial conditions, and the conclusions drawn by him. In Italy he found business and finances on the road to recovery, but in England, France, Belgium, Holland, Germany and in the other European countries visited, business, social and political uncertainty. Paper, he stated, is worth more in Europe as a commodity than as currency, and he returned to the United States convinced that real prosperity is here, where "85 per cent of our textile mills, 75 per cent of our shoe factories and 70 per cent of our steel mill capacity is in operation." Those present took exception to Mr. Bullard's figures on steel mill operations.

Mr. Winslow's remarks were confined largely to the problems confronting all Congressmen in Washington. He is convinced we have been misled by newspapers regarding the so-called agricultural bloc. He stated no such thing existed in the House. The East, he declared, does not realize the West has grown up, and that representatives of Western interests simply are doing no more for and showing no greater interest in those measures looking for the protection of Western business and industry, than Eastern representatives of peoples have been doing for years.

Because of its bearing on industry and business, Mr. Winslow spoke at length on the bonus question. He claimed representatives of the American Legion are threatening Representatives and Senators with political extinction if the bonus bill is not passed. So far as he knows, not one member of the American Legion has advanced even a suggestion as to how money for the bonus can be raised. While not making a direct statement, Mr. Winslow strongly intimated that industry and business cannot sustain any added taxation for the purpose of raising a bonus fund.

The Hanna Furnace Co., Cleveland, is planning to blow in its Dover furnace at Dover, Ohio, this week. This furnace has been out of blast 13 months. During that time, the furnace has undergone extensive repairs. Two new hot blast stoves and a new boiler plant and machine shop have been built and a turbo generator, several pumps and a gas washer have been installed.

The Union Street mill of the Edwards Iron Mills, Columbia, Pa., which has been idle for more than a year, was scheduled to be put in full operation on Feb. 15, according to an announcement of the owner, Edward T. Edwards. The puddling rate will be \$6 per ton. Several hundred men will be employed.

Iron and Steel Markets

OPERATIONS IMPROVED

Increase Slight But Less New Business

Tonnage Traceable to Railroads--Wire Lower Pig Iron Dull Coke Higher

Operations of steel mills have improved slightly following the broadening scale of purchases last week, but fresh buying has fallen off somewhat, as is characteristic of the alternations of a replenishment market. Both consumers and jobbers are freer buyers, but only for immediate needs. The week's bookings have relatively few items of large tonnage.

The potentialities of railroad demand, in the light of recent equipment sales, are again encouraging producers. Meanwhile, new rail business calls for 23,000 tons, including 18,000 tons for the Chesapeake & Ohio, and three roads have bought 10,600 tons of tie plates, with 5000 tons from another pending. Active railroad car inquiries in the West exceed 8000 and an order has been placed by the Reading for 2000, the first of any size in the East in many weeks. The Lackawanna is considering repairs to 985 hopper cars.

The heavy tonnage products are none too steady, but the uninterrupted succession of reports of operating losses sustained by large producers appears to have done much to discourage belief in lower prices. Some observers regard possible freight rate reductions as already discounted. Producers emphasize that plates, shapes and bars, bringing 1.40c., Pittsburgh, to-day, averaged in 1913 1.55c. on bars and 1.50c. on shapes and plates and mills did not have to-day's freight, fuel and labor costs to absorb.

Following the reduction of wire nails to \$2.40 per keg, plain wire is now quoted at \$2.15. Incidentally, this brings THE IRON AGE composite price to 2.005c. per lb., the lowest yet on the receding movement which began in September, 1920.

Leading sellers of foundry, malleable and basic grades of pig iron in the Chicago district are making an attempt to advance the selling price to \$20, but the latest sales were made at \$18 to \$18.50 and the new quotation has not been established. Prices of Bessemer ferrosilicon and silvery irons have been reduced \$2 per ton. In nearly all centers, the pig iron market is extremely quiet and sellers are maintaining recent quotations with difficulty. At Pittsburgh, concessions have been made on foundry and malleable irons.

Makers of cold finished bars and of bolts, nuts and rivets have encountered some liquidating sales. These are taken to indicate the final clearing up of accumulated stocks in purchasers' hands. The Ford Motor Co. bought 10,000,000 nuts at a sharp concession.

The outstanding new item in fabricated steel

is 23,000 tons for a bridge across the Hudson for the New York Central. Outside of that, new projects total barely 10,000 tons and awards amount to about 7000 tons.

Tin plate mills are even more fully engaged than they were last week, independent mills in the Pittsburgh and Valley districts averaging close to 90 per cent of capacity.

Gas companies in Chicago and Milwaukee are in the market for 15,000 and 4000 tons, respectively, of cast-iron pipe.

Exporters look for business in semi-finished steel with Europe, matching low prices here with advancing exchange there. For the Far East, 17,000 tons of rails has been closed.

British producers of ferromanganese have advanced prices to \$62.50, seaboard, and American makers are expected to follow suit. Stocks of the higher grade of spiegeleisen have been exhausted and prices for the lower grades have been advanced \$5 per ton, or to \$30, furnace.

Coke prices have advanced as a result of demand in anticipation of a coal strike, 15 cents a ton, or to \$2.90 on furnace coke and 25 cents or to \$4 on foundry coke.

Pittsburgh

PITTSBURGH, Feb. 14.

The trend of the demand for finished steel products still is in the direction of improvement, and while the gains are seen more in the number than the size of the orders, the aggregate is more satisfying than it has been before this year. It cannot be said that the improvement yet has filtered through to price changes, and it is also a fact that all products do not share alike in the buying. The lighter materials, such as tin plate, sheets, and tubular goods, are doing much better, relatively, than are the heavier tonnage products. As far as prices are concerned, buyers who have fairly substantial tonnages to place have a dominating voice in the terms. At that, however, buyers are having some difficulty in obtaining concessions from 1.40c. on plates, shapes and bars, and the larger producers of sheets continue to refuse business in black and galvanized stock at less than 3c. and 4c., respectively.

The market in wire products is unsettled. Persistent and widely circulated reports of an early reduction of \$5 per ton have seriously restricted orders, as buyers are holding back until convinced that such action is not likely.

Business calling for extended delivery is entirely lacking; indeed, all of the business coming to manufacturers is for prompt shipment and represents only the immediate requirements of buyers. Liquidation has been so complete in practically all products that actual needs are increasing, and this accounts for the improvement in business during the past few weeks. Manufacturers of cold-finished steel bars and of nuts, bolts and rivets still are encountering some liquidating sales, but in all other lines consumers' and jobbers' stocks appear to be down to bare boards. The prices now prevailing seem to be the obstacle in the path of advance business in sheets, as buyers seem to have the idea that because the decline in prices has been relatively less in this line than in several others, current

A Comparison of Prices

Advances Over the Previous Week in Heavy Type, Declines in Italics

At date one week, one month and one year previous

For Early Delivery

Pig Iron	100 lbs. to	100 lbs. to	100 lbs. to	100 lbs. to
No. 2, Philadelphia	\$11.10	\$11.10	\$11.10	\$11.10
No. 2, Valley Forge	\$11.10	\$11.10	\$11.10	\$11.10
No. 2, Southern	\$11.10	\$11.10	\$11.10	\$11.10
No. 2, Birmingham	\$11.10	\$11.10	\$11.10	\$11.10
No. 2, foundry	\$11.10	\$11.10	\$11.10	\$11.10
Basic, del. c. f. m.	\$11.10	\$11.10	\$11.10	\$11.10
Basic, Valley Forge	\$11.10	\$11.10	\$11.10	\$11.10
Bessemer, Pitt. Forge	\$11.10	\$11.10	\$11.10	\$11.10
Malleable, Chi. & Co.	\$11.10	\$11.10	\$11.10	\$11.10
Malleable, Valley	\$11.10	\$11.10	\$11.10	\$11.10
Gray, Forge, Pittsburgh	\$11.10	\$11.10	\$11.10	\$11.10
Le. S. Chicago, Chi. & Co.	\$11.10	\$11.10	\$11.10	\$11.10
Forming, S. S. d. m.	\$11.10	\$11.10	\$11.10	\$11.10

Rails, Billets, etc.	100 lbs. to	100 lbs. to	100 lbs. to	100 lbs. to
O. h. rail, heavy, d. m.	\$11.10	\$11.10	\$11.10	\$11.10
Less, bill. s. Pitt. Forge	\$11.10	\$11.10	\$11.10	\$11.10
O. h. bill. s. Pitt. Forge	\$11.10	\$11.10	\$11.10	\$11.10
O. h. sheet, L. s. Pitt. Forge	\$11.10	\$11.10	\$11.10	\$11.10
Forging, bill. s. Pitt. Forge	\$11.10	\$11.10	\$11.10	\$11.10
O. h. billets, Phila.	\$11.10	\$11.10	\$11.10	\$11.10
Wire, d. m. Pitt. Forge	\$11.10	\$11.10	\$11.10	\$11.10
Skelp, p. steel, L. s. Pitt. Forge	\$11.10	\$11.10	\$11.10	\$11.10
Light, roll, d. m.	\$11.10	\$11.10	\$11.10	\$11.10

Finished Iron and Steel	100 lbs. to	100 lbs. to	100 lbs. to	100 lbs. to
Per lb. of iron, B. & S.	\$11.10	\$11.10	\$11.10	\$11.10
Iron, L. s. Pitt. Forge	\$11.10	\$11.10	\$11.10	\$11.10
Iron, L. s. Chi. & Co.	\$11.10	\$11.10	\$11.10	\$11.10
Steel, L. s. Pitt. Forge	\$11.10	\$11.10	\$11.10	\$11.10
Steel, L. s. Chi. & Co.	\$11.10	\$11.10	\$11.10	\$11.10
Steel, L. s. New York	\$11.10	\$11.10	\$11.10	\$11.10
Tank, plate, Pitt. Forge	\$11.10	\$11.10	\$11.10	\$11.10
Tank, plate, Chi. & Co.	\$11.10	\$11.10	\$11.10	\$11.10
Tank, plate, New York	\$11.10	\$11.10	\$11.10	\$11.10
P. m. s. Pitt. Forge	\$11.10	\$11.10	\$11.10	\$11.10
P. m. s. Chi. & Co.	\$11.10	\$11.10	\$11.10	\$11.10
P. m. s. New York	\$11.10	\$11.10	\$11.10	\$11.10
Steel, L. s. Pitt. Forge	\$11.10	\$11.10	\$11.10	\$11.10

* The average switching charge for delivery of iron in the Chicago district is 70¢ per ton. (Shore 17¢ to 45¢ per ton.)

Sheets, Nails and Wire	100 lbs. to	100 lbs. to	100 lbs. to	100 lbs. to
Sheet, L. s. Pitt. Forge	\$11.10	\$11.10	\$11.10	\$11.10
Sheet, L. s. Chi. & Co.	\$11.10	\$11.10	\$11.10	\$11.10
Sheet, L. s. New York	\$11.10	\$11.10	\$11.10	\$11.10
Nails, L. s. Pitt. Forge	\$11.10	\$11.10	\$11.10	\$11.10
Nails, L. s. Chi. & Co.	\$11.10	\$11.10	\$11.10	\$11.10
Nails, L. s. New York	\$11.10	\$11.10	\$11.10	\$11.10
Wire, L. s. Pitt. Forge	\$11.10	\$11.10	\$11.10	\$11.10
Wire, L. s. Chi. & Co.	\$11.10	\$11.10	\$11.10	\$11.10
Wire, L. s. New York	\$11.10	\$11.10	\$11.10	\$11.10

Old Material	100 lbs. to	100 lbs. to	100 lbs. to	100 lbs. to
Old, L. s. Pitt. Forge	\$11.10	\$11.10	\$11.10	\$11.10
Old, L. s. Chi. & Co.	\$11.10	\$11.10	\$11.10	\$11.10
Old, L. s. New York	\$11.10	\$11.10	\$11.10	\$11.10
Old, L. s. Pitt. Forge	\$11.10	\$11.10	\$11.10	\$11.10
Old, L. s. Chi. & Co.	\$11.10	\$11.10	\$11.10	\$11.10
Old, L. s. New York	\$11.10	\$11.10	\$11.10	\$11.10

Coke, Connellsville	100 lbs. to	100 lbs. to	100 lbs. to	100 lbs. to
Connellsville	\$11.10	\$11.10	\$11.10	\$11.10
Connellsville	\$11.10	\$11.10	\$11.10	\$11.10

Metals	100 lbs. to	100 lbs. to	100 lbs. to	100 lbs. to
Metals, L. s. Pitt. Forge	\$11.10	\$11.10	\$11.10	\$11.10
Metals, L. s. Chi. & Co.	\$11.10	\$11.10	\$11.10	\$11.10
Metals, L. s. New York	\$11.10	\$11.10	\$11.10	\$11.10
Metals, L. s. Pitt. Forge	\$11.10	\$11.10	\$11.10	\$11.10
Metals, L. s. Chi. & Co.	\$11.10	\$11.10	\$11.10	\$11.10
Metals, L. s. New York	\$11.10	\$11.10	\$11.10	\$11.10

At times, the market for iron and steel is very active and rather easy.

Composite Price, Feb. 14, 1922, Finished Steel 200% Per Lb

Based on price of steel bars	\$11.10	\$11.10	\$11.10	\$11.10
beam, tank plate, plain wire	\$11.10	\$11.10	\$11.10	\$11.10
open hearth, rails, black, 100	\$11.10	\$11.10	\$11.10	\$11.10
and black she 10	\$11.10	\$11.10	\$11.10	\$11.10

Composite Price, Feb. 14, 1922, Pig Iron, \$18.02 Per Gross Ton

Based on average of basic iron	\$18.02	\$18.02	\$18.02	\$18.02
from the basic iron, Valley Forge	\$18.02	\$18.02	\$18.02	\$18.02
the foundry, Valley Forge	\$18.02	\$18.02	\$18.02	\$18.02
Philadelphia and Birmingham	\$18.02	\$18.02	\$18.02	\$18.02

prices cannot be maintained. A general proposition, however, the lack of forward buying is ascribable to the belief that if there is not a horizontal reduction in freight rates, at least there will be a cut in the rates on iron and steel, and buyers consequently are limiting their purchases with an idea of avoiding stocks loaded with present freight charges.

Plant operations reflect the increase in business. Tin plate mills are even more fully engaged this week than they were last week, independents in this and nearby districts, including the Wheeling Steel Corporation, which is making an effort to operate its Yorkville, Ohio, works on an "open shop" basis averaging close to 90 per cent of capacity. The American Sheet & Tin Plate Co., taking sheet and tin plate mills together, is running about two thirds of capacity. There is also a high rate of operation of pipe plants while sheet and wire mills are making a relatively good showing. The leading independent in this district has more than 50 per cent of its steel works capacity engaged and the average of the Carnegie Steel Co. also

exceeded 50 per cent. There has been some gain in bar mill operation, but plate and structural mill still are rather poorly engaged.

The pig iron market reflects a firmer attitude upon the part of producers of basic grade, all of whom quoted \$18 Valley furnace against a recent inquiry for a round tonnage. Foundry iron, however, is lightly weaker, and some furnace interests outside the Valley district have been coming into Pittsburgh with tonnage. There is a firmer market in coke due to a better demand for coal, impeded by the possibility of a miners' strike. The scrap market still is inactive and rather easy.

Pig Iron—It has been another dull week in this market as far as sales are concerned. The only important inquiry which recently has come out is from the Allegheny Steel Co. which is seeking 1000 tons of basic and 300 tons of Bessemer iron for immediate delivery. It is probable that this business will be closed this week. Common expectation is that some more resale basic iron will be bought, as a railroad equipment

company still is liquidating its stock, and is understood to have made a quotation of \$17.75, Valley furnace, on the tonnage sought. Producers having any of this grade for sale, however, no longer are willing to consider less than \$18. We note a sale of a fair-sized tonnage of No. 2X foundry iron at \$19.25, Valley furnace, and subtracting the usual differential of 50c. per ton, this would mean \$18.75 for plain No. 2. Carload lots of the latter grade still command \$19, Valley furnace, and the same price is asked for No. 3 and forge iron.

We q	Valley furnace	freight	to for delivery
Cleve	100 lb. Pittsburgh dist	at being	\$1.95 per gross ton
Base			\$17.75
Box			19.50
No. 1		3.75 to	19.00
No. 2		8.75 to	19.00
Malleable		8.75 to	19.00

Ferroalloys.—Domestic makers of ferromanganese have followed the advance recently announced by English makers to \$62.50 c.i.f. Atlantic seaboard, for 80 per cent material, and this price probably will be adopted by the Steel Corporation subsidiary making this alloy. So far agents of German makers have had no advices with regard to prices, but the impression prevails that German material also will be advanced. The new quotation as yet is largely on asking price, as the demand is moderate in this district and there have been no important sales recently. The advance in ferromanganese, coupled with the fact that existing supplies are exceedingly small, is reflected in a stiffer market in spiegeleisen. A western Pennsylvania manufacturer several weeks ago disposed of all stocks laying on the furnace yard and stocks of an Eastern producer now are reported to consist of only about 200 tons of 16 to 19 per cent material. The former is out of the market and the latter has put a price of \$30 furnace on the unsold tonnage. A Valley steel maker is seeking 100 tons of 16 to 19 per cent spiegeleisen. Fifty per cent ferrosilicon is inactive with makers asking \$60 furnace, freight allowed, for 50 per cent, but no important sales are being made at that price.

We quote 78 to 82 per cent ferromanganese, \$62.50 c.i.f. Atlantic seaboard for domestic and English and \$58.35 for German. Average 20 per cent spiegeleisen, nominal; \$30 to \$35 delivered Pittsburgh or Valleys; 50 per cent ferrosilicon, domestic, \$55 to \$60 furnace, freight allowed. Bessemer ferrosilicon is quoted f.o.b. Jackson and New Straitsville, Ohio furnaces as follows: 10 per cent, \$36.50; 11 per cent, \$39.80; 12 per cent, \$43.10; 13 per cent, \$47.10; 14 per cent, \$52.10; silvery iron, 6 per cent, \$25; 7 per cent, \$26; 8 per cent, \$29.50; 9 per cent, \$29.50; 10 per cent, \$31.50; 11 per cent, \$34; 12 per cent, \$36.50. The present freight rate from Jackson and New Straitsville, Ohio, into the Pittsburgh district is \$1.06 per gross ton.

Billets, Sheet Bars and Slabs.—The inquiry for 1500 to 2000 tons of billets from a Pittsburgh district maker of strip steel, referred to a week ago, has been closed with a Valley producer. It is understood that the price was \$28 Youngstown for 4-in. and larger billets and \$29 for the smaller sizes. Since the freight to point of consumption is greater from Youngstown than from Pittsburgh, it is believed there was equalization of freight on this transaction, which also indicates a re-establishment of the pre-war differential of \$1 per ton between large and small billets. There has been no further business in sheet bars since the recent sale of 1000 tons at \$29 Pittsburgh. Slabs are inactive and prices nominal.

We quote 4 x 4-in. soft Bessemer and open-hearth billets at \$28 to \$29; 2 x 2-in. billets, \$29 to \$30; Bessemer and open-hearth sheet bars, \$29 to \$30; slabs, \$29 to \$30; forging billets, ordinary carbons, \$32 to \$33, all f.o.b. Youngstown or Pittsburgh mills.

Wire Rods.—The best demand coming to local makers is for export, Japanese export houses being especially prominent. Domestic demands still are few and for small tonnages. On export business, the market is not quotable above \$35 for the base size of soft rods, but such domestic business as is doing is at \$36 to \$37. Prices are given on page 505.

Steel Skelp.—Makers still are holding to 1.50c. for pipe skelp, but demands are so few and small that this price must be regarded as largely untested. Since skelp usually sells at the same price as plates, and the latter have gone as low as 1.40c., it is probable that a sizable tonnage of skelp could be placed at that price.

Wire Products.—A good many inquiries are coming out for nails and other wire products from jobbers, pre-

paratory to the Spring demand, but only a small percentage of them is going upon makers' books as orders because there is so much uncertainty about prices. A widely circulated report that at an early date nails would be reduced to \$2.25 base per keg, Pittsburgh, with a corresponding reduction in other products, has caused buyers to withhold orders in expectation of some sort of a move in that direction. Meanwhile, makers in this district are trying to maintain the market at \$2.50 base, per keg, for nails and \$2.25 base per 100-lb. for plain wire, but large buyers are getting concessions of \$2 per ton from these prices, and the smaller distributors are trying to buy at the same prices. We make a range of \$2 per ton in the quotations, the lower prices being to large buyers. Export business in nails and wire, including both plain and barbed, notably to Japan, is relatively good.

We quote wire nails at \$2.40 to \$2.50 base per keg, Pittsburgh, and bright basic and Bessemer wire at \$2.15 to \$2.25 base per 100 lb., Pittsburgh.

Steel Rails.—The market for light rails is inactive and inclined toward weakness. Occasional export inquiries, some of them running as much as 300 and 400 tons, are coming out, but most of the domestic demands are for single carloads. The market on these sections, rolled for new steel, still is quoted at 1.50c. base, but more business is being lost than obtained at that price. Light rails rolled from old standard rails, readily are obtainable at 1.45c., and it is believed that a sizable lot of new steel rails could be placed at the same figure.

We quote 25 to 45-lb. sections, rolled from new steel, 1.50c. base, rolled from old rails, 1.45c. base, standard rails, \$10 per gross ton mill for Bessemer and open-hearth sections.

Iron and Steel Bars.—At 1.40c., Pittsburgh, soft steel bars seem to have touched a level which appeals to buyers, and there is not only more business and heavier operations of the mills than before in some time, but a marked tendency on the part of makers to regard that price as an irreducible minimum and not to go that low on ordinary orders. Both consumers and jobbers are freer buyers, although not anticipating their requirements very far ahead. There is a very fair demand from some of the makers of popular priced motor cars and recent export inquiries have included some bars, along with plates and shapes. Not much reinforcing bar business is in sight in this district. Iron bars still are slow of sale.

We quote steel bars rolled from billets at 1.40c. to 1.50c.; reinforcing bars, rolled from billets, 1.40c. to 1.50c. base; reinforcing bars, rolled from old rails, 1.35c. to 1.40c.; refined iron bars, 2c. to 2.10c. in carloads, f.o.b. mill, Pittsburgh.

Structural Material.—The report about this district still is one of fairly numerous inquiries and much activity in the engineering department of the fabricating companies, but only a few awards, and those mostly of tonnages of less than 100. The Mellon-Stuart Co. is reported to have been given the general contract for a new four-story building for the Mellon National Bank, Pittsburgh, but no action has been taken in connection with letting the 1700 tons of steel which will be required. A seven-story building for the Pittsburgh Y. M. C. A., which has been dormant for several months, again is showing life, and a formal inquiry probably will go out shortly. The Pittsburgh-Des Moines Steel Co. will fabricate more than 500 tons of penstock work for a New York State Stock Farm. Plain material business is better in the prospective than in the actual, because mills in this district are not benefiting much by the big jobs which are being placed in other cities. Some export demands for small shapes are filtering in. The going market price on structural beams is 1.40c., Pittsburgh, but this price is not acceptable to the mills except on fairly large tonnages. Prices are given on page 505.

Sheets.—Possibly business is a little better on the whole than it was recently, but the improvement is seen in the number rather than the size of the orders, and there is no tangible evidence of any departure on the part of buyers from their recent policy of merely taking on their actual requirements. In view of the fact that all stock ordered is wanted immediately, it is evident that buyers' stocks are low, but the expectation that the

weakness in other lines of finished steel will eventually force price concessions in sheets is making buyers cautious about placing their future needs. There continues to be remarkably close adherence to 3c. base for black sheets and 4c. base for galvanized on new rollings, but in the heavier gages of blue annealed the plate base is as frequently quoted as the blue annealed base. Concessions on black and galvanized sheets usually refer to stock material or sheets that have been thrown back upon makers' hands because of some defect. Prices are given on page 505.

We quote sheared plates, $\frac{1}{4}$ in. and heavier, tank quality, at 1.50c. f.o.b. Pittsburgh.

Tin Plate.—Mills in this and nearby districts are enjoying a very high rate of operation, but the explanation is found in specifications against old contracts, rather than in new business. Two of the independent plants in this district are running full while three others are running 90 per cent or higher. The leading interest is not doing quite so well as the independents in the matter of operations, but it succeeded in moving so much tonnage during November, December and January that this is an altogether natural condition. Prices do not change much, due to the fact that so little new business is coming out. Export demands are lighter than they were recently.

We quote standard production coke tin plate \$1.75 per base box f.o.b. Pittsburgh for carload lots.

Cold Finished Steel Bars and Shafting.—Makers in this district are experiencing a somewhat better inquiry, but the improvement is in the number rather than in the tonnages involved. Buyers, quite generally, are confining purchases to small lots to round out existing stocks. The common quotation is 2c. base Pittsburgh, but it is frequently necessary for makers to go to 1.90c. base and occasionally even lower, to secure orders in competition with liquidating sales. Ground shafting holds at 2.25c. base, f. o. b. mill for carload lots.

Hoops and Bands.—There is no particular change in the situation either as regards demand or prices. Buyers are extremely cautious and are doing considerable shopping before placing orders. Prices are not very well established. On bands there is a range of from 1.75c. to 1.90c. and on hoops from 1.90c. to 2c., but the higher prices are the exception.

Nuts and Bolts.—No material increase in inquiries or orders can be chronicled, as buyers are merely covering their barest requirements. Prices still lean in buyers' favor. Nothing yet has been reported in connection with the inquiry of the New York Central Lines for 5000 to 8000 kegs of track bolts, bids against which went in Feb. 8. There is much interest in this business and also in the bolt and nut requirements for the new vehicular tunnel, New York. Discounts are given on page 505.

Plates.—Demands upon mills in this and nearby districts still are few and small and there is poorer engagement of capacity than of any other class of finishing mills. Tank builders are fairly busy, but seem to be covered against their orders and railroad equipment companies in this territory are not faring nearly as well as those in other centers, notably in the Chicago district. There is no disposition by mills here or in the Valleys to go below 1.40c. and more is sought on the general run of inquiries, which are for small lots. Stocks everywhere are low, but there being no question as to deliveries, buyers are inclined to order supplies as they are wanted.

Iron and Steel Pipe.—There is a steady, although not particularly active, demand for merchant pipe in both steel and wrought iron, as spring building activities in most parts of the country promise well and jobbers want to be prepared for the demands involved. Some improvement also is noted in the demand for oil country goods, despite the fact that oil prices have declined on some grades in the Western fields. Line pipe inquiries are fairly numerous. The Hope Engineering & Supply Co., Mt. Vernon, Ohio, has asked for prices on 98 miles of 12-in. pipe for a gas line out of the Monroe, La., field. There is also an inquiry for 100 miles of 6-in. pipe. Export demand for oil well pipe is reported to be better, and especially from Mexico and South America.

There is just fair observance of the card discounts, which are given on page 505.

Boiler Tubes.—Expectations of a fairly good spring demand are causing somewhat larger purchases by jobbers. There is still some price cutting in steel tubes, both lap welded and seamless, but prices of iron tubes are fairly well maintained. Discounts are given on page 505.

Hot-Rolled and Cold-Rolled Strips.—There is a fairly good business in both kinds of material, but it is for the replenishment rather than the building up of stocks. On cold-rolled strips makers are holding rather firmly to 3.50c., base, Pittsburgh, but there is pretty frequent departure from the regular or official quotation of 2c., base, on hot-rolled. Makers, however, are not going to recent minimums except to secure orders which are attractive from a rolling standpoint.

Coke and Coal.—The market is considerably firmer on spot tonnages of coke than it was recently, this development being directly due to a better market for coal as a result of purchases in anticipation of a strike of union coal miners on April 1. While coal prices have not advanced, there is a better market and this has induced some producers to put out coke ovens and ship coal. Disappearance of coke offerings by those without regular consuming connections has left the market rather bare, and lately fuel suitable for blast furnaces has not been available at less than \$2.90 per net ton, oven, while some business has been done at \$3. Spot foundry coke also is less freely offered and \$4 per net ton oven has become the minimum price. Blowing out of the furnaces of the Sharon Steel Hoop Co., Lowellville, Ohio, has thrown back upon the market about 11,000 tons of coke a month, but this has had no effect upon the market, as the bulk of the tonnage has been diverted to other consumers. The Hanna Furnace Co., which will blow in a furnace at Dover, Ohio, next week, is negotiating for 14,000 tons a month and is reported to have covered a portion of these requirements.

Old Material.—The market is no more active nor any firmer than it has been despite the fact that the past week or ten days has seen some increase in steel works activities among plants in this and nearby districts. Evidently the steel companies have accumulated fair sized stocks because they are still very sparing buyers of scrap. Even those charging light material have been less eager for supplies in the past week than they had been previously. Two important consumers of machine shop turnings are endeavoring to obtain supplies at \$9.50, but are not getting much material for the reason that dealers are paying that much and in some instances higher against contracts they took at higher prices. Offerings of this grade are moderate and \$10 is probably as low as round lots could be bought. The only demand for heavy melting steel is from dealers who have contracts to cover and they are unwilling to go above \$14. There are occasional sales a little above this price for single carloads for quick shipment.

We quote for delivery to consumers' mills, in the Pittsburgh and other districts taking the Pittsburgh freight rate, as follows:

Heavy melting steel, Steubenville, Follansbee, Brackenridge, Monessen	
Midland and Pittsburgh	\$12.50 to \$14.00
No. 1 case, cupola size	16.00 to 16.50
Re-rolling rails, Newark and Cambridge, Ohio; Cumberland, Md.; Huntington, W. Va., and Franklin, Pa.	15.00 to 15.50
Compressed sheet steel	11.75 to 12.00
Bundled sheets, sides and ends	10.50 to 11.00
Railroad knuckles and couplers	11.00 to 11.50
Railroad coil and leaf springs	11.00 to 14.50
Low phosphorus standard bloom and billet ends	17.00 to 17.50
Low phosphorus plates and other grades	16.50 to 17.00
Railroad malleable	12.50 to 13.00
Iron car axles	23.00 to 24.00
Locomotive axles, steel	21.00 to 22.00
Steel car axles	14.50 to 15.00
Cast iron wheels	14.50 to 15.00
Rolled steel wheels	14.00 to 14.50
Machine shop turnings	9.50 to 10.00
Sheet bar crop ends	13.50 to 14.00
Heavy steel axle turnings	11.00 to 11.50
Short shoveling turnings	11.00 to 11.50
Heavy breakable cast	14.50 to 15.00
Stove plate	12.50 to 13.00
Cast iron borings	11.00 to 11.50
No. 1 railroad wrought	11.50 to 12.00

Chicago

CHICAGO, Feb. 14.

Mill bookings continue to show a gradual but steady increase, one important local producer reporting the best week's sales for a year. While prices on the heavier rolled products are not any too steady, there is a growing disposition on the part of consumers to buy at present levels. The uninterrupted succession of losses shown in the quarterly reports of large steel producers has discouraged the belief that prices can go much lower. Possible freight rate reductions which were taken into consideration by purchasing agents earlier in the year now appear more remote and by some observers are regarded as already discounted by the market. That these or other considerations have removed much of the caution of the trade is evident from the increasing number of orders placed by a great diversity of buyers, being received particularly from the railroads. So far as tonnage buying is concerned, this continues to be traceable directly or indirectly to the carriers. Heavy specifications are being received from car builders and there is still much railroad car business in sight. From the railroads themselves are coming generous orders for track supplies, and while rail buying is not brisk, a few good-sized inquiries are pending. The Inland Steel Co. expects to start its rail mill during the week commencing Feb. 28.

Increased bookings have been reflected in better mill operations. The Illinois Steel Co. has started another blast furnace at Gary, making six active at that plant, four at South Works and one at Joliet, or a total of 11. At the same time, it has increased its steel output to 50 per cent of capacity. The Inland Steel Co. is on practically the same basis as last week.

Pig Iron.—The leading Northern merchant to-day advanced its prices to \$20 base furnace, for foundry, malleable and basic. This action was followed by a steel works furnace which is selling malleable, while the Inland Steel Co., which is employing one furnace on merchant iron, is booked ahead through March. Up until the time the new prices were announced the local market was exceedingly weak. Sales were made at prices ranging from \$18 to \$18.50 base, furnace, with the tendency toward the general establishment of the lower base. As yet the new prices are untested, but it is evident that they constitute an effort on the part of producers to stem a decline which was steadily increasing the red figures on their books. One effect of the advance will be to make it easier for Southern iron to enter this territory. Until recently the delivered price of the Southern product has been so high that any extensive sales were out of the question. In general the market has been somewhat more active during the past week. Shipments from the furnaces represented by the leading local merchant continue to increase, although some iron is still being piled. On the whole, buyers have been more receptive to the efforts of sellers than for some time. Prominent among recent sales may be mentioned 1000 tons of foundry for delivery in Wisconsin over the next three months and 500 tons of malleable for Indiana shipment. Charcoal, low phosphorous and silvery are quiet. Jackson County producers have announced a \$2 reduction on all grades of silvery and Bessemer ferrosilicon.

Quotations on Northern foundry, high phosphorus malleable and basic irons are f.o.b. local furnace and do not include a switching charge averaging 70c. per ton. Other prices are for iron delivered at consumers' yards, or when so indicated, f.o.b. furnace other than local.

Lake Superior charcoal, averaging sil 1.50, delivered at Chicago.....	\$30.50 to \$31.50
Northern coke, No. 1, sil. 2.25 to 2.75.....	18.50 to 19.00
Northern coke, foundry, No. 2, sil. 1.75 to 2.25.....	18.00 to 18.50
Northern high phos.....	18.00 to 18.50
Southern foundry, sil. 1.75 to 2.25.....	21.67
Malleable, not over 2.25 sil.....	18.00 to 18.50
Basic.....	18.00 to 18.50
Low phos., Valley furnace, sil. 1 to 2 per cent copper free.....	29.50
Silvery, sil 8 per cent.....	32.82

Railroad Equipment.—The Burlington has not yet placed the 500 automobile cars remaining on its inquiry, but is expected to do so this week. The Great Northern will probably close on 500 refrigerator cars in the next few days and on the remaining 2600 freight cars on its inquiry next week. Action on its inquiry for

20 passenger coaches has been postponed indefinitely. The St. Paul is in the market for 1000 drop bottom stock cars in addition to the 1000 box reported last week. Additional inquiry reported from this road will probably bring the total up to 4000 cars. The Northern Pacific is inquiring for 500 refrigerator cars, while the Union Pacific wants 18 observation cars and 70 caboose cars. In the East the Philadelphia & Reading has distributed orders for 2500 hopper cars.

Ferroalloys.—Ferromanganese has been advanced to \$62.50, tidewater, or \$70.90 delivered Chicago. There was considerable business closed on the eve of the advance, one local broker having taken orders for 600 tons.

We quote 78 to 82 per cent ferromanganese, \$70.90, delivered, 50 per cent ferrosilicon, \$56 to \$57.50, delivered; spiegeleisen, 18 to 22 per cent, \$36.50 to \$37, delivered.

Bars.—Mills report a gradual increase in bookings as well as a growing diversification in demand for soft steel bars. Miscellaneous manufacturers, including machinery builders and farm implement makers, are commencing to buy in a small way and at the same time orders are being cautiously placed by jobbers. The bulk of current business, however, consists of specifications from car builders and orders for reinforcing steel. One local merchant mill yesterday commenced rolling an order for 4000 tons of deformed bars. A round tonnage of reinforcing has been placed recently for road building purposes, and numerous reinforced concrete building projects are being figured on. The St. Paul, Minnesota, Water Department took bids yesterday on 500 tons for a pumping station. Prices are still weak, with the general market at substantially the same level as last week. Demand for bar iron is light and prices are unchanged. Hard steel bar demand is sufficient to enable local mills to operate single turn. Tonnage booked is largely for bedstead and steel post manufacture and for reinforcing purposes. The ruling market is 1.50c. mill, although attractive tonnages have brought out concessions. A local mill booked 1200 tons for the American Fore building, Chicago, at 1.45c.

Mill prices are: Mild steel bars, 1.55c. to 1.60c., Chicago; common bar iron, 1.60c., Chicago; rail carbon, 1.50c., mill or Chicago.

Jobbers quote 2.53c. for steel bars out of warehouse. The warehouse quotation on cold-rolled steel bars and shafting is 3.10c. for rounds and 3.90c. for flats, squares and hexagons. Jobbers quote hard and medium deformed steel bars at 1.90c. base. Hoops and bands, 3.13c.

Wire Products.—While jobbers are buying a little more freely, they are not yet laying in stocks in the quantities they usually do at this time of the year. The price situation is weaker and large orders for wire nails are being placed at \$2.40, Pittsburgh. Reports that the leading interest will announce a new price of \$2.25 cannot be confirmed here. For mill prices see finished iron and steel, f.o.b. Pittsburgh, page 505.

We quote warehouse prices f.o.b. Chicago: No. 9 and heavier black annealed wire, \$3.13 per 100 lb.; No. 9 and heavier bright basic wire, \$3.28 per 100 lb.; common wire nails, \$3.25 per 100 lb.; cement coated nails, \$2.65 per keg.

Sheets.—Further reports of slight concessions on galvanized and black are circulating, but no general weakness is to be noted, and prices appear to remain fairly firm at the quotations published below. Domestic demand is slightly better, but still light. Export business is good.

Mill quotations are 3c. for No. 28 black, 2.25c. for No. 10 blue annealed and 4c. for No. 28 galvanized, all being Pittsburgh prices, subject to a freight rate to Chicago of 38c. per 100 lb.

Jobbers quote: Chicago delivery out of stock, No. 10 blue annealed, 3.38c.; No. 28 black, 4.15c.; No. 28 galvanized, 5.15c.

Steel Castings.—Orders for the steel castings in the Burlington cars have not yet been placed. The bolsters, side-frames and couplers will be placed by the railroad, while the miscellaneous castings will be bought by the car builders. Covered in each case by protections granted in December, the placing of these orders will not develop changes in prices which might be warranted by present market conditions. On new business the prices and discounts on pages 348 to 350 of THE IRON AGE of Feb. 2 are regarded as the market.

Plates.—Specifications from car builders continue to account for the bulk of the bookings of local plate

mills, but orders from miscellaneous sources are notably more numerous, although individually small. On the other hand, demand from oil storage tank fabricators has fallen off markedly. The price situation is still weak, steel for cars being bought at \$2 to \$3 below the general market.

The ruling mill quotations range from 1.55c. to 1.60c., Chicago. Jobbers quote 2.63c. for plates out of stock.

Structural Material.—Fabricating awards have fallen off during the past week, but a large amount of work is pending. The Chicago sales office of one important fabricator reports that it has submitted bids on 40,000 tons since Jan. 1, as compared with a maximum of 110,000 tons for any previous complete year. One of the largest jobs on which bids have recently been taken is the Bankers' Life building, Des Moines, Iowa, involving 1700 tons. Plain material prices are on about the same basis as described last week. Recent fabricating awards include:

Chicago, Burlington & Quincy Railroad, one 88-foot and two 103-foot through truss spans, 134 tons, to Veching Steel Works and A. Holters Sons.

Bridge over Saint Croix river, Prescott, Wis., 372 tons, to Milwaukee Bridge Co.

Bridge over Missouri River, Boonville, Mo., 1827 tons, to Mount Vernon Bridge Co.

The mill quotation in plain material from 1.55c. to 1.60c., Chicago. Jobbers quote 2.63c. material out of warehouse.

Bolts and Nuts.—The market remains decidedly weak, but the prices and discounts published last week are still representative. The automobile builders and the railroads are the principal buyers. The Ford Motor Co. has closed for 10,000,000 nuts at sharp concessions in prices. Jobbers are buying very cautiously.

Jobbers quote structural bolts, 3/4 x 4 in., 60, 10 and 10 per cent off, larger sizes, 60 to 10 off, carriage bolts up to 3/4 x 6 in., 60 and 10 off; larger sizes, 5 and 5 off; hot pressed nuts, square and hexagon tapped, \$3.75 off; blank nuts, \$1 off; coach or lag screws, gimlet points, square head, 65 and 5 per cent off. Quantity extras are unchanged.

Old Material.—Sentiment among dealers has improved, but in the absence of any consumptive buying of importance the price situation remains largely unchanged. There are indications, however, pointing to increased speculative buying and it is possible that a strong dealers' market may develop. The only notable purchases by users recently have been for cast scrap. Railroad offerings include: The Great Northern, 6000 tons; the Rock Island, 3000 tons; the Northern Pacific, 3000 tons; the Santa Fe 2500 tons; the Wabash, 1000 tons. The quotation on No. 1 busheling published last week, was in error. It should have been \$8.25 to \$8.75 per net ton.

We quote delivery in consumers' yards Chicago and vicinity, all freight and transfer charges paid, as follows.

Per Gross Ton	
Iron rails	\$16.00 to \$16.50
Relaying rails	20.00 to 20.00
Cast iron car wheels	15.00 to 15.00
Rolled or forged steel car wheel	13.00 to 13.50
Steel rails, rerolling	12.00 to 12.50
Steel rails, less than 3 ft.	12.50 to 13.00
Heavy melting steel	11.25 to 11.75
Frags, switches and guards cut apart	11.25 to 11.75
Shoveling steel	10.75 to 11.25
Low phos., heavy melting steel	13.50 to 14.00
Drop forge flashings	7.50 to 8.00
Hydraulic compressed sheet	7.50 to 8.00
Axle turnings	8.50 to 9.00

Per Net Ton	
Iron angles and splice bars	14.00 to 14.50
Steel angle bars	10.50 to 11.00
Iron arch bars and transoms	15.00 to 15.50
Iron car axles	19.50 to 20.00
Steel car axles	12.50 to 13.00
No. 1 busheling	8.25 to 8.75
No. 2 busheling	6.00 to 6.50
Cut forge	10.00 to 10.50
Pipes and flues	10.50 to 11.00
No. 1 railroad wrought	10.00 to 10.50
No. 2 railroad wrought	10.75 to 11.25
Steel knuckles and couplers	12.50 to 13.00
Coil springs	13.00 to 13.50
No. 1 machinery cast	12.50 to 13.00
No. 1 railroad cast	11.00 to 11.50
Low phos. punchings	9.50 to 10.00
Locomotive tires, smooth	4.50 to 5.00
Machine shop turnings	6.00 to 6.50
Cast borings	12.50 to 13.00
Stove plate	10.50 to 11.00
Grate bars	10.50 to 11.00
Brake shoes	11.25 to 11.75
Railroad malleable	11.25 to 11.75
Agricultural malleable	11.25 to 11.75

Rails and Track Supplies.—The Chesapeake and Ohio is about to place 18,000 tons of rails, a part of which at least is expected to go to local mills. The Minneapolis & St. Louis and the Soo Line recently

ordered 3000 tons and 2000 tons respectively from a Chicago producer. Demand for track materials is more active than for rails. The Great Northern and the Soo Line placed orders in Chicago for 6000 tons and 1000 tons of tie plates respectively. The Louisville & Nashville placed 3600 tons with the Tennessee company and the Michigan Central is in the market for 5000 tons. Demand for light rails is small, with billet steel rails available at from 1.55c. to 1.60c. mill, and re-rolled rails for 1c.

Standard Be	Fourth rail	10c. light rails
Standard rail	1.60c. for buckers mills	
with square nuts	1.60c. Pittsburgh track bolts	
1.55c. 1 c. b. mill	1.60c. tie plates, steel and iron	
	1.60c. 1 c. b. mill	

Cast-Iron Pipe.—The People's Gas Co., Chicago, is in the market for 15,000 tons of gas pipe and the Milwaukee Gas Co. for 4000 tons. While few new inquiries for water pipe have appeared within the past week, there is much municipal work in a formative stage. Brillion, Wis., has let 375 tons to the American Cast Iron Pipe Co. The same producer is low bidder on 800 tons for Minneapolis. Fort Wayne, Ind., will take bids, Feb. 21, on 190 tons.

We quote per net ton for Chicago as follows: Water pipe 1-in. \$15.60 to \$16.60, 6 in. and above, \$11.60 to \$12.60; 4-in. and pipe 3 extra.

New York

NEW YORK, Feb. 14.

Pig Iron.—The buying by the heater companies last week and the week before, included most of the large tonnages of recent date, although one machinery company has purchased 2000 tons and another melter 800 tons. The failure to open bids on the vehicular tunnel caused some disappointment, but it is expected that consumers of pig iron will be actively figuring this week with contractors successful to-morrow in the tunnel bidding. Reports brought by representatives of selling companies who have been in New England in the past few days indicate an increase of melt and more encouraging conditions generally, but fear that the strike of textile workers will have a depressing effect on the situation.

We quote delivered in the New York district as follows, having added to furnace prices \$1.52 freight from eastern Pennsylvania, \$5.46 from Buffalo and \$6.16 from Virginia:

East. Pa. No. 1 4dy, sil. 75 to 3.25	\$23.52
East. Pa. No. 2X 6dy, sil. 2.25 to 2.75	23.02
East. Pa. No. 2 4dy, sil. 1.75 to 2.25	22.52
Buffalo, sil. 1.75 to 2.25	\$23.46 to 23.71
No. 2 Virginia, sil. 1.75 to 2.25	23.16

Ferroalloys.—The quotation of all the sellers of British ferromanganese in this market is now on a basis of \$62.50, seaboard, and it is understood that the leading American producer and the Carnegie Steel Co. are also on the same basis. Before the advance it is understood that sales aggregating about 1000 tons, mostly domestic alloy, were made. Inquiries at present before the market include one of 300 tons and also others for carload lots bringing the total to about 500 tons. A decided change has developed in the spiegeleisen market. No more of the high, or 20 per cent, grade is available and for the lower, or 16 to 19 per cent, grade the price has been advanced to \$30, furnace, as contrasted with \$25 previously. Sales of several hundred tons are reported, some of it at the higher quotation. There have been no developments in the manganese ore situation and quotations continue nominally unchanged. Demand of 50 per cent ferrosilicon is confined to small lots at unchanged prices. Quotations are as follows:

Ferromanganese, domestic, at per ton	\$62.50
Ferromanganese, British, seaboard, per ton	\$62.50
Spiegeleisen, 16 to 19 per cent, furnace, per ton	\$30.00
Ferrosilicon, 50 per cent, delivered, per ton	\$55.00 to \$60.00
Ferrotungsten, per lb. of contained metal	40c. to 50c.
Ferrocromium, per lb. of contained metal	80c. to 1.00c.
70 per cent Cr., per lb. Cr., delivered	12c. to 14c.
Ferrovandium, per lb. of contained vanadium	\$4.00
Manganese ore, foreign, per unit, seaboard	22c. to 25c.
Tungsten ore, per unit, in 60 per cent concentrates	\$2.00 up
Chromite ore, 40 to 45 per cent Cr ₂ O ₃ , crude, per net ton, Atlantic seaboard	\$20.00 to \$25.00
Chromite ore, 45 to 50 per cent Cr ₂ O ₃ , crude, per net ton, Atlantic seaboard	\$25.00 to \$27.00
Molybdenum ore, 85 per cent concentrates, per lb. of MoS ₂ , New York	50c. to 60c.

Finished Iron and Steel.—What improvement has occurred in the broadened replenishment buying has tended to stiffen prices at the 1.40c. Pittsburgh basis. Inquiries of the week have probably not amounted to as much as those of the week preceding, but the situation is regarded as merely a repetition of the up and down movement expected under a market of buying largely for current needs. More is heard of the potentiality of railroad buying. Outstanding in this is the first large purchase in the East for some time of railroad cars, the Reading distributing 2000 steel hopper cars calling for upward of 20,000 tons of steel, equally among four companies, the Pressed Steel Co., Cambria Steel Co., American Car & Foundry Co., and the Standard Steel Co. With the common expectation that better than the going market will be realized on purchases, the car builders are counting on pricing at 1.35c., Pittsburgh, for bars, plates and shapes. The Reading is also interested in securing 50 passenger equipment cars; the Lehigh Valley is asking for prices on the repair of 985 steel hopper cars and the Pennsylvania is inquiring for prices on box and hopper cars. In the structural field the New York Central proposal to build a bridge across the Hudson River at Closter, involving 23,000 tons, looms large. The Pennsylvania Equipment Co., Philadelphia, is in the market for 15 tank cars of 10,000-gal. capacity. In the export market 7000 tons of 100 lb. rails for South Manchuria have been placed in the United States and 10,000 tons of 60-lb. rails for the Imperial Government Railways of Japan are substantially closed. Exporters look for increasing business in semi-finished steel to Europe, favored by lower prices here and rising exchange there. New fabricated steel projects, beside the New York Central bridge, include 400 tons for small bridges for the Lehigh & New England, 700 tons for a power house at Pittston, Pa., 100 tons for a school at Corning, N. Y., 1000 tons for an office building at Broadway, Seventh Avenue and Fifty-first Street, New York, and 700 tons for public school No. 67, Brooklyn. Bids scheduled to open on Feb. 15 for the vehicular tunnel under the Hudson involve several thousand tons of fabricated steel work. Recent award include the following: Two bridges for the Baltimore & Ohio, 550 tons, one in Delaware to the Fort Pitt Bridge Works and the other in Ohio to the Mount Vernon Bridge Co.; an apartment house at 485 Park Avenue, 700 tons, to the Bethlehem Fabricators; 250 tons for a highway bridge over the Shark River, Monmouth County, N. J., to the Penn Bridge Co.; 700 tons for an apartment in Newark, to the Hay Foundry & Iron Works. 500 tons for the Intervale telephone exchange to Eiditz & Ross, and 1700 tons for two lofts, one on Thirty-seventh Street and the other on Thirty-eighth Street, to the Hinkle Iron Co.

We quote for mill shipments, New York, as follows: Soft steel bars, 1.75c. to 1.85c.; plates, 1.75c. to 1.85c.; structural shapes, 1.75c. to 1.85c.; bar iron, 1.75c. to 1.85c. On export shipments the freight rate is 28.5c. per 100 lb., instead of 38c., the domestic rate.

High Speed Steel.—The situation here is still unchanged. The reduced inventories reported from the automobile business provide some optimism as to future purchases, but on the whole there is no prospect of early return to active selling. Prices are weak, probably caused to a great extent by sales at reduced prices of overstocks of dealers and others. A fair estimate of the present market would be a nominal quotation of 80c. to 90c. per lb. for 18 per cent tungsten high speed steel with special brands of some companies still selling up to \$1.05 per lb.

Cast-Iron Pipe.—The market shows some slight activity and prices are firm. The municipal letting of 600 tons of 8-in. to 12-in. cast-iron pipe for the Department of Water Supply, Gas and Electricity, New York, was awarded to the United States Cast Iron Pipe & Foundry Co., at \$45.80 per ton. The optimism that has prevailed in this market during the past few weeks continues strong and further municipal purchases are expected soon. We quote per net ton, f.o.b. New York, carload lots, as follows: 6-in. and larger, \$47.30; 4-in. and 5-in., \$52.30; 3-in., \$62.30, with \$4 additional for Class A and gas pipe.

Warehouse Business.—There is no notable increase

in activity. While there is still a tendency on the part of some warehouses to look for a reduction in prices, both black and galvanized sheets, which have been rather weak lately, caused by offerings of small dealers, overstocked, have stiffened considerably, and 3.75c. per lb. on No. 28 gage black and 4.75c. per lb. on No. 28 gage galvanized are fairly representative of the market. Bars are not active, but there is some buying of structural material in the metropolitan district. The brass and copper market is unchanged, a slightly quieter tone prevailing. No change is reported by dealers in wrought iron and steel pipe. We quote prices on page 518.

Coke.—The coke market continues active on both beehive and by-product grades, the selling price of the former ranging from \$3.75 to \$4.50 and the latter selling at \$8.59 delivered at New Jersey points, this being on the basis of \$4.25 on Connellsville coke ovens and \$4.34 freight. Orders have been coming in so rapidly that some of the Connellsville producers have not been able to give as prompt delivery as usual. All the activity is attributed to the fear of a strike in the bituminous and anthracite regions April 1.

Old Material.—The market is quiet with no new contracts by mills reported. Heavy melting steel is off 50c., a quotation of \$7.50 to \$8 per ton being representative of the present market. The lower price now prevailing may have been caused partly by the reduction in the offering price of the Bethlehem Steel Co., which has reduced No. 1 heavy melting steel at Bethlehem to \$11 per ton and railroad steel to \$11.50. The recent purchase of heavy melting steel by the Cambria Steel Co. for Johnstown, Pa., also figured back to \$8 per ton. Machine shop turnings have been slightly more active and business has been transacted at a price nearer \$5 per ton than \$4.50. Stove plate shows an advance on actual purchases of about 25c., a fair range being \$10 to \$10.50 per ton.

Buying prices per gross ton, New York, follow:

Heavy melting steel, yard	\$7.50 to \$8.00
Steel rails, short lengths, or equivalent	8.25 to 8.75
Revolving rails	9.25 to 9.75
Relaying rails, nominal	27.00 to 28.00
Steel car axles	10.00 to 10.50
Iron car axles	18.50 to 19.00
No. 1 railroad wrought	10.00 to 10.50
Wrought iron track	8.50 to 9.00
Forge fire	5.00 to 5.50
No. 1 yard wrought, long	9.00 to 9.50
Cast borings (clean)	7.00 to 7.50
Machine-shop turnings	4.50 to 5.00
Mixed borings and turnings	4.50 to 5.00
Iron and steel pipe (1 m. diam. not under 2 ft. long)	7.25 to 7.75
Stove plate	10.00 to 10.50
Locomotive grate bars	9.50 to 10.00
Malleable cast (railroad)	8.00 to 8.50
Cast-iron car wheels	10.50 to 11.00

Prices which dealers in New York and Brooklyn are quoted to local foundries, per gross ton, follow:

No. 1 machinery cast	\$16.50 to \$17.00
No. 1 heavy cast (columns, building materials, etc.), cupola size	15.50 to 16.00
No. 1 heavy cast, not cupola size	14.00 to 14.50
No. 2 cast (radiators, cast boilers, etc.)	10.00 to 10.50

Birmingham

BIRMINGHAM, ALA., Feb. 14.

Pig Iron.—Probably the largest iron business of several weeks was done in that ending last Saturday. One maker booked 2500 to 3000 tons, practically all of which was for prompt shipment and included lots ranging from carloads to 750 tons. The last named order came from the Pacific Coast and was on a \$16 base, which by reason of ocean rates out of Mobile, places the Alabama iron, delivered, under the base of foreign offerings. One concern shipped 1400 tons to the Pacific Coast in January following a like amount in December. The state of the Birmingham market may be judged from sales of 300 tons to a local consumer at \$15.50. The usual price for small lots is \$16. The Sloss-Sheffield company's entrance into river iron business this week is not experimental. It shipped Sheffield iron that way several years ago at a saving of freight rate and with dispatch in delivery. Beginning with an advantage of 40c. to 80c. rail rate over Birmingham, the fur-

ther advantage of transportation by river places Sheffield in that much stronger strategic position. Eastern consumers are again interested in Birmingham iron for delivery by rail and water. Negotiations for considerable tonnage are pending. The manner in which Alabama iron has again entered Northern markets is the outstanding feature of encouragement. The initial movement to metropolis is understood to consist of 1000 tons already contracted for. Barges will hold 300 tons apiece. The Woodward Iron Co. has not resumed at its banked stack, but continues operation of two. Stock showing is considered good. Stocks on Alabama yards Jan. 1 and Feb. 1 were as follows: Foundry, 74,000 and 82,000; machine cast, 35,000 and 46,000; warrants, 4800 and 800 basic, 37,000 and 27,000; total, 152,000 and 157,000. Increased steel production is reflected in decrease of basic iron stocks. Merchant iron holdings are practically confined to three interests. Active stacks are four on basic, six on merchant iron and two on charcoal iron.

We quote per gross ton f.o.b. Birmingham district furnaces as follows:

Foundry, silicon 1.75 to 2.25	\$15.00 to \$16.00
Basic	11.00 to 15.00
Charcoal, warm blast	32.00

Finishing Mills.—Tennessee company continued 75 to 80 per cent of ingot production this week and operation of all finishing mills except the structural and plate mills at Fairfield. The rail mill is on its second week of 8000-ton production. The American Steel & Wire Co. is at 50 to 60 per cent. The Gulf States Steel Co. is understood to be at about the same. Steel hoop and band mills have been idle for some time. Fabricating steel plants have received a fair business in steel for school buildings in the South.

Cast Iron Pipe.—High pressure pipe makers report improved business on books and are sanguine of the near future. The National Cast Iron Pipe Co. booked 1200 tons for St. Paul and is at 60 to 70 per cent. The rebuilt plant of the Agricola Pipe Co., Gadsden, has resumed. Sanitary pipe makers report the first strong inquiry following recent price reductions, and fairly good orders toward close of week. A turn for the better seems imminent. The high pressure base is \$33 and that of sanitary pipe is \$37. Cuba has placed small orders of sanitary pipe recently.

Coal and Coke.—Standard coke rules at \$5 to \$5.25. Market is stronger and sales embrace larger tonnage owing to increased foundry takings.

Old Material.—The scrap market remains featureless. Dealers are taking in little stock and very little is going out.

We quote per gross ton f.o.b. Birmingham district yard as follows:

Steel rails	\$11.00 to \$13.00
No. 1 steel	10.00 to 11.00
No. 1 cast	14.00 to 15.00
Car wheels	13.00 to 14.00
Tramcar wheels	12.00 to 13.00
No. 1 wrought	12.00 to 13.00
Stove plate	11.00 to 12.00
Cast iron borings	6.00 to 7.00
Machine shop turnings	6.00 to 7.00

Boston

BOSTON, Feb. 14.

Pig Iron.—Fresh weakness has developed in Buffalo and eastern Pennsylvania iron. The probable closing this week on 2000 tons of No. 2X iron by the Gurney Heater Co., Framingham, Mass., has brought out \$19, furnace, eastern Pennsylvania iron, with a possibility of that price being met by Buffalo interests, which would bring the Buffalo furnace price down to around \$17.50. Sales of Buffalo iron in this territory are reported this week at \$18, a new low for this movement, and others of No. 1X iron at \$18.50, furnace, by one interest heretofore holding at \$19. One eastern Pennsylvania furnace interest, heretofore quoting \$20 furnace base, this week sold 300 tons No. 2X at less than \$19.50. On the other hand a Massachusetts stove maker bought 200 tons eastern Pennsylvania No. 2X at \$20, furnace, and another melter in that State 100 tons No. 2X at \$20.50. Sales this week are about evenly divided between eastern Pennsylvania and Buffalo irons,

amounting in the aggregate to approximately 3000 tons. They include 500 tons No. 2X to a textile machinery interest, the largest individual transaction, 200 tons of malleable to a New Hampshire and 100 tons to a Massachusetts foundry at \$18.50, furnace, and car lots of special high manganese irons to Massachusetts melters at \$19.50 and \$20, furnace.

We quote delivered at common New England points as follows, having added to furnace prices: \$1.06 freight from eastern Pennsylvania, \$1.46 from Buffalo, \$0.58 from Virginia and \$10.60 from Alabama.

East Penn., sd 2.25 to 2.75	\$23.06 to \$24.06
East Penn., sd 1.75 to 2.25	23.06 to 24.06
Buffalo, sd 2.25 to 2.75	23.16 to 23.96
Buffalo, sd 1.75 to 2.25	23.16 to 23.96
Virginia, sd 2.25 to 2.75	23.08 to 23.08
Virginia, sd 1.75 to 2.25	28.80 to 29.58
Alabama, sd 2.25 to 2.75	27.16
Alabama, sd 1.75 to 2.25	26.66

Finished Material.—Weakness in prices on structural steel has held up approximately 5000 tons that otherwise would have been closed last week. In the aggregate, some 18,000 tons of structural steel tonnage has strong possibility of developing in this territory within the next month or two. Mill representatives continue to report general order—running well ahead of bookings last month, but below normal. Business on bars, shapes and plates has been closed this week at 1.40c. and 1.45c., Pittsburgh. The Bangor & Aroostook Railroad is about to close on 2000 tons of 80 lb. rails and 7100 standard angle joints. The Maine Central Railroad is inquiring on 5000 tons of 85 lb. rails. Wire products continue in demand. The Acme Wire Co., New Haven, Conn., has an order for 150,000 coils of wire from the Ford Motor Co., sufficient to keep the plant operating at present capacity five weeks. The American Steel & Wire Co., Worcester, Mass., and other wire plants are not so active as they were last month. Warehouses in this territory report sheets and structural shapes more active than other lines, but bar, band and other small business continues to show slow expansion.

Jobbers now quote: soft steel bars, \$7.50, per 100 lb. base. Hot, \$9.00. corner to bar, stock length, \$2.50. structural angles and beams, \$7.60. plate, \$2.60. to \$2.85. tin steel, \$3.85 to \$4.00. open hearth casting steel, \$4.50. crucible spring steel, \$11.00. band, \$11.00. to \$12.00. hoop steel, \$3.10. cold rolled steel, \$3.10 to \$3.20. for cold steel, \$8. rolled iron, \$2.50. per 100 lb. base. best refined iron, \$12. Wayne iron, \$5.00. Norway iron, \$3.00. No. 10 blue annealed sheet, \$3.18 per 100 lb. base. No. 18 black sheets, \$1.00. No. 28 galvanized sheets, \$1.00.

Coke. The movement of by-product foundry coke from the ovens is freer than it has been before in months, but business is not sufficiently large to warrant increased oven operations. Shipments are made on contract, mainly. Spot business is limited to a car here and there. Both the New England Coal & Coke Co. and the Providence Gas Co. continue to quote by-product foundry coke at \$10.15, delivered, where the local freight does not exceed \$3.40.

Old Material.—The market has been practically at a standstill the past week. Dealers characterize it as a "waiting" market. Pennsylvania mill are inquiring for little, if any, heavy melting steel, offerings by the Government evidently diverting attention from this market. The demand for borings and turnings has slumped since last reports, but prices hold firm. New England foundries, due to the low cost of pig iron, are using more of it and less machinery cast for mixing purposes, which has a tendency to minimize inquiries, according to large dealers. Small dealers, in many cases, are supplying foundries in their immediate neighborhood.

The following prices are for gross ton lots delivered at common points:

No. 1 machinery cast	\$18.00 to \$18.50
No. 2 machinery cast	16.00 to 16.50
Stove plate	15.00
Railroad malleable	13.00 to 14.00

The following prices are offered per gross ton lots f.o.b. Boston rate shipping point.

No. 1 heavy melting steel	\$8.00 to \$9.00
No. 1 railroad wrought	10.00 to 11.00
No. 1 yard wrought	9.50 to 10.00
Wrought pipe (1-in. in diam. over 2 ft. long)	7.00 to 7.25
Machine shop turnings	4.00 to 4.50
Cast iron borings, rolling mill	7.50 to 8.00
Cast iron borings, chemical	5.50 to 6.00
Blas furnace boring and turnings	3.50 to 4.50
Forged scrap and banded skeleton	1.50 to 5.00
Street car axles and shafting	10.00 to 11.00
Car wheels	11.50 to 12.00
Revolving rails	10.00 to 10.50

Philadelphia

PHILADELPHIA, Feb. 14.

The local iron and steel market continues without definite trend. In some lines there appears to be spotty improvement, but on the whole there has not been much change for the better. Prices are weak, almost every commodity except black and galvanized sheets being sold at concessions, and in sheets there is not enough demand of importance to bring out sharp competition.

Pig iron producers have been attempting to hold No. 2 plain at \$20, furnace, and No. 2X at \$20.50, but have not been successful in all instances, especially in territory where the competition of \$18 Buffalo iron has to be met. Concessions on foundry pig iron, however, are infrequent except where a furnace finds it necessary to absorb part of the freight rate in competition with producers having a freight rate advantage.

Pig Iron.—Inquiry for pig iron has dropped off. The local market has been exceedingly quiet in the past week. In the immediate Philadelphia territory there is little interest in foundry iron and inquiries and orders mostly range from a carload to 200 or 300 tons. Two lots of 1000 tons each were sold to pipe makers. One lot of 1000 tons was gray forge iron, which was sold at \$18.50, furnace. Producers of foundry iron are attempting to hold prices, but there are some concessions from the usual quotations of \$20 for No. 2 plain and \$20.50 for No. 2X. Such concessions are usually granted only when it is necessary for the furnace to absorb a part of a freight rate disadvantage in competing with \$18 Buffalo iron in New England and other territory lying between eastern Pennsylvania and Buffalo. Some eastern Pennsylvania producers have gone to \$19.50 for No. 2 plain and to \$20 for No. 2X. We note a sale of 200 tons of malleable iron at \$22.50, delivered. Buffalo malleable costs \$23.96, delivered in this district. Two or three inquiries for standard low phosphorus iron aggregate a few hundred tons, and sales have been made in the past week at \$30, furnace. There is no inquiry for basic iron.

The following quotations are, with the exception of those on low phosphorus iron, for delivery at Philadelphia, and include freight rates varying from 81 cents to \$1.51 per gross ton:

East. Pa. No. 2 plain, 1 7/8 to 2 1/2 s.	\$20.84 to \$21.26
East. Pa. No. 2X, 2 1/8 to 2 1/2 s.	21.34 to 21.76
Virginia No. 2 plain, 1 7/8 to 2 1/2 s.	27.24 to 27.74
Virginia No. 2X, 2 1/8 to 2 1/2 s.	27.74 to 28.24
Basic delivery eastern Pa.	19.84
Gray forge	20.50 to 21.50
Malleable	22.50 to 21.00
Standard low phos. (f.o.b. furnace)	30.00
Upper bearing low phos. (f.o.b. furnace)	28.00

Ferroalloys.—British producers of ferromanganese have advanced prices for American shipment to \$62.50, Atlantic seaboard. The reason given is the higher exchange value for the pound sterling. Domestic producers have also advanced their prices to the same figure. An inquiry for 2000 tons of spiegeleisen comes from Belgium, but exporters have little expectation of the business being placed here. Asking prices for spiegeleisen range from \$25 to \$26, furnace.

Billets.—There is little demand for semi-finished steel. Open-hearth rerolling billets are obtainable at \$28 to \$29, Pittsburgh, and forging billets at \$32 to \$33, Pittsburgh.

Rails.—It is expected that the Chesapeake & Ohio Railroad will place orders shortly for 26,000 tons of heavy rails, of which 4000 tons is for the Hocking Valley Railroad.

Plates.—A slight improvement in the volume of plate business is noted by some Eastern mills, but the situation as a whole is still far from healthy. Prices are weak, 1.40c., Pittsburgh, now being generally recognized as the market on attractive lots. Mills are able to obtain 1.45c. and 1.50c., Pittsburgh, only on small lots. An Eastern shipbuilding company, which is bidding on a riveted steel pipe project, is inquiring for 2500 tons of plates for the job. The Philadelphia & Reading Railroad was expected to place orders to-day for 800 tons of tank steel for car repairs. The same road has placed orders for 2000 freight cars and 50 steel passenger coaches, requiring about 25,000 tons of steel. The

passenger cars will be built by the Harlan plant of the Bethlehem Steel Co. at Wilmington, Del., while the passenger cars were divided as follows: Standard Steel Car Co., 500; Pressed Steel Car Co., 500; American Car & Foundry Co., 500, and Cambria Steel Co., 500.

Structural Material.—As soon as a site for the proposed sesqui-centennial World's Fair, to be held in Philadelphia in 1926, shall have been selected, it is expected that two or three hotel projects, which have been informally discussed, will go ahead. Bids will be opened next week on the Philadelphia public library, which will require about 3000 tons of steel. Fabricators are figuring building projects on the basis of 1.40c., Pittsburgh, for plain material.

Bars.—Bar iron is now obtainable at 1.40c., Pittsburgh, from Eastern mills. Steel bars are to be had at the same figure. Business is limited to small orders, but a somewhat better demand for concrete reinforcing bars is expected as soon as spring building work gets under way.

Sheets.—While there is little demand for black and galvanized sheets and therefore little test of prices, it is noted that quotations of 3c. on black and 4c. on galvanized are holding more firmly than are prices on other steel products. Blue annealed sheets are firm at 2.25c., Pittsburgh, except that some plate mills are offering Nos. 10, 11 and 12 gages on the plate basis, with usual extras. The tin plate market appears to have settled to \$4.60 per 100 lb. base box, with occasional lots selling at \$4.50.

Strip Steel.—Quotations on hot rolled strip steel have gone as low as 1.75c., Pittsburgh, though some mills are asking all the way up to 2c. Cold-rolled strip steel is quoted at 3.50c., Pittsburgh, by most makers, but there are occasional deviations in the way of cancelling extras.

Warehouse Business.—A moderate improvement in the volume of buying out of stock is reported. Prices are unchanged and for local delivery are as follows:

Soft steel bars and small shapes, 2.50c.; iron bars (except bands), 2.50c.; round edge iron, 2.50c.; round edge steel, iron finish, 1 1/2 x 1/2 in., 2.95c.; round edge steel planished, 3.70c.; tank steel plates, 3/4-in. and heavier, 2.75c.; tank steel plates, 3/16-in., 2.925c.; blue annealed steel sheets, No. 10 gage, 3.50c.; light black sheets, No. 28 gage, 4c.; galvanized sheets, No. 28 gage, 5c.; square twisted and deformed steel bars, 2.65c.; structural shapes, 2.60c.; diamond pattern plates, 3/4-in., 4.60c.; 3/16-in., 4.785c.; 1/4-in., 4.90c.; spring steel, 4.10c.; round cold-rolled steel, 3.25c.; squares and hexagons, cold-rolled steel, 3.75c.; steel hoops, No. 13 gage and lighter, 3.25c.; steel bands, No. 12 gage to 3/16-in., inclusive, 3.10c.; iron bands, 3.90c.; rails, 2.75c.; tool steel, 8c.; Norway iron, 5c.; toe steel, 4.50c.

Old Material.—There have been no developments of interest in the scrap market within the past week and prices are substantially unchanged. We quote for delivery at consuming points in this district as follows:

No. 1 heavy melting steel	\$12.00 to \$12.50
Scrap rail	12.00 to 12.50
Steel rails, rerolling	15.00 to 15.50
No. 1 low phos., heavy 0.01 and under	18.00 to 19.00
Cast iron car wheels	15.00 to 15.50
No. 1 railroad wrought	14.50 to 15.00
No. 1 yard wrought	12.00 to 12.50
No. 1 forge fire	10.00 to 10.50
Bundled sheets (for steel works)	9.50 to 10.00
No. 1 busheling	11.00 to 12.00
No. 2 busheling	9.00 to 10.00
Turnings (short shoveling grade for blast furnace use)	9.50 to 10.00
Mixed borings and turnings (for blast furnace use)	9.50 to 10.00
Machine-shop turnings (for rolling mill and steel works use)	9.50 to 10.00
Heavy axle turnings (or equivalent)	9.50 to 10.00
Cast borings (for steel works and rolling mills)	12.00 to 12.50
Cast borings (for chemical plants)	13.50 to 14.00
No. 1 cast	16.50 to 17.00
Railroad grade bars	14.00 to 14.50
Stove plate (for steel plant use)	14.00 to 14.50
Railroad malleable	12.50 to 13.50
Wrought iron and soft steel pipes and tubes (new specifications)	12.00 to 12.50
Iron car axles	No market
Steel car axles	17.00 to 18.50

The Electric Controller & Mfg. Co., Cleveland, has received an order for complete electric control equipment for the new plant of the International Nickel Co. at Huntington, W. Va. The order covers 46 pieces of equipment.

St. Louis

St. Louis, Feb. 14.

Pig Iron.—The employment of barge service in the movement of Southern pig iron at a saving of \$1.50 under the all rail rate is interesting to the melters in this district. The barge service will be effective tomorrow. The iron will be moved via the Tennessee River to Metropolis, Ill., thence by rail to St. Louis. Under this arrangement, iron will be delivered at St. Louis at \$19.44 or \$13.70, Birmingham. Shipment will be made from Sheffield, which has a differential of 80c. under the Birmingham freight rate. On the basis of \$16, Birmingham, iron shipped all rail from that point is delivered in St. Louis at \$21.74. With Northern iron at \$18.50, Chicago, plus \$2.80 freight, the St. Louis price is \$21.30, giving the Southern product shipped water and rail an advantage on the present market of \$1.86 a ton. The capacity of these barges is about 400 tons. The first purchaser in St. Louis of a barge load of pig iron for the new service was Bridge & Beach Mfg. Co., manufacturer of stoves. The biggest order of the week, if not for the year, of Northern iron was made by a local melter, being 2000 tons of foundry grade for shipment over March and April. The volume of orders for carloads was fairly large, and these invariably were for immediate shipment. The consumption of iron is a bit stronger, but most melters are content to buy only for their immediate needs. More stove foundries are starting up. The Belleville stove plants have adjusted the wage differences with their men, and they are expected to resume operations soon. An Illinois radiator concern is in the market for 500 tons of foundry iron for March shipment. A northern Illinois steam specialty company wants 200 tons. An Indiana engine boiler concern has an inquiry out for 500 to 1000 tons. Foundries specializing in railroad castings are hopeful that the proposed new plan of financing the lines will result in a better demand from that source.

We quote delivered consumers' yards, St. Louis, as follows, having added to furnace prices \$2.88 freight and war tax from Chicago and \$5.91 from Birmingham:

Northern foundry, sil. 1.75 to 2.25	\$21.30
Northern malleable, sil. 1.75 to 2.25	21.30
Basic	21.30
Southern foundry, all rail, sil. 1.75 to 2.25	21.11
Southern foundry, sil. 1.75 to 2.25, rail and water	19.11

Finished Iron and Steel.—The demand for finished iron and steel products is rather light. Railroads centering here are not getting out any inquiries, and there is very little doing in structurals here, pending a readjustment of the wage scale. Jobbers report a little better demand, but they are not stocking up, and are depending upon the manufacturers to do that for them. A manager of sales stationed here has just returned from a trip to the jobbing centers of Tennessee, Louisiana and Arkansas, finding the jobbers buying only goods that they actually must have. They are not fearful of the market, but they feel that there is no necessity to carry large stocks so long as prompt shipments can be had from manufacturers. The awarding of the contract for the Jewish Hospital, Memphis, involving 300 tons of reinforcing bars, for which the James Alexander Construction Co. was the low bidder, has been held up for several weeks. The Kansas City, Clay County & St. Joseph Railway, Kansas City, has an inquiry out for 100 tons of 70-lb. steel rails, and the East St. Louis & Suburban Railway, East St. Louis, Ill., want 100 tons of the same weight rails. A manufacturer of engines bought 10 crankshafts, involving about 30 tons. The Union Pacific Railroad has issued notices of an indefinite postponement of the buying of 25 observation and 50 passenger cars on which they had asked prices.

For stock out of warehouse we quote: Soft steel bars, 2.62½c. per lb.; iron bars, 2.62½c.; structural shapes, 2.72½c.; tank plates, 2.72½c.; No. 10 blue annealed sheets, 3.47½c.; No. 28 black sheets, cold rolled, one pass, 4.15c.; cold drawn rounds, shafting and screw stock, 3.65c.; structural rivets, \$3.52½ per 100 lb.; boiler rivets, \$3.62½; tank rivets 7/16 in. and smaller, 65 and 5 per cent off list; machine bolts, large, 60-10 per cent; small, 60, 10 and 10 per cent; carriage bolts, large, 55-5 per cent; small, 60 and 10 per cent; lag screws, 65-15 per cent; hot pressed nuts, square or hexagon blank \$4; and tapped, \$3.75 off list.

Coke.—There is more buying of coke in this district, and the situation looks much better than it has. Con-

sumers are drawing more heavily on supplies contracted for, and generally more interest is being shown. For the present most of the business is confined to carload orders, and these are for immediate shipment. Between 1000 and 1500 tons of Granite City by-product water gas and furnace coke were booked last week as well as 300 to 400 tons of foundry coke. A cause of increasing interest in coke is the talk of coal miners' strikes. The movement of domestic coke has been far more liberal because of colder weather.

Old Material.—The market for old material remains dull and listless, and there is very little trading of any description even among dealers. Consumers refrain from making any purchases even at what appears to be bargain prices and intimate that until their reserve stocks have been heavily depleted they will remain out of the market. Current railroad offerings include: Great Northern, 7500 tons; Northern Pacific, 2000 tons; Pullman Co., 1000 tons, and Kansas City Terminals 500 tons.

We quote dealer prices for consumers' works, St. Louis industrial district and dealers' yards as follows:

Per Gross Ton	
Old iron rails	\$14.00 to \$14.50
Steel rails, re-rolling	10.50 to 11.00
Steel rails, less than 2 ft.	12.50 to 13.00
Relaying rails, standard section	23.00 to 28.00
Cast iron car wheels	13.50 to 14.00
No. 1 heavy railroad melting steel	10.00 to 10.50
No. 1 heavy shoveling steel	9.75 to 10.00
Ordinary shoveling steel	9.50 to 10.00
Forge, switch and guards, cut apart	10.00 to 10.50
Ordinary bundle sheet	1.00 to 4.50
Cast steel bolsters	9.50 to 10.00

Per Net Ton	
Heavy axles and tire turning	6.00 to 6.50
Iron angle bars	13.00 to 13.50
Steel angle bars	9.00 to 9.50
Iron car axles	18.00 to 18.50
Steel car axles	12.00 to 13.00
Wrought iron arch bars and trapezoids	1.00 to 15.50
No. 1 railroad wrought	9.50 to 10.00
No. 2 railroad wrought	8.50 to 9.00
Railroad springs	10.00 to 10.50
Steel couplers and knuckles	10.00 to 10.50
Locomotive tires, 17 in. and over, smooth inside	8.00 to 8.50
No. 1 dealers' forge	8.00 to 8.50
Cast iron borings	5.50 to 6.00
No. 1 bushings	8.50 to 9.00
No. 1 boilers cut in sheets and tubes	6.00 to 6.50
No. 1 railroad cast	12.00 to 12.50
Stove plate and light cast	11.00 to 11.50
Railroad malleable	8.50 to 9.00
Agricultural malleable	9.00 to 9.50
Pipes and flues	7.50 to 8.00
Heavy railroad sheet and tank	5.50 to 6.00
Light railroad sheet	3.50 to 4.00
Railroad grate bars	9.50 to 10.00
Machine shop turnings	3.00 to 3.50
Country mixed iron	6.00 to 6.50
Unheat railroad mixed	7.00 to 7.50
Horse shoes	9.50 to 10.00
Railroad brake shoes	9.50 to 10.00

Buffalo

BUFFALO, Feb. 14.

Pig Iron.—With radiator interests having contracted for their wants for February and March and possibly well into April, this market has settled into a condition where small business is the rule and none of this extends beyond second quarter delivery. It is generally understood the American Radiator Co. has bought between 25,000 and 35,000 tons from a Buffalo furnace and that \$18 base was the price. No inquiry was sent out on this purchase and verification of the details is not available from either the furnace or the purchaser. Carload lot purchases are freely closed at \$18.50 and \$19, and a furnace which has consistently quoted \$19.50 is not getting any business in consequence. Other than carload lot business the only inquiry out is one for 500 tons of No. 2X for a buyer in New York State outside Buffalo. Buffalo iron is quoted at \$18.50 in any quantity desired. The status of the New York vehicular project is unchanged insofar as Buffalo furnaces are concerned and quotations are made for delivery to the end of June only.

We quote f.o.b. per gross ton Buffalo as follows:

No. 1 foundry, 2.75 to 3.25 sil.	\$19.50 to \$20.00
No. 2X foundry, 2.25 to 2.75 sil.	19.00 to 19.50
No. 2 plain, 1.75 to 2.25 sil.	18.50 to 19.00
Basic	18.00 to 18.25
Malleable	19.50
Lake Superior charcoal	31.75

Finished Iron and Steel.—In the volume of business placed the general situation compares with December, which was unusually quiet. January business held up

surprisingly well when tonnages were finally reckoned. Carload lots and less represent the size of tonnages in demand. With the exception of sheets, prices are irregular, but in the exception noted prices have held up and 3c. is generally quoted. The Lackawanna Bridge Co. will erect two bridges in Tonawanda, N. Y., the total requirements being 300 tons. The same interest has also contracted for a skating rink in Princeton, N. J., requiring 150 tons. Inquiries are out for 500 tons of shapes for use in erecting a school building in Corning, N. Y., and a new bank building at Niagara Falls, N. Y., involving 100 tons.

We quote warehouse prices for Buffalo as follows: Structural shapes, 2.60c.; plates, 2.65c.; No. 8 gage, 2.35c.; soft steel bars and shapes, 2.55c.; hoops and bands, 2.15c.; blue annealed sheet, No. 10 to 24, 3.10c.; galvanized sheet, No. 10 to 24, 3.10c.; flat, No. 28, 1.20c.; cold-rolled strip steel, 2.90c.; cold-rolled round, halfing, 3.40c.

Old Material.—Several lots of 1000 tons and a number of lesser tonnages of heavy melting steel have been bought by a mill interest at \$13.50. The demand for turning and boring from the Youngstown and Pittsburgh districts continues to appear here, but production is so light that little of this business will be placed with Buffalo dealers. A number of foundries interested in the New York vehicular tunnel project are inquiring for cast scrap, but Buffalo dealers quoting \$16 to \$17 on this material have not interested these prospective buyers, who can buy pig iron in the same market for \$18.50 or less.

We quote dealer's average prices per gross ton for Buffalo as follows:

Heavy melting steel	\$13.00 to \$14.00
Lackawanna mill and mill	17.00 to 18.00
No. 1 cold-rolled wrought	15.00 to 16.00
Car wheel	16.50 to 17.50
Machine shop turnings	7.50 to 8.00
Cold iron turnings	7.00 to 8.00
Heavy axle turnings	10.50 to 11.50
Grate bars	12.00 to 13.00
No. 1 bucking	10.00 to 11.00
Stove plate	15.00 to 16.00
Rough sheet, turning	8.00 to 9.00
No. 1 machinery cast	17.00 to 18.00
Hydraulic compressed	10.50 to 11.50
Railroad materials	13.00 to 14.00

Fred J. Waldow, salesman, Rogers, Brown & Co.; Justus Egbert, purchasing agent American Radiator Co., and William J. McClain, district sales agent Republic Iron & Steel Co., announce the formation of a partnership to engage in sales of pig iron, coal, coke, alloys and steel products. The new firm will do a brokerage business.

Cleveland

CLEVELAND, Feb. 14.

Iron Ore.—In the opinion of ore men, some blast furnace interests are looking for greater reductions in ore prices than are likely to be made. Some consumers have been talking of a cut of \$1 or more a ton from last season's prices. The mine operators point out that while labor costs have been reduced, their other mining costs are as high as last year. The largest items of cost in mine operations, outside of labor, are for lumber and coal. Many mining companies, because of curtailment of operations, carried over large stocks of coal last year, so that they are not getting the benefit of lower coal prices. Whatever reductions are made on ore prices will depend largely on what changes are made in transportation charges. Prospects do not seem bright for a reduction in rail rates during the coming ore carrying season, but a 10 per cent cut in the vessel rate on ore is expected. While a large share of the underground mines are now operating in the Lake Superior district, this is not because sellers need the ore, but only to furnish work for the men. Ore stock piles are already unusually large.

We quote delivered lower lake ports: Old range Bessemer, 55 per cent iron, \$6.45; Old range non-Bessemer, 51½ per cent iron, \$5.70; Mesabi Bessemer, 55 per cent iron, \$6.20; Mesabi non-Bessemer, 51½ per cent iron, \$5.55.

Pig Iron.—Furnaces booked a fair number of orders for foundry iron during the week, but in most cases the tonnage involved was small, the largest lots being 300 to 400 tons. One lake furnace sold 4000 tons including three lots of malleable iron aggregating 400

tons. Prices continue to show a weakness on sales to competitive points. One lake furnace is quoting No. 2 foundry iron down to \$18.50 for shipment to points where it must meet competition, but is asking \$19 to \$19.50 for iron for nearby delivery. However, it seems probable that \$18.50 could be shaded. In fact, one sale in the Indiana territory is reported at \$18.25. Present prices on Southern iron have reached a level where they are becoming a factor in competition for shipment to some central and southern Ohio points and probably have some bearing on the weakness of Northern iron. The Detroit, Toledo & Ironton Railroad has announced a 53c. per ton rate reduction on pig iron from Toledo, effective Feb. 20, making the rate to Springfield \$2.13 as compared to \$2.02 from the Ironton district. The Standard Sanitary Mfg. Co. has received quotations on 2000 tons or more of Southern iron for February and March shipment to its Louisville plant and is expected to close for this business to-day. A quotation of \$15.50 has been made on this iron. This company is also understood to be in the market for a round lot of Northern foundry iron for early shipment.

Quotations below are f.o.b. local furnace for Northern foundry iron, not including a 56c. switching charge. Other quotations are delivered Cleveland, being based on a \$1.96 freight rate from Valley points, a \$3.36 rate from Jackson and a \$6.67 rate from Birmingham:

Basic	\$19.71
Northern No. 2 fdy, sil. 1.75 to 2.25	\$19.00 to 20.00
Southern fdy, sil. 1.75 to 2.25	22.17
Old silvery, sil. 8 per cent	32.86
Standard low phosph, Valley furnace	33.00

Semi-Finished Steel.—The demand shows an improvement. A Cleveland mill has placed 800 tons of sheet bars with a Youngstown mill at \$29, and another inquiry for 500 tons is pending. A Cleveland consumer has placed 150 tons of forging billets.

Finished Material.—The improvement in the demand noted last week continues. While few large orders are being placed, mills are getting a moderate volume of business from various industries and reports indicate that manufacturing plants are getting busier. Automobile manufacturers are buying a little more freely. An order from an Ohio automobile plant was for 750 tons of bars. Several small lots of steel were placed by agricultural implement manufacturers. Little change is noted in the price situation. Steel bars, plates and structural material are quoted at 1.40c., Pittsburgh, for desirable orders, with car lot sales being made in many cases at 1.50c. On boiler plates a 1.40c. price has appeared and an Eastern mill that has been quoting these at 1.60c. has reduced its price to 1.50c. for desirable orders. The demand for hot-rolled strip steel has improved and some makers of this steel now have a fair order book. The Trumbull Steel Co. has advanced its price on hot-rolled strip steel to 2c. An automobile parts manufacturer is considering his requirements for the year for the manufacture of tubing which may result in the placing of 9000 tons of strip steel or skelp. The structural outlook continues to improve. Some building projects that were held up last year are being revived and with the approach of spring considerable school building work is coming up in Ohio. An inquiry for approximately 900 tons for the sintering plant for the McKinney Steel Co. plant has come out. Bids have been taken for a municipal power plant in Lansing, Mich., requiring 1500 tons. A building for the Ohio Wesleyan University, Delaware, will require 300 tons. Bids for a Y. M. C. A. building, Columbus, requiring 500 tons, have been rejected and new bids will be taken. A reservoir in Detroit will require 1500 tons of reinforcing bars. Hard steel bars are still quoted at 1.40c., but a round lot inquiry would probably bring out a lower price because of the competition of soft steel bars. The Cleveland Railway Co. is inquiring for 1000 tons of rails.

Jobbers quote steel bars, 2.36c.; plates and structural shapes, 2.46c.; No. 9 galvanized wire, 3.25c.; No. 9 annealed wire, 2.75c.; No. 28 black sheets, 3.75c.; No. 28 galvanized sheets, 4.75c.; No. 10 blue annealed sheets, 3.10c.; hoops and bands, 2.96c.; cold-rolled rounds, 3.25c.; flats, squares and hexagons, 3.75c.

Sheets.—The demand shows a little improvement, but few orders are coming out for more than car lots. The Ford Motor Co. has divided an order for 1500 tons of frame and crank case stock between three mills. Regular prices appear to be holding well.

Bolts and Nuts.—The demand for bolts and nuts shows improvement, but consumers are buying only in small lots. The minimum discounts have virtually disappeared on machine and carriage bolts, but local makers claim they are not shading prices that have been quoted recently as maximum discounts. Prices on machine bolts, cold-punched chamfered and trimmed nuts are lower. Rivets are still in light demand. Local makers are adhering to regular prices, although these are being shaded by some makers \$1 to \$2 a ton.

Alloy Steel.—The demand for alloy steel has improved, some good orders having come from the automotive industry. The United Alloy Steel Corporation, Canton, which is operating five open-hearth furnaces is planning to start additional furnaces. The Central Steel Co., Massillon, has started two additional open hearth furnaces, now operating six of its nine furnaces. Alloy steel prices are fairly firm. Makers quote 3½ per cent nickel steel at 5c.; chrome nickel steel 4c., and chrome vanadium steel 5c. for bars and 4.75c. per lb. for spring steel.

Old Material.—The market is dull and inclined to weakness. The only local activity reported is the purchase of a few small lots of heavy melting steel by a Cleveland consumer at \$13 delivered. In the absence of activity, prices on blast furnace scrap which were recently advanced have declined 25c. a ton. The buying that was expected from the Youngstown district steel plants during February has as yet failed to materialize. There is little demand except for blast furnace scrap. Transactions between local dealers were few during the week as they are well cleaned up on old orders.

We quote per gross ton, each Cleveland, as follows:

Heavy melting steel	\$12.00 to \$12.50
Steel rails, under 3 ft.	12.50 to 13.00
Steel rails, rerolling	11.00 to 11.50
Iron rails	11.00 to 12.50
Iron car axles	18.00 to 19.00
Low phosphorus melting	13.00 to 13.50
Cast borings	9.00 to 9.25
Machine shop turnings	9.00 to 9.25
Mixed borings and short turnings	9.00 to 9.25
Compressed steel	9.00 to 9.50
Railroad wrought	12.00 to 12.50
Railroad malleable	12.50 to 13.00
Light bundled sheet stampings	6.00 to 7.00
Steel axle turnings	9.50 to 10.00
No. 1 cast	15.00 to 16.00
No. 1 bushing	8.75 to 9.00
Drop forge flashings, over 10 in.	9.00
Drop forge flashings, under 10 in.	7.50 to 8.00
Railroad grate bars	12.75 to 13.00
Stove plate	13.00 to 13.25
Pipes and flues	8.50 to 9.00

Interest in Basing Point at Cleveland

The Cleveland Chamber of Commerce has appointed a special committee of seven members on basing points for steel and this committee will at once become very active in investigating the subject, although it has not yet outlined its plan of procedure. The Milwaukee hearing before the Federal Trade Commission on the Pittsburgh basing point practice and the recent complaints of some Cleveland manufacturers against using a Pittsburgh base have tendered to stimulate interest in the subject in Cleveland. Fred L. Borton is chairman of the committee and F. H. Baer, chairman of the Traffic Committee of the Chamber of Commerce, is secretary.

The Youngstown Pressed Steel Co., Warren, Ohio, closely allied with the Sharon Steel Hoop Co., Sharon, Pa., is enlarging its capacity for the production of metal lath, installing additional machinery. With its new layout, manual labor will be reduced to a minimum, various steps in the manufacturing processes being carried forward mechanically.

The Federated American Engineers, including the American Society of Mechanical Engineers and the American Institute of Mining and Metallurgical Engineers, Boston, are to maintain a volunteer employment committee. This committee will endeavor to relieve the unemployment problem among their professions in and about Boston.

Cincinnati

CINCINNATI, Feb. 14.

Pig Iron.—The market was quiet again last week although some sales of Southern iron were reported outside the immediate Cincinnati district. A radiator company is reported to have purchased 1500 tons of Southern iron at \$16 furnace, and a sanitary manufacturing company in Indiana took 500 tons of Southern iron at \$16 furnace base. The delivered price on this iron, which will be shipped by river and rail, is understood to be about \$2 a ton less than if the iron were shipped by the all rail route. An Indiana manufacturer is understood to have purchased 300 tons of 3.75 to 4.25 silicon at a price of \$18.50 Northern furnace. Several other sales of 100 tons each are reported, mostly of Southern iron at a \$15.50 base. The Standard Sanitary Mfg. Co. has an inquiry out for 1500 tons for its Louisville plant and will likely close the deal to-day. It is said that \$15.50 is the lowest price quoted on this inquiry. Other inquiries include one for 400 tons from Anderson, Ind.; one from Mansfield for 100 tons and one of 200 tons from Ft. Wayne. Prices are inclined to be weaker. It is said Chicago iron can now be purchased at \$18 furnace, and Lake iron from \$18 to \$18.50 regardless of silicon content. Southern Ohio furnaces have reduced their prices 50c. a ton and now are quoting \$19 to \$19.50, Ironton. Jackson county furnaces have cut prices on silvery and bessemer ferro-silicon \$2 a ton, effective Feb. 13. This makes 8 per cent silvery, \$27.50 furnace.

Back on freight rate of \$1.00 from Birmingham and

Southern Ohio, silvery, 3.75 to 4.25	21.25 to 22.00
(No. 2)	21.00
Basic, Northern	21.00
Malleable	20.00 to 22.00

Finished Material. An order for 1000 tons of plates is reported to have been placed by a tank manufacturer in this district, who recently secured an order for a large tank to be erected in California. Several 200 ton orders for structural shapes are also reported, but as a general thing inquiries are confined to carload lots and most of the business booked is being done on a single carload basis. There is still a fair demand for concrete reinforcing bars, as a number of small projects taking up to 100 tons are going ahead. The demand for sheets is reported to be picking up slightly, but there is no disposition on the part of buyers to contract ahead, the orders placed being for immediate shipment. Fairly good demand for wire products is reported. Prices on all finished products are ruling about the same as last week, 1.40c. now being the general quotation on bars, shapes and plates, although there is some disposition on the part of a few mills to hold out for 1.50c. Very little is heard of lower prices on sheets and it is said that 2.75c. and 3.75c. for black and galvanized respectively exist only in the imagination of some buyers, all of the orders now being placed are on the 3c. and 4c. base. In the structural field, the only new inquiry to come out was for the Athletic Club at Indianapolis involving between 1500 and 2000 tons. Bids will close on March 1 and it is expected that bids will also be taken on the Wilde Bank Building in the same city at the same time. Plans for this building, however, have not been sent out. The National Cash Register Co. has let the general contract for new buildings at Dayton to the H. K. Ferguson Co. at Cleveland; 250 tons of steel will be used. It is reported that the Belknap Hardware job at Louisville will be up again shortly for bids as some changes are being made in the plans. An auditorium at Memphis will also likely be refigured in the near future. Pending projects include a ten-story building to the Rollman department store in Cincinnati, an office building for the Southern Railroad in the same city and hotel building at Frankfort, Ky. The first two of these will be probably of reinforced concrete construction and the latter of steel. The Big Four Railroad closed bids on its axle requirements for the first quarter. The Standard Forge Co. was low

bidder, car axles being quoted at 2.05c. per lb., engine truck axles at 2.40c. per lb. and drivers and trailers at 3.40c. per lb., f.o.b. Chicago. In regard to plant operations, the East Side works of the American Rolling Mill Co. is running full time and the Newport Rolling Mill Co. has four mills on. The steel and sheet mills of the Ashland Iron & Mining Co. are closed down at the present time, but will likely reopen in two weeks.

Warehouse Business. Local jobbers report business as quiet during the past week. Some orders for wire products, however, are being booked for spring delivery. Local jobbers have at the price on wire nails to \$2.95 per keg base. All other prices are unchanged.

It and elbows, 7c. base, hoops and bands, 3.35c. base, shapes and under 1 1/2 in. and flats, 10c. base, blue annealed sheet, 2 1/2 galvanized sheet, No. 5 annealed wire, \$2.95 per keg b.

Coke.—Some fair-sized orders for prompt shipment coke are reported, two of these being for 600 tons each. The coke market is firming up slightly and some operators have withdrawn prices for nearby shipment. Prices, however, are generally as quoted in last week's report.

Old Material.—The scrap market is quotably weaker and while it is expected that steel companies operating in this district will shortly be in the market for small tonnages, present business is very quiet. Most dealers have marked down their prices on practically all items 50c. per ton. The Norfolk and Western railway is offering 6000 tons.

We quote dealers' buying f.o.b.

	Per Gross Ton	
Bundled sheets	\$3.50 to \$4.00	
Iron rails	11.50 to 12.00	
Relaying rails, 50 lb. and up	24.50 to 25.00	
Revolving steel rails	10.00 to 10.50	
Heavy melting steel	8.50 to 9.00	
Steel rails for melting	8.50 to 9.00	
Car wheels	11.50 to 12.50	
	Per Net Ton	
No. 1 railroad wrought	8.00 to 8.50	
Cast borings	3.00 to 3.50	
Steel turnings	2.00 to 2.50	
Railroad cast	11.50 to 12.00	
No. 1 machinery	13.00 to 13.50	
Burnt scrap	7.00 to 7.50	
Iron axles	15.00 to 15.50	
Locomotive tires (smooth inside)	9.00 to 9.50	
Pipes and flues	3.50 to 4.00	

Rogers, Brown & Co. pig iron and coke merchants have been appointed sole agents for the sale of Tuscaloosa and Warrior pig iron produced at Holt, Ala. The furnace company reserves the right of making sales direct to buyers in Alabama and the adjoining States. All other business will be handled through Rogers, Brown & Co. Tuscaloosa is one of the old popular brands of Southern, high in manganese and low in phosphorus. The Warrior brand is a high manganese specialty.

San Francisco

SAN FRANCISCO, Feb. 8.

Pig Iron.—The dull condition prevailing at the first of the year has not yet been relieved on the Coast. In the San Francisco market, business has been especially trivial during the past 10 days or two weeks, practically no sales of any significance having been reported, although routine buying in small lots is not wanting. Again the Southern Pacific Co. affords the major interest, this road just having closed for 400 tons of 1.75 to 2.25 silicon, 250 tons of 2.25 to 2.75 and 100 tons of standard Bessemer. It is reported that large users have just taken 500 tons of No. 1 foreign iron at Tacoma and 500 tons at San Pedro, the price being very favorable. There are liberal offerings of material here at present, and some large dealers report working on a considerable tonnage of domestic iron, which is approximately on the same basis as foreign. Quotations around \$28 are heard on American pig, for Gulf shipment, delivered here. The foreign iron market appears to be firming, with the strengthening of exchange rates and a tendency of freight rates to advance. In the absence of demand and actual sales, it is difficult to estimate the market accurately.

but prices asked appear to range from about \$27 to \$30 for good grades, ex ship, San Francisco.

Cast Iron Pipe.—Since the moderately good activity of several weeks ago, business in pipe has been quieter, both from municipal and private sources. The market is ruling around \$32 base, with the tendency toward higher levels. The 2000 tons for Portland was recently awarded to the United States Cast Iron Pipe & Foundry Co. Bids which the city of Seattle received for 2143 tons have been rejected, and it is reported it will readvertise about the end of the present month. Glendale, Cal., is asking for bids on Feb. 9 for 300 tons of 4-in. pipe, and San Bernardino the following day for 77 tons. Santa Barbara on Feb. 11 will be in the market for 30 tons.

Finished Iron and Steel.—It is a dull situation which is to be reported in this district, about the only feature being a moderate demand in small quantities for mixed materials. Prices seem to be holding pretty well, but there is no assurance of stability, except as at present, when demand is virtually absent. The larger producers are looking for a betterment in the following two or three months, but nothing large is foreseen at this time. There is fair prospect for building operations around San Francisco, which will mean a fair demand for bars. Seattle is reported inquiring in this market for 1000 tons of low range section girder rails. The Southern California Edison Co.'s contract for from 1100 to 1200 tons of hammered welded pipe was reported awarded to an Eastern fabricator.

Coke.—A steady consumption of coke in this district is reported, the main demand coming from smelters, since foundry operations are on such a narrow, hand-to-mouth basis. A considerable quantity of English material is loading and some is en route. Stocks in consumers' hands here generally are low.

Old Material.—Buying has been active in scrap of late, but this does not indicate a revival of foundry operations. A large quantity of railroad accumulation was disposed of at the prevailing market of \$10 a gross ton for heavy melting steel, delivered at the consumer's mill. Around 12,000 tons was taken by various interests. Most users, accordingly, are heavily stocked with scrap at present. Moreover, about 6000 tons of steel and cast scrap will be offered from the old cruiser Brooklyn, which is to be dismantled. The Pacific Coast Steel Co. will start up its open-hearth furnace March 1, which has been idle since last June. This is necessitated by the accumulation of ingots being exhausted.

British Pig Iron and Steel Output for January

LONDON, ENGLAND, Feb. 14 (By Cable).

The production of pig iron in Great Britain in January was 288,000 gross tons and that of steel ingots and castings 327,500 tons. These compare with an output of 275,000 tons of pig iron and of 381,000 tons of steel in December. The January pig iron is the largest since last March. The steel output is the lowest in six months.

The United States Malleable Iron Co., Toledo, Ohio, is reported to have received a large number of orders for malleable castings which will permit it to increase its present operating force during February from 150 to 650 men. It will also resume operations in its Wauseon, Ohio, plant with a force of about 175 employees.

There are now 95 Bailly electric furnaces for melting non-ferrous metals and alloys and 34 Bailly electric heat-treating furnaces operating in the United States and Canada, according to the January issue of *Electric Furnace News*, published by the Electric Furnace Co., Salem, Ohio.

The National Safety Congress held annually under the auspices of the National Safety Council, the headquarters of which are in Chicago, will meet in Detroit the week beginning Aug. 28. The Safety Council of Detroit Board of Commerce has started to make preparations and a large attendance is expected.

British Iron and Steel Market

Steel Consumers Awaiting Price Concessions —
Tin Plate Makers Expect Lower
Steel—Coke Is Higher

(By Cable)

LONDON, ENGLAND, Feb. 14.

PIG iron sales are increasing and traders are now more confident of the commencement of a genuine revival. Practically all production of Cleveland iron is going into consumption. Hematite is firmer; makers are well booked up and there is a fair demand from the Continent.

Best Bilbao Rubio is sold up to 26½s. (\$5.78) ex-ship Tees, an advance of 1s. (22c.) over last week.

Continental inquiries are coming in for foundry coke. Durham blast furnace coke is dearer.

India is inquiring for 15,000 tons of steel plates, delivery to be distributed over two years. The steel business generally is quieter; consumers are still awaiting price reductions.

Finished iron is cheaper. Crown iron bars are offered at £11 (2.14c. per lb.) f.o.b. Staffordshire. Marked bars are held at £14 10s. (2.82c. per lb.).

Continental quotations are slightly harder. French merchant bars are held at £8 15s. (1.70c. per lb.) f.o.b., for April and May delivery. Luxemburg merchant bars are offered at £8 to £8 5s. (1.56 to 1.61c. per lb.) for April and May shipment. Luxemburg structural shapes are quoted at £7 10s. to £7 15s. (1.46 to 1.51c. per lb.) f.o.b., for April and May delivery.

Belgian wire rods are held at £9 to £9 15s. (\$39.24 to \$42.51) f.o.b., April and May shipment. French wire rods are offered at £9 10s. (\$41.42) f.o.b., for May and June delivery. German 3/16-in. plates are quoted at £7 15s. (1.51c. per lb.) f.o.b. for June and July shipment.

Continental foundry iron is offered at £5 5s. (\$22.89).

Tin plate is weaker. Makers are selling in anticipation of a reduction in steel prices. Stock 14 x 20 in. are being sold at 18½s. (\$4.03) f.o.b., for February and March shipment; 250,000 boxes of oil sizes have been placed in Wales at 18¾s. (\$4.09 basis, f.o.b.).

Galvanized sheets are being sold to Argentina at £16 5s. (3.16c. per lb.) f.o.b., in cases. Australia has bought some small lines at £15 15s. (3.07c. per lb.) f.o.b. Japan 67's are being sold at £23 (4.48c. per lb.) f.o.b.

India has bought black sheets at £12 15s. (2.48c. per lb.) f.o.b., basis 24 gage. France is paying £12 10s. to £13 (2.13 to 2.53c. per lb.) f.o.b. Japan 33's for galvanizing have been sold at £15 15s. to £16 (3.07 to 3.11c. per lb.) f.o.b.

We quote per gross ton, except where otherwise stated, f.o.b. maker's works, with American equivalent figured at \$1.36 per £1 as follows.

Durham coke delivered	11 8s	\$6 10
Cleveland No. 1 foundry	4 1½	20 71
Cleveland No. 2 foundry	4 10	19 62
Cleveland No. 3 foundry	4 7½	19 07
Cleveland No. 4 foundry	4 10	19 62
Cleveland basic	4 10	19 62
Hematite	4 0*	30 5*
East Coast mixed	4 1½ to 4 15	20 16 to 20 71
Portsmouth, Chinese	15 0 & 11 10*	65 40 & 63 22*
Rails, 60 lb. and up	8 0 to 9 10	31 88 to 31 42
Billets	7 0 to 7 10	30 52 to 32 70
Sheet and tin plate bars		
Welsh	7 0 to 7 7½	31 61 to 32 15
Tin plates, base box	0 18½ to 0 19	1 03 to 1 14
		(^c per lb.)
Ship plates	9 0 to 10 10	1 75 to 2 04
Boiler plates	11 10 to 14 0	3 13 to 2 72
Tees	9 10 to 11 0	1 85 to 2 14
Channels	8 1½ to 10 5	1 70 to 1 99
Beams	8 5 to 10 0	1 61 to 1 95
Round bars, ¾ to 3 in.	10 10	2 04
Galvanized sheets, 24 g.	15 1½ to 16 0	3 01 to 3 11
Black sheets	12 10 to 13 0	2 13 to 2 53
Steel hoops	12 0 & 12 0*	2 34 & 2 38*
Cold rolled steel strip, 20 g.	23 10	4 57

*Export price

MODERATE IMPROVEMENT

Youngstown Mills Report Better Buying, Especially of Lighter Lines

YOUNGSTOWN, Feb. 14.—Moderate improvement in buying of steel products, principally affecting the lighter lines, is noted. The Ford Motor Co. and Dodge Brothers are entering the market for larger sheet requirements, against broadened production schedules. Actual buying of sheets, however, is still restricted.

Valley furnace interests are attempting to hold to an \$18 minimum on standard basic pig iron, despite the sale of a 1000-ton lot at \$17.75 by a Valley interest. One of the larger independents appraises the market at \$18 to \$18.25, depending upon size of the order and other special considerations. Aside from the regular buying by non-integrated interests, there is comparatively little activity in the iron market.

Wire products, particularly nails, are moving with more freedom, jobbers being important factors in the market. Such schedules show some pickup over previous weeks. The principal district independent states it is adhering to quotations of 2.25c. on plain wire and \$2.50 per base keg on nails, though concessions to large buyers are reported. Buying of nails has been stimulated by seasonal requirements.

Reports of Concessions on Sheets

Valley sheet makers are still following up reports of concession prices in sheets, and say that while quotations have been shaded elsewhere, they are holding firm in this district. In fact, one buying interest, which did considerable shopping to uncover a concession on a moderate tonnage, states that the market in the Valley is tight, and there appears to be a firm disposition on the part of producers to hold prices.

Placement of sheet business is confined to 25, 50 and 100-ton lots in the main. All interests are hopeful, however, that the month will bring out tonnage in sufficient volume to appreciably accelerate production.

Despite the fact that buying in finished lines, with possible exception of tin plate, lacks sustaining influence, railroads report that shipments of steel products from Valley mills are expanding. During the first six days of February, the Ohio region of the Erie Railroad handled 4456 loaded cars per day, as compared with an average daily movement in January of 3843 cars and 3371 cars per day in February, 1921.

The Franklin division of the New York Central System, handling tonnage from the Valleys, reports that it is moving 200 more cars per day than last year's average at this time. Shipments are running to pipe, tin plate, sheets and coke oven by-products.

Inquiry for 1700 Tons of Sheets

An inquiry for a mixed lot of blue annealed, black and galvanized sheets involving 1700 tons, put forth by the Ford company, has made its appearance in this district.

Plate makers at Youngstown will benefit through a fabricating-in-transit rate on steel plates shipped to Sharon, Pa., fabricators, chiefly builders of steel cars and tanks. When this rate is finally approved, Youngstown plate interests will be enabled to ship their product to Sharon plants for working into cars and tanks at a rate based on the through rates from Youngstown to points of delivery for the completed product.

This will enable makers at Youngstown to compete on a more favorable basis with important plate interests in the East, which have heretofore enjoyed a rate advantage in this respect. Youngstown producers have been virtually shut out of the Sharon and Masury markets for some time by reason of this inequality.

NON-FERROUS METALS

The Week's Prices

	Copper, New York, Strait						Zinc	
	Electro	Refined	New York	St. Louis	New York	St. Louis	New York	St. Louis
Feb. 8	13.60	13.50	13.50	13.50	13.50	13.50	4.50	4.50
9	13.50	13.40	13.40	13.40	13.40	13.40	4.50	4.50
10	13.50	13.40	13.40	13.40	13.40	13.40	4.50	4.50
11	13.50	13.40	13.40	13.40	13.40	13.40	4.50	4.50
12	13.50	13.40	13.40	13.40	13.40	13.40	4.50	4.50
13	13.50	13.40	13.40	13.40	13.40	13.40	4.50	4.50
14	13.50	13.40	13.40	13.40	13.40	13.40	4.50	4.50
15	13.50	13.40	13.40	13.40	13.40	13.40	4.50	4.50
16	13.50	13.40	13.40	13.40	13.40	13.40	4.50	4.50
17	13.50	13.40	13.40	13.40	13.40	13.40	4.50	4.50
18	13.50	13.40	13.40	13.40	13.40	13.40	4.50	4.50
19	13.50	13.40	13.40	13.40	13.40	13.40	4.50	4.50
20	13.50	13.40	13.40	13.40	13.40	13.40	4.50	4.50
21	13.50	13.40	13.40	13.40	13.40	13.40	4.50	4.50
22	13.50	13.40	13.40	13.40	13.40	13.40	4.50	4.50
23	13.50	13.40	13.40	13.40	13.40	13.40	4.50	4.50
24	13.50	13.40	13.40	13.40	13.40	13.40	4.50	4.50
25	13.50	13.40	13.40	13.40	13.40	13.40	4.50	4.50
26	13.50	13.40	13.40	13.40	13.40	13.40	4.50	4.50
27	13.50	13.40	13.40	13.40	13.40	13.40	4.50	4.50
28	13.50	13.40	13.40	13.40	13.40	13.40	4.50	4.50
29	13.50	13.40	13.40	13.40	13.40	13.40	4.50	4.50
30	13.50	13.40	13.40	13.40	13.40	13.40	4.50	4.50

*Refined by Electrolysis

New York

NEW YORK, Feb. 14.

All the markets except lead are exceedingly inactive. Demand for copper does not improve and that for tin is brisk one day and lacking the next. Demand for lead continues steady and so do prices. Buying of zinc has not improved but quotations are stationary. Yesterday, Feb. 13, the markets were all closed in observance of Lincoln's birthday.

Copper.—Conditions which prevailed in this market in July, August and September have reappeared, in that there is a marked tendency on the part of dealers and speculators, as well as small producers, to liquidate their stocks. In some cases this has been necessary by the 10th of the month and in other cases before the end of the month, and has resulted in the offering of the market down until quotations have gradually declined again in the past week. Electrolytic copper for February-March delivery is quoted as low as 13.25c., delivered, or 13c., refinery. The amount available is not large but is apparently sufficient to meet the small buying power. Large producers, although they have somewhat modified their minimum selling prices, will not meet these low quotations and it is difficult to buy from those sources at less than 13.50c., delivered.

Tin.—With the exception of one day the market for Straits tin has been dull and uninteresting. On Friday, Feb. 10, however, consumers were buyers, and sales, estimated up to 600 tons and mostly future shipment, are reported to have been made. Following the holiday yesterday the market was quiet to-day and spot Straits tin was quoted at 30.75c., New York, quotations having declined gradually almost daily in the last week. London prices were also lower to-day by nearly £4 per ton than a week ago, with spot standard quoted at £152, future standard at £153 15s. and spot Straits at £154 10s. Arrivals thus far this month have been 1600 tons, with 8060 tons reported afloat.

Lead.—Demand and production continue to flow in the steady stream which has characterized this market for so many weeks. As a consequence there has been no reason to elevate or depress prices. The leading interest continues to quote 4.70c., New York and St. Louis, and the outside market continues unchanged at 4.40c., St. Louis, or 4.70c. to 4.75c., New York and Eastern points, all for early or 30-day delivery.

Zinc.—There has been no change in the market for prime Western zinc either for the better or for the worse and quotations remain fairly firm at 4.50c., St. Louis, or 4.85c., New York, for early delivery. This price was slightly shaded on one or two days last week, but otherwise the market is steady and demand is still confined to small lots for early delivery. Interest continues keen in the possibility of exports to England, opinion in some quarters being optimistic and in others to the contrary.

Antimony.—The market is quiet and wholesale lots for early delivery are quoted at 4.40c., New York, duty paid.

Aluminum.—Virgin metal, 98 to 99 per cent pure, in wholesale lots for early delivery, is quoted at 19c. to 19.10c. per lb., f.o.b. plant, depending on the quantity, by the leading producer and importations of the same grade are quoted at 17c. to 18c., New York, duty paid.

Old Metals.—The market continues very sluggish with a little easing off of prices. Dealers' selling prices are as follows:

	Cents Per Lb.
Copper, heavy and crucible	13.00
Copper, heavy and wire	12.00
Copper, light and bottoms	9.00
Heavy machine composition	10.00
Brass, heavy	7.50
Brass, light	5.75
No. 1 red brass or composition turnings	8.00
No. 1 yellow red brass turnings	6.00
Lead, heavy	4.25
Lead, tea	3.25
Zinc	3.00

Chicago

FEB. 14.—In a quiet market tin and spelter have declined. The weakness in tin is accounted for by the large tonnage hanging over the market which has been held for over a year by the Federated Malay States and the Dutch Government respectively, their joint holdings being estimated at 14,000 tons. Naturally the trade is beginning to wonder when this unsold tonnage will be forced on the market. We quote in carload lots: Lake copper, 13.50c.; tin, 32.50c. to 33c.; lead, 4.50c.; spelter, 4.55c. to 4.60c.; antimony, 6.50c., in less than carload lots. On old metals we quote: Copper wire, crucible shapes and copper clips, 9.50c.; copper bottoms, 7.50c.; red brass, 7.50c.; yellow brass, 6c.; lead pipe, 3.25c.; zinc, 2c.; pewter, No. 1, 22c.; tin foil, 23c.; block tin, 25c.; all buying prices for less than carload lots.

St. Louis

FEB. 14.—Lead and zinc are unchanged. We quote lead, car lots, at 4.35c. to 4.40c.; slab zinc, 4.52½c. to 4.65c. On old material we quote: Light brass, 3.50c.; heavy yellow brass and light copper, 7c.; heavy copper and copper wire, 7.50c.; pewter, 15c.; tin foil, 16c.; tea lead, 2c.; aluminum, 9c.

Manganiferous Iron Ores Leaflets

An interesting leaflet on manganiferous iron ores has been published by Clement K. Quinn & Co., miners and shippers of iron ores, Duluth and Cleveland. Four definite assertions as to the effect of manganese in the blast furnace and open-hearth furnace are made as follows:

- (1) High manganese iron is a help rather than a hindrance in blast furnace practice
- (2) High manganese iron improves the quality of open-hearth steel without reduction of tonnage or practice or other injurious effects.
- (3) High manganese iron is of a very great assistance in meeting the demands for the better grades of steels, alloy steels, etc.
- (4) Due to better surface conditions steel made from high manganese iron shows increased yields with ordinary rolling mill practice.

It is also urged that increasingly high sulphur fuels are making it more difficult for steel manufacturers to meet sulphur requirements and specifications without additional cost and it is urged that manganese is the answer. Various other benefits to be derived from the use of manganese are given.

The engineering association of the school of Liege, Belgium, will conduct a scientific congress on June 11 to 16 on the occasion of the seventy-fifth anniversary of the foundation of the school. The congress will comprise seven sections; mines, metallurgy, mechanical engineering, electricity, chemical industries, civil engineering and geology. The secretary-general of the association is O. Lepersonne, 16 Quai des Etats-Unis, Liege, Belgium. Circulars are available covering the questions which will be taken up by each section.

Herbert DuPuy, formerly chairman, Crucible Steel Company of America, on Feb. 10, filed a second suit against the company, claiming \$117,487.50 as the amount due him under a deferred compensation and bonus plan.

Prices Finished Iron and Steel, f.o.b. Pittsburgh

Freight Rates

Freight rates from Pittsburgh on finished iron and steel products, in carload lots, to points named, per 100 lb., are as follows:

Philadelphia, domestic.....	\$0.36	Kansas City.....	\$0.81
Philadelphia, export.....	0.26	Kansas City (pipe).....	0.77
Baltimore, domestic.....	0.35	St. Paul.....	0.66
Baltimore, export.....	0.25	Omaha.....	0.81
New York, domestic.....	0.38	Omaha (pipe).....	0.77
New York, export.....	0.28	Denver.....	1.33
Boston, domestic.....	0.105	Denver (wire products).....	1.11
Boston, export.....	0.28	Pacific Coast.....	1.65
Buffalo.....	0.29	Pacific Coast ship plates.....	1.33
Cleveland.....	0.24	Birmingham.....	0.76
Detroit.....	0.32	Jacksonville, all rail.....	0.55
Indianapolis.....	0.32	Jacksonville, rail and water.....	0.16
Indianapolis.....	0.34	New Orleans.....	0.51
Chicago.....	0.38		
St. Louis.....	0.47		

The minimum carload to most of the foregoing points is 36,000 lb. To Denver the minimum loading is 10,000 lb., while to the Pacific Coast on all iron and steel products, except structural material, the minimum is 30,000 lb. On the latter item the rate applies to a minimum of 30,000 lb., and there is an extra charge of 9c per 100 lb. on carloads of a minimum of 40,000 lb. On shipments of wrought iron and steel pipe to Kansas City, St. Paul, Omaha and Denver the minimum carload is 46,000 lb. On iron and steel items not noted above the rates vary somewhat and are given in detail in the regular railroad tariffs.

Rates from Atlantic Coast ports (i.e., New York, Philadelphia and Baltimore) to Pacific Coast ports of call on most steamship lines, via the Panama Canal, are as follows: Pig iron, 50c.; ship plates, 75c.; ingot and muck bars, structural steel, common wire products, including cut or wire nails, spikes and wire hoops, 75c.; sheets and tin plates, 60c. to 75c.; rods, wire rope, cable and strands, \$1. wire fencing, netting and stretcher, 75c.; pipe, not over 8 in. in diameter, 75c.; over 8 in. in diameter, 25c. per in. or fraction thereof additional. All prices per 100 lb. in carload lots, minimum 40,000 lb.

Structural Material

I-beams, 3 to 15 in.; channels, 3 to 15 in.; angles, 3 to 6 in., on one or both legs, 1/4 in. thick and over, and zees, structural sizes, 1.40c. to 1.60c.

Sheared plates, 1/4 in. and heavier, tank quality, 1.10c. to 1.50c.

Wire Products

Wire nails, \$2.10 to \$2.50 base per keg, galvanized, 1 in. and longer, including large-head barbed roofing nails, taking an advance over this price of \$1.25 and shorter than 1 in., \$1.75, bright Bessemer and basic wire, \$2.15 to \$2.25 per 100 lb.; annealed fence wire, Nos. 6 to 9, \$2.15 to \$2.25, galvanized wire, \$2.65 to \$2.75; galvanized barbed wire, \$3.00 to \$3.15, galvanized fence staples, \$3.00 to \$3.15, painted barbed wire, \$2.55 to \$2.65, polished fence staples, \$2.55 to \$2.65, cement-coated nails, per count keg, \$1.90 to \$2.00; these prices being subject to the usual advances for the smaller trade, all f.o.b. Pittsburgh, freight added to point of delivery, terms 60 days, net, less 2 per cent off for cash in 10 days. Discounts on woven-wire fencing are 7 1/2 per cent off list for carload lots, 6 1/2 per cent for 1000-foot lots, and 6 1/2 per cent for small lots, f.o.b. Pittsburgh.

Bolts and Nuts

Machine bolts, small, rolled threads, 70, 10 and 10 per cent off list
Machine bolts, small, cut threads, 70 and 10 per cent off list
Machine bolts, larger and longer, 70 and 10 per cent off list
Carriage bolts, 3/4 in. x 6 in.:

Smaller and shorter rolled threads, 70 and 10 per cent off list
Cut threads, 70 per cent off list
Longer and larger sizes, 70 per cent off list
Lag bolts, 70, 10 and 10 per cent off list
Plow bolts, Nos. 1, 2 and 3 heads, 60 and 10 per cent off list

Other style heads, 20 per cent extra
Machine bolts, c.p.c. and t. nuts, 3/4 in. x 4 in.:

Smaller and shorter, 65, 10 and 10 per cent off list
Larger and longer sizes, 65 and 10 per cent off list
Hot pressed sq. or hex. blank nuts, \$5.50 off list
Hot pressed nuts, tapped, \$5.25 off list
C.p.c. and t. sq. or hex. blank nuts, \$5.25 off list
C.p.c. and t. sq. or hex. blank nuts, tapped, \$5.00 off list
Semi-finished hex. nuts:

1/4 in. to 9/16 in. inclusive, 80, 10 and 10 per cent off list
Small sizes S. A. F., 80, 10 and 10 per cent off list
3/4 in. to 1 in. inclusive, U. S. S. and S. A. F., 70, 10, 10 and 10 per cent off list

Stove bolts in packages, 80, 10 and 5 per cent off list
Stove bolts in bulk, 80, 10 and 7 1/2 per cent off list
Tire bolts, 65, 10 and 10 per cent off list
Track bolts, carloads, 3c. to 3.25c. base
Track bolts, less than carloads, 4c. to 4.25c.

Upset and Hex. Head Cap Screws

1/4 in. and under, 80 and 10 to 80, 10 and 10 per cent off list
9/16 in. to 1 in. inclusive, 80 and 10 to 80, 10 and 10 per cent off list

Upset Set Screws

1/4 in. and under, 80, 10 and 5 to 85 per cent off list
9/16 in. to 1 in. inclusive, 80, 10 and 5 to 85 per cent off list

Milled Square and Hex. Cap Screws

All sizes, 75 and 10 to 80 per cent off list

Milled Set Screws

All sizes, 70, 10 and 10 per cent off list

Rivets

Large structural and ship rivets, \$2.25
Large boiler rivets, 2.35
Small rivets, 10, 10 and 10 to 10, 10, 10 and 5 per cent off list

Wire Rods

No. 5 common basic or Bessemer rods to domestic consumers, \$36 to \$41, chain rods, \$36 to \$37, screw stock rods, \$41 to \$42, rivet and bolt rods and other rods of that character, \$36 to \$42, high carbon rods, \$43 to \$49, depending on carbons.

Railroad Spikes and Track Bolts

Railroad spikes, 3 1/2 in. and 4 in., \$2.15 to \$2.20 base per 100 lb. in lots of 200 kg. or 60 lb. each or more; spikes, 1 1/2 in., 3 1/2 in. and 4 1/2 in., \$2.20 to \$2.30 base, 3 1/2 in., \$2.25 to \$2.30 base, 4 in. and 4 1/2 in. base spikes, \$2.20 to \$2.30 base per 100 lb. in carload lots of 200 kg. or more, f.o.b. Pittsburgh. Track bolts, 3/4 to 1 in. base per 100 lb. The plates, \$2 per 100 lb. Angle bars, \$1.20 per 100 lb.

Terne Plates

Prices of terne plates are as follows: 8-lb. coating, 200 lb., \$9.30 per package; 8-lb. coating, 1 C., \$9.60; 15-lb. coating, 1 C., \$11.80; 20-lb. coating, 1 C., \$13; 25-lb. coating, 1 C., \$14.25; 30-lb. coating, 1 C., \$15.25; 35-lb. coating, 1 C., \$16.25; 40-lb. coating, 1 C., \$17.50 per package, all f.o.b. Pittsburgh, freight added to point of delivery.

Iron and Steel Bars

Steel bars, 1 in. to 4 in. diam. and 1/2 in. to 2 in. diam., 2c. to 2.10c.

Welded Pipe

The following discounts are to jobbers for carload lots on the Pittsburgh basis card.

Butt Weld			Iron		
Inches	Steel	Galv.	Inches	Black	Galv.
1 1/2	51 1/2	28	1 1/2	3 1/2	+22 1/2
1 1/2 to 3/4	60	33 1/2	1 1/2	3 1/2	18 1/2
3/4	61	34 1/2	1 1/2	4 1/2	27 1/2
3/4 to 1	69	36 1/2	1 1/2	4 1/2	29 1/2
1 to 3	71	38 1/2			

Lap Weld			Lap Weld		
Inches	Steel	Galv.	Inches	Black	Galv.
2 1/2	61	51 1/2	2 1/2	29 1/2	25 1/2
2 1/2 to 6	68	55 1/2	2 1/2 to 6	42 1/2	29 1/2
6 to 8	65	51 1/2	7 to 12	40 1/2	27 1/2
8 to 12	61	50 1/2			

Butt Weld, extra strong, plain ends			Butt Weld, extra strong, plain ends		
Inches	Steel	Galv.	Inches	Black	Galv.
1 1/2	50 1/2	33	1 1/2	+4 1/2	+37 1/2
1 1/2 to 3/4	56	38 1/2	1 1/2	3 1/2	23 1/2
3/4	62	50 1/2	3/4	42 1/2	28 1/2
3/4 to 1	67	55 1/2	1 to 1 1/2	44 1/2	30 1/2
1 to 1 1/2	69	57 1/2			
2 to 3	70	58 1/2			

Lap Weld, extra strong, plain ends			Lap Weld, extra strong, plain ends		
Inches	Steel	Galv.	Inches	Black	Galv.
2 1/2	62	50 1/2	2 1/2	40 1/2	27 1/2
2 1/2 to 4	66	54 1/2	2 1/2 to 4	43 1/2	31 1/2
4 1/2 to 6	69	57 1/2	4 1/2 to 6	42 1/2	30 1/2
7 to 8	61	47 1/2	7 to 8	39 1/2	23 1/2
9 to 12	59	41 1/2	9 to 12	30 1/2	18 1/2

To the large jobbing trade the above discounts are increased by one point, with supplementary discounts of 5 and 2 1/2 per cent.

Boiler Tubes

The following are the discounts for carload lots f.o.b. Pittsburgh:

Lap Welded Steel		Charcoal Iron	
Inches	Discount	Inches	Discount
1 1/2 in.	26 1/2	1 1/2 in.	5
2 to 2 1/2 in.	41	1 1/2 to 1 3/4 in.	15
2 1/2 to 3 in.	52	2 to 2 1/4 in.	25
3 1/4 to 13 in.	57	2 1/2 to 3 in.	30
		3 1/4 to 4 1/2 in.	32

To large buyers of steel tubes a supplementary discount of 5 per cent is allowed.

Standard Commercial Seamless Boiler Tubes

New discounts have been adopted on standard commercial seamless boiler tubes, but manufacturers are not yet ready to announce them for publication, and for that reason we publish no discounts this week.

Sheets

Prices for mill shipments on sheets of standard gage in carloads, f.o.b. Pittsburgh, follow:

Blue Annealed		Blue Annealed	
No.	Cents per Lb.	No.	Cents per Lb.
No. 8 and heavier	2.20	No. 11 and 12	2.30
No. 9 and 10 (base)	2.25	No. 13 and 14	2.35
		No. 15 and 16	2.45

Box Annealed, One Pass Cold Rolled

Cents per Lb.		Cents per Lb.	
No.	Cents per Lb.	No.	Cents per Lb.
Nos. 17 to 21	2.80	No. 28 (base)	3.00
Nos. 22 to 24	2.85	No. 29	3.10
Nos. 25 and 26	2.90	No. 30	3.20
No. 27	2.95		

Galvanized

Cents per Lb.		Cents per Lb.	
No.	Cents per Lb.	No.	Cents per Lb.
Nos. 10 and 11	3.00	Nos. 25 and 26	3.70
Nos. 12 to 14	3.10	No. 27	3.85
Nos. 15 and 16	3.25	No. 28 (base)	4.00
Nos. 17 to 21	3.40	No. 29	4.25
Nos. 22 to 24	3.55	No. 30	4.50

Tin-Mill Black Plate

Cents per Lb.		Cents per Lb.	
No.	Cents per Lb.	No.	Cents per Lb.
Nos. 15 and 16	2.80	No. 28 (base)	3.00
Nos. 17 to 21	2.85	No. 29	3.05
Nos. 22 to 24	2.90	No. 30	3.05
Nos. 25 to 27	2.95	Nos. 30 1/2 and 31	3.10

PERSONAL

William J. Morris, for many years assistant treasurer Youngstown Sheet & Tube Co., Youngstown, Ohio, has been elected treasurer, succeeding Richard Garlick, resigned because of ill health. Mr. Garlick had been treasurer virtually since the formation of the company in 1900. He continues on the board of directors. For the past few years Mr. Morris has been practically acting treasurer. Walter E. Meub, secretary of the company and assistant to President James A. Campbell, was elected assistant treasurer. Mr. Garlick is now in the south with his family.

L. A. Lenhart, vice president and general manager Youngstown Steel Car Co., Niles, Ohio, was added to the board of directors at the annual stockholders' meeting, Feb. 7. Other directors are: James A. Campbell, A. E. Adams, George F. Alderdice, R. E. Cornelius, U. C. DeFord, L. B. McKelvey, Porter Pollock, William Wilkoff, D. J. Wilkoff and L. C. Wilkoff.

Robert A. McDonald, for a number of years manager, Crescent Works, Crucible Steel Company of America, Pittsburgh, has been promoted to the position of general superintendent of all plants of the company, with headquarters in New York.

Charles Russ Richards, dean of the College of Engineering and director of the Experimental Engineering Department at the University of Illinois, has been elected president of Lehigh University, Bethlehem, Pa. Mr. Richards succeeds Dr. Henry S. Drinker, who retired more than a year ago to become president emeritus. Mr. Richards was born in Clarksville, Ind., March 23, 1871. He received his bachelor's degree in mechanical engineering from Purdue University in 1890 and the following year his master's degree, continuing his post-graduate studies at Cornell University. For several years he was instructor of mechanical engineering at Colorado Agricultural College, in later years becoming associate dean of the Industrial College in charge of all engineering. In 1907 he was chosen dean of the College of Engineering. In 1909 he went to the University of Nebraska and in 1917 to University of Illinois.

Col. James Milliken has been elected president of the Pittsburgh Testing Laboratory, Pittsburgh, succeeding George H. Clapp, who remains with the organization as a member of the board of directors. Colonel Milliken, during the war, was assistant to S. M. Felton, of the Railroad Administration, and was active in the designing, construction and shipment of railroad equipment to France.

Bradley Stoughton, formerly secretary of the American Institute of Mining and Metallurgical Engineers, was elected president of the Yale Engineering Association at the annual meeting on Feb. 2.

Albert H. Whipple, superintendent of the Whitin Machine Works, Whitinsville, Mass., recently received a 50-year service pin from the company. Mr. Whipple entered the employ of the Whitin company in January, 1872, as an apprentice and has had an unbroken service record ever since.

Louis F. Vonier, Milwaukee, who resigned recently as sales engineer Federal Bridge & Structural Co., Waukesha, Wis., has been appointed district representative for Wisconsin of the National Pressed Steel Division, Central Steel Co., Massillon, Ohio, and has established headquarters at 412 Matthews Building, Milwaukee.

Frederick K. Vial, chief engineer Griffin Wheel Co., Chicago, and consulting engineer for the Association of Manufacturers of Chilled Car Wheels, will represent the last named organization at the convention of the International Railway Association at Milan, Italy, April 18 to 30. This will be the first meeting of the International Association to be held since 1910. This body

ordinarily convenes every five years, but the last meeting, which was scheduled to take place at Berlin in 1915, was abandoned for obvious reasons.

Herman A. Zannoth, Detroit, connected with the Cadillac Motor Car Co. of that city for the past nineteen years, has been appointed plant manager of the company's new works on Clark Avenue.

F. N. Arbaugh, of Lansing, Mich., has been elected president of the Auto Body Co., of Lansing, one of the largest companies of its kind in the Middle West.

Albert U. Widman has been made manager of manufacturing for the Cadillac Motor Car Co., Detroit, succeeding George H. Layng, resigned.

The American Spring & Mfg. Corporation, Holly, Mich., has elected C. J. Lane president. Other officers are: vice president, R. D. Tobin; secretary, treasurer and general manager, E. A. Hartz.

James F. Finneran, secretary and treasurer Northway Motors Corporation, Boston, has resigned. William W. Caswell takes his place. James F. Cavanagh has resigned as president to become chairman of the board of directors. Ralph E. Northway, formerly vice-president, has been made president and general manager.

F. M. Germane has been elected a director and vice-president of the Gilliam Mfg. Co., Canton, Ohio, and will have charge of the sales of the company's line of taper bearings. He was for many years associated with the former Standard Roller Bearing Co., Philadelphia.

D. W. Pratt of the Philadelphia office, the United States Cast Iron Pipe & Foundry Co., has been appointed sales agent in Kansas City territory at an office just established at 604 Interstate Building, Kansas City, Mo.

H. H. Hines has been appointed Toronto agent for the Consolidated Steel Corporation, succeeding Allan Hills, who has resigned.

Business in Refractories Restricted

PITTSBURGH, Feb. 13.—Purchases of refractories still are of a size sufficient only to meet actual requirements of buyers. There is absolutely no disposition on the part of the iron and steel industry to stock up at present and, indeed, there are numerous instances where the order is considerably smaller than the known needs of the purchaser. Fire clay brick seems to be finding a better sale than silica brick. No important change in prices is noted. Occasional instances come to light of Pennsylvania makers of fire clay brick going as low as \$30 per 1000, f.o.b. works, on high duty brick, and the claim is made by buyers that they have had quotations of \$28 per 1000, f.o.b. works, on Pennsylvania silica brick. These prices are about \$2 per 1000 below the general market quotation and in the case of fire clay brick it was stated that there being no close observance of standard specifications, some makers might offer as high duty grade, brick not coming quite up to standard.

We quote per 1000 f.o.b. works:

Fire Clay	High Duty	Moderate Duty
Pennsylvania	\$32.00 to \$35.00	\$30.00 to \$32.00
Ohio	30.00 to 35.00	28.00 to 30.00
Kentucky	32.00 to 35.00	30.00 to 32.00
Illinois	32.00 to 35.00	30.00 to 32.00
Missouri	32.00 to 35.00	28.00 to 32.00
Silica Brick:		
Pennsylvania		30.00
Chicago		35.00 to 37.00
Birmingham		40.00
Magnesite Brick:		
Standard size, per net ton (f.o.b. Baltimore)		53.00
Chrome Brick:		
Standard size, per net ton		41.00 to 43.00

The Coxe Traveling Grate Co., Port Carbon, Pa., resumed operations on full time on Monday. The plant employs 200 men, who have been idle for about one month.

OBITUARY

GEORGE A. OHL, veteran machinery manufacturer, died at his home in East Orange, N. J., Feb. 8, in his eighty-fifth year. He retired from business activities in 1892 when he turned the business over to his son, George A. Ohl, Jr. Up to that time, he had taken out 52 patents on machinery of his own invention. He was born in Germany May 18, 1837, and came to this country when 15 years of age. He found employment in a locomotive works in Trenton and was also employed by the Newark Machine Co. and the Hewes & Phillips machine shops, Newark, N. J. Later he organized George A. Ohl & Co., of which his son, George A., Jr., is president and treasurer. His energies were devoted largely to making sheet metal machinery.

GEORGE W. BLAKE, president Buckeye Aluminum Co., Wooster, Ohio, died Feb. 6, following an operation for appendicitis, aged 36 years.

RICHARD HENRY RICE, manager Lynn Works General Electric Co., Lynn, Mass., died suddenly Feb. 10, at Bolton, Lake George, N. Y., where he had gone two days previously to recuperate from the shock of the sudden death of his son in Montreal. Mr. Rice was born in Rockland, Me., Jan. 9, 1863. His early education was obtained in that town. He graduated at the Stevens Technical School, Hoboken, N. J., as engineer, following which he was engaged in western railroad work and ship construction, latterly at Bath, Me. From Bath, Mr. Rice went to Providence, R. I., with the Providence Machine Works and subsequently became a member of the engineering firm of Rice & Sargent, that city. In 1903, he became associated with the turbine department, General Electric Co., Lynn, and in 1918 was made manager of the Lynn Works.

WILLIAM C. SARGENT, secretary Chain Belt Co., Milwaukee, died suddenly on Feb. 5 from heart trouble, at the age of 73 years. He was born in Troy, N. Y., and went to St. Paul, Minn., as a youth, entering the farm implement industry. In 1900 he, with the late C. W. LeValley, left St. Paul to go to Milwaukee, where they founded the Chain Belt Co.

WALTER READ, president and treasurer Filer & Stowell, Co., Milwaukee, died Feb. 10 after a brief illness with heart trouble. He was 66 years of age and resided in Milwaukee 59 years. He became associated with the Filer & Stowell Co., 45 years ago as an apprentice and afterward, with Thomas J. Neacy, became the principal owner.

CLARENCE J. CURBY, 39 years old, vice-president and general manager of the Smith & Davis Mfg. Co., manufacturer of iron bedsteads, St. Louis, was found dead in a room on the third floor of his home. It was believed that he was accidentally shot while cleaning an automatic pistol or a high-power rifle. Mr. Curby began work with the Smith & Davis Mfg. Co. as a boy of 18, gradually rising to an executive position upon the death in 1912 of his father, Clarence Edgar Curby, who was secretary and a heavy stockholder in the company.

BARTHOLOMEW TOOMEY, superintendent of the rolling mills of the American Car & Foundry Co., Detroit, died in that city, Jan. 29, at the age of 76.

ALBERT LEE BALDWIN, production manager and member of the board of directors, the Detroit Steel Products Co., Detroit, died at his home in that city on Jan. 30, following three weeks illness with pneumonia.

JOHN H. STREETER, secretary and treasurer Riverside Iron Works, Chicago, died on Jan. 26.

GEORGE W. PECK, manager of Miner & Peck Mfg. Co., Derby, Conn., manufacturer of drop presses, died Feb. 2.

WALTER D. OSBORNE, president of C. S. Osborne & Co., Harrison, N. J., manufacturer of tools, died Feb. 1, at Winter Park, Fla., where he had gone for his health. His death resulted from apoplexy. He was 65 years of age, and is survived by his wife and son.

WILLIAM S. FAIRHURST, proprietor of the American

Compressed Air Works, Brooklyn, died Feb. 3 at the Hahnemann Hospital, as the result of an operation.

ALBERT LEE BALDWIN, production manager and member of the board of directors of the Detroit Steel Products Co., of Detroit, died recently after a three weeks' illness. Mr. Baldwin joined the company in 1911 as an order clerk, and was advanced to a directorship in January, 1920. When the Fenestra Construction Co. was organized as a subsidiary of the Detroit Steel Products Co., he was made secretary.

E. R. ARMSTRONG, proprietor Wilson Stove & Mfg. Co., Easton, Pa., was killed in an automobile accident, as was also Mrs. Armstrong, at a grade crossing near Miami, Fla., Thursday, Feb. 2.

Plant Operations in the Mahoning Valley

YOUNGSTOWN, Feb. 14.—Owing to accumulation of iron, the Sharon Steel Hoop Co., Sharon, Pa., has blown out its Mary blast furnace at Lowellville, Mahoning county, leaving 17 of 47 stacks active in the Mahoning and Shenango Valleys. This suspension eliminates a stack using beehive coke.

Production of the lighter steel products is holding up in the Youngstown district. In the Mahoning Valley, 33 of 51 independent open hearth furnaces are charged, while sheet mill capacity was scheduled at the beginning of the week at about 45 per cent, as compared with 39 per cent the previous week.

On the other hand, pipe production is sagging, eight of 17 pipe furnaces being fired. The Youngstown Sheet & Tube Co. has six tube mills in operation and the Republic Iron & Steel Co., three.

Blast furnace operation in the Mahoning Valley is being carried forward as follows—Carnegie Steel Co., 5; Sheet & Tube Co., 2; Brier Hill Steel Co., Republic Iron & Steel Co., A. M. Byers and Trumbull-Cliffs Furnace Co., one each.

The Republic company is operating its plate mill on skelp for pipe.

The Newton Steel Co., which has been running its 10-mill sheet plant at Newton Falls steadily for some time, has booked a sizable order for full finished sheets, placed by an automobile manufacturer.

Large Judgments Granted

Judgments aggregating \$721,580 were granted the Pittsburgh Tinplate & Steel Corporation, Marietta, Ohio, against its ex-officers and directors and the brokerage firm of Goodman & Josephs, Cleveland, in a report filed Feb. 7, in the Franklin County Common Pleas Court, Columbus, Ohio, by Attorney Henry A. Williams, master commissioner. The company brought action for an accounting. In his report, Commissioner Williams declared that the Cleveland brokers received \$556,909.52 from the company under three commission contracts that were illegal. A finding in the same amount was made against Lakin C. Taylor, ex-president of the company, for permitting these brokerage contracts and also for \$116,802.09 for the receipt of which from the treasury of the company he failed to make satisfactory explanation to the master commissioner. Findings for the amounts paid the Cleveland brokers also were made against Curtis E. Waters, ex-treasurer, and John W. White, ex-secretary.

Lakin C. Taylor Sentenced to Penitentiary

Lakin C. Taylor, convicted several weeks ago in the criminal court in Pittsburgh on a conspiracy charge based upon the sale of stock in the Pittsburgh Tin Plate & Steel Corporation, was sentenced Feb. 10 to serve not less than 14 months nor more than two years in the Western Penitentiary of Pennsylvania. The maximum sentence allowed is two years. Taylor, who was president of the company, is alleged to have secured stock subscriptions by issuing prospectuses in which the condition and capacity of the company's plant at Marietta, Ohio, were exaggerated. Counsel for Taylor announced an appeal to the Superior Court would be taken at once.

IRON AND INDUSTRIAL STOCKS

Irregularity Noted in Quotations During the Past Week

Quotations for iron and industrial stocks the past week have been irregular. The strength of the common shares of United States Steel has been an outstanding feature. On the other hand, shares of those companies included in pending consolidations of steel properties have been weaker. No news is forthcoming to explain the strength of one and the weakness of the other. Quotation for industrial shares in general have moved up and down by turn, the net change for the week, on the average, not being worthy of special mention. At the moment the two outstanding constructive features in the business world are the strength of sterling exchange and of grain quotations. In both instances, greater buying power is indicated.

The range of prices of iron and industrial stocks from Monday of last week to Monday of this week was as follows:

Albis Steel corp.	41 1/2	40 1/2	Midvale Steel	29 1/2	31 1/2
Albis Steel pt.	9 1/2	9 1/2	Nat. Acme		12 1/2
Am. Can. corp.	36 1/2	38 1/2	Nat. E. & S. com.	39	43
Am. Can. pt.	36 1/2	36 1/2	Nat. E. & S. pt.		90
Am. C. & P. com.	116 1/2	118	N. Y. Air Brake	58 1/2	60
Am. Loco. com.	106	110 1/2	Nova Scotia Steel		25
Am. Loco. pt.	112 1/2	114 1/2	Pitts. Steel pt.		85
Am. Rad. com.	8 1/2	8 1/2	Pres. Steel com.	6 1/2	67
Am. Rad. pt.	32	33	Ry. S. Spg. com.	97 1/2	99
Am. S. & P. com.	32	33	Ry. S. Spg. pt.		112
Am. S. & P. pt.	91	91	Replage Steel	29 1/2	32 1/2
Bald. Loco. com.	100 1/2	101 1/2	Republic com.	51 1/2	54
Bald. Loco. pt.	100 1/2	101	Republic pt.		83
Beth. Steel com.	5 1/2	5 3/4	Sloss com.	40	41
Beth. Steel Cl. B	6 1/2	6 1/2	Trans.-Williams	33 1/2	34
Beth. S. & P. pt.	105 1/2	108 1/2	Un. Alloy Steel	26	28
Chic. Pneu. Tool	65 1/2	66 1/2	U. S. Pipe com.	19 1/2	27 1/2
Colorado Fuel	26 1/2	27	U. S. Pipe pt.	59	64
Cone. Steel com.	60 1/2	63 1/2	U. S. Steel com.	86 1/2	89 1/2
Cone. Steel pt.	80 1/2	82 1/2	U. S. Steel pt.	116	116 1/2
Gen. Electric	11 1/2	11 7/8	Vanadium Steel	33 1/2	35 1/2
Gr. No. Ore. Co.	31	32 1/2	W. I. C. & C.	81 1/2	84 1/2
Gulf States Steel	70 1/2	77 1/2	Westhouse Elec.	52 1/2	53 1/2
Int. Har. com.	82	86			
Lack. Steel	163 1/2	191 1/2			

Trumbull Steel Co.'s Report

YONKOSKOWS, Ohio, Feb. 11. President Jonathan Warner of the Trumbull Steel Co. stated at the annual stockholders meeting at the main offices in Warren last week that the company had received invitations to participate in merger negotiations, but had declined and was not a party to any such plans. He predicted gradual betterment in business conditions over the rest of the year, which, he said, would be reflected in the steel industry, though he looked for a period of little activity during the summer. Gross sales of \$12,851,000 last year compared with \$35,850,811 in 1920. The company reported a surplus account as of Dec. 31 last of \$7,581,000, a reduction from \$8,129,000 reported a year ago. The statement for the year showed a depreciation write-off against the plant of \$500,000 and inventory readjustment of \$750,000. The company produced 137,746 tons of finished steel including 50,000 tons of tin plate last year, and shipped 136,711 tons. Shipments for 1920 aggregated 250,451 tons. The company reported operating profit for the year of \$260,000. The 1921 payroll of \$1,285,000 compares with a wage distribution of \$9,922,516 in 1920. There was a further set up of \$250,000 against doubtful accounts, which the company expects to be 10 times more than necessary.

J. G. Brill Co. Report

The annual report to the stockholders of the J. G. Brill Co. says:

"For the year 1921 the combined output of your company's four plants amounted in sales value to \$7,647,898.56.

"The combined output of your company's plants for each of the past six years follows:

1916	\$6,180,895.79
1917	7,706,099.28
1918	16,761,154.95
1919	14,210,622.09
1920	17,537,293.13
1921	7,647,898.56

"After deducting from earnings the sum of \$370,453.93 for depreciation and the cost of all maintenance and repairs for the year, and after charging against earnings and reserves, set aside for this purpose, the sum of \$325,915.80 to cover depreciation in inventory values, the result, combined for the year, of the operation of all the plants of your company, shows a profit of \$163,899.96.

"While your company has been doing business in Canada for many years, it seemed desirable to extend its operations in that territory, and for this purpose a new company was formed known as Canadian Brill Co., Ltd., all the stock of

which is owned by your company, except the directors' qualifying shares. The new company has leased, with an option to purchase, a moderate size plant at Preston, Ont., which was put in operation Sept. 1, 1921, and now has sufficient work to keep it running at its full capacity."

Industrial Finance

The Norwalk Iron Works, Co., Norwalk, Conn. has filed a preliminary certificate of dissolution. All claims should be sent to A. Raymond Betts, care of the company, South Norwalk.

The Winchester Repeating Arms Co., New Haven, Conn. has issued 90,000 shares of heretofore unissued authorized capital stock, thereby bringing the outstanding capital up to \$10,000,000.

The 1921 net earnings, after federal taxes, depreciation and reserves, of the Sullivan Machinery Co., Chicago and Claremont, N. H., were \$512,488, equivalent to \$3.25 a share on its 157,803 no par shares outstanding. In 1920, the net earnings were \$1,347,315, or \$8.69 a share on 155,118 shares. At the close of 1921, the company had current liabilities of \$1,937,242, and current assets of \$7,829,124, leaving a net working capital of \$6,791,882.

At the annual meeting of the Greenfield Tap & Die Corporation, Greenfield, Mass., held recently, it was announced 1921 results would not be available until March. Incoming orders for January, 1922, were more than 50 per cent larger than those for the corresponding month last year. The company is employing 600, contrasted with 1500 fifteen months ago.

The Pittsburgh Steel Co. reports gross earnings for the six months ended Dec. 31, 1921, at \$6,609,876, against \$18,077,585 in the same period in 1920 and net profits of \$242,035, against \$1,469,700 in the last six months of 1920.

Trade Changes

Maxwell Spiro, formerly district manager of the New York office of Briggs & Turivas, operators in iron and steel scrap, is now connected with the Merchants' Metals Corporation, Woolworth Building, in the capacity of general manager. The Merchants Metals Corporation deals in iron and steel and machinery, and it is intended to develop the scrap iron department of the corporation. Mr. Spiro, prior to his service with Briggs & Turivas, was a commanding officer of a motor transport company in the U. S. Army in France during the World War. He was also connected with the engineering staff of the Baldwin Locomotive Works at Burnham, Pa.

The American Foreign Steel Co., Grand Central Terminal Building, New York, which has been liquidating its affairs in the past two months, has just sold its iron and steel scrap yard at Lackawanna, New York, to the Joseph Schonthal Co., Columbus, Ohio, which operates scrap yards at Columbus, Huntington, W. Va., Detroit and Cleveland. Joseph Neel, general manager of the Lackawanna plant of the American Foreign Steel Co., has been retained in the same position by the purchasing concern.

J. D. Adams has opened an office at 204 Seitz Building, Syracuse, N. Y., as manufacturers' agent (not a jobber) for foundry equipment and supplies. He will also represent the E. Reed Burns Mfg. Corporation with platers and polishers supplies in New York State, outside of the Metropolitan District. For the past three years Mr. Adams has been salesman for the S. Obermayer Co. through the east.

D. E. Hadley, S. H. Baird and John F. Kevern, all formerly connected with the Sly Mfg. Co. in sales and engineering capacities, have just organized the Mutual Equipment Co., 251 Port Washington Avenue, New York, to bring out modern and improved sand blast equipment, dust arresters, core ovens, tumbling mills, and special machinery to meet the requirements of the foundry trade.

The Max Anis Machine Co., New York, announces that on Feb. 1 it opened an office in Rochester, N. Y., at 705 Commerce Building. H. S. Freeman who was the Western representative of the company, has charge of the Rochester office. L. J. La Cava has been appointed western representative at the company's new Chicago office, 20 East Jackson Boulevard.

The general offices of the Superior Steel Corporation have been removed from the Union Arcade Building, Pittsburgh, to the works of the company at Carnegie, Pa. The company, however, retains sales offices in the Union Arcade Building.

The Standard Sanitary Mfg. Co. regular quarterly of 1 1/2 per cent on preferred stock and 2 per cent on common stock, both payable Feb. 15, to stock of record Feb. 7.

The A. C. Warner Co., Philadelphia and Baltimore, is now representing the Dow Co., Louisville, Ky., designing and supplying conveyors.

PIG IRON MAY BE EXPORTED

**American Price Decline Favoring Sales to Europe
—Ore Imports—Foreign Buying Largely
Governmental**

NEW YORK, Feb. 14.—Foreign buying continues, but is almost entirely confined to Japan, with sporadic inquiring from other Far Eastern markets. A large part of the Japanese buying is either by the Imperial Government or municipalities. Black sheet business has dwindled to a few scattered orders, but there is a noticeable activity in blue annealed sheets in small lots. The recent inquiry of a large Japanese oil company for 20,000 base boxes of oil can tin plate has been placed in the United States and will probably go to the leading interest. The government call for bids on about 8000 tons of structural material for two bridges, issued some time ago, is also understood to have been placed in this country with an exporter, who submitted the quotations of one of the largest independents.

The Imperial Government Railways, beside the 10,000 tons of rails now being bid upon, has purchased several hundred tons of steel for the construction of light locomotives. Among inquiries still open is a tonnage of light rails (about 18-lb.) and 300 tons of 15-in. steel beams. The Taiwan Electric Power Co., Formosa, which has purchased electric equipment and pipe in the United States, has placed a part of the 225 miles of steel transmission towers required with a Japanese export house in New York.

British sheet mills are at present strong competitors in Japan, but the gradual rise of the pound sterling toward parity is expected to mark an increase in sales of the American product. The increase in European exchange is affecting imports and purchases for shipment to other markets. The German fuel shortage and its consequent effect upon pig iron prices and production, coupled with the rise in foreign exchange of the Belgian franc, has placed Belgian iron upon too high a price basis for importation into the United States, excepting, as has been the rule for some time, to the Pacific coast. Even in this market transactions are diminishing as values increase. Belgian foundry iron, which a few weeks ago with the franc quoted at about 7c., could be landed c.i.f. Atlantic port at 300 fr. per ton (about \$21), now costs about \$24.57 per ton with the Belgian franc at 8.19c. in exchange.

In view of the rise in Continental prices and exchange and the decline in American prices on pig iron, one importer and exporter of pig iron and semi-finished material believes that should this condition continue, it will be possible before long to export pig iron to European consumers. In fact, with foundry iron quoted at \$15.50 to \$16 per ton, Birmingham, this exporter claims that he could consummate sales now, were it not for the freight rate from Birmingham to a port abroad.

Foreign ores are in a much better position in the American market than foreign pig iron. Ore imports are not only possible but Eastern furnaces show a strong inclination to negotiate for their purchase. A trial cargo of North African low phosphorus ore, from Algiers, analyzing about 50 per cent iron, raw, and 57 per cent, dry, has been shipped to a Pennsylvania furnace. Should this ore prove satisfactory, a contract for continued shipments will probably be made with the importer. Ore of this analysis can now be delivered, c.i.f. Atlantic port at about 10½c. per unit.

Practically the only manganese ore, except Indian, that it is now possible to import is Brazilian, on which contracts have recently been made at 22c. per unit. Caucasian manganese ores from Poti, Georgia, are not only reported to be uncertain as to quality, but are now quoted at 25c. per unit, c.i.f. Atlantic ports. The situation at these mines is said to be steadily improving since the organization of an association of the government and the producers, but rail connections do not permit of shipments from mines to port and current shipments are practically all from stock.

The list of electrification projects in various foreign markets continues to grow. According to the Bureau

of Foreign and Domestic Commerce, a company has been organized at Utsunomiya, Japan, to construct a high speed electric railroad between Nikko and Tokio, at an estimated cost of 10,000,000 yen (about \$4,725,000). German competition in the Far East on electrical material is reported to be keen. Highly satisfactory credit arrangements appeal to Chinese buyers particularly. The German Siemens-Schuckert Co., has combined with Chinese interests to erect an electrical manufacturing plant at Soochan and with the Furukawa Electro-Industrial Co. in Japan to erect a plant for the manufacturing of small electric meters.

Stocks of Coal Increasing

WASHINGTON, Feb. 14.—Warnings of Government officials to industries of the country to lay in stocks of coal on account of the threatened strike of union bituminous and anthracite miners on April 1, are bearing fruit. It is evident that stocks are being added to and as indicative of this is the fact that production of both grades of fuel is increasing, according to the report of the United States Geological Survey. The total output of bituminous coal, including a small amount of lignite, during the week ended Feb. 4, is estimated at 9,708,000 net tons. In comparison with the week preceding, this was an increase of 88,000 tons, and in comparison with the corresponding period a year ago, the increase was 1,576,000 tons. The present production is declared to be large enough to meet current requirements for consumption and export, and at the same time add to the reservation in storage. Stocks of bituminous coal on Jan. 1, consisted of 47,500,000 tons in the hands of consumers, and 7,151,000 tons on the upper lake docks.

The stocks at steel works were sufficient to last 48 days and those at coal plants were sufficient to last 42 days.

Nearly a million tons of by-product coke, according to the Survey, is on hand at coke plants, much of which can be used for domestic fuel. While production of anthracite coal increased in the first week of February, and amounted to approximately 1,811,000 net tons, it is declared that the reserve in storage and in transit has probably decreased because production in January was not enough to meet estimated current consumption. But since then its report indicates greater stocks.

Nine Years Without a Strike

A record of nine years' operation of plants without a strike is one of the achievements noted by Simon Guggenheim, president of the American Smelting & Refining Co., in a general report on improvement in industrial relations between the company and its employees, which has just been issued for the information of stockholders.

The report indicates that as a result of the company's policies in its relationships with its working forces, only a couple of minor differences intervened since 1913, and these incidents were practically repudiated by the employees.

President Guggenheim shows that the company early adopted an 8-hr. day, was a pioneer in establishing a system of pensions and indemnities, and employees' committees for co-operation in plant operation, together with other features aimed to promote harmony and efficiency.

Blast Furnace Activities

The Mary furnace, Sharon Steel Hoop Co., Lowellville, Ohio, was blown out Feb. 11, after a run of eight months. The furnace, which has a capacity of 12,000 tons a month, has been producing from 3500 to 4000 tons a month more iron than the company has been charging and the accumulation is sufficient to carry the company along for several months at the present rate of consumption. This leaves only 16 of the 47 blast furnaces in the Mahoning and Shenango valleys in blast. Preparations are being made to start up the Dover furnace, Dover, Ohio, during the week of Feb. 19. This is a Hanna Furnace Co. stack.

EXPECTS IMPROVEMENT

President Campbell Looks for Gradual Change— Discusses Proposed Consolidations

YOUNGSTOWN, OHIO, Feb. 14.—“At the present time the outlook for profitable business during the year is not good,” President James A. Campbell of the Youngstown Sheet & Tube Co. told stockholders to-day at the annual meeting. “I am of the opinion that the first half of the year will be unprofitable, because of the small volume of business and the very low prices prevailing. There are, however, many hopeful signs of future improvement, which in my judgment bid fair to make for better conditions. The most hopeful of these are the success of the Arms Limitation Conference recently held in Washington; the arrangement between Great Britain and France, by which Great Britain agrees to assist France in case of invasion by any other power, which marks, in my opinion, the end of deterioration and the beginning of reconstruction in Europe, and the proposed financial conference at Genoa, which gives hope for the solution of some of the serious financial problems of Europe and the stabilization of exchange.

“With these things accomplished, taxes should be greatly reduced, disorder in Russia and the Balkan States should rapidly diminish, and order be restored in Europe. I think that few of us fully realize the vast importance of the events that have taken place during the last 60 days, or their probable influence on the peace of the world, the reduction of Government expenditures, and the business situation both here and abroad.

President Harding's Policies

“In our own country the President is thoroughly impressed with the importance of liquidation of labor and material values where this has not fully taken place, realizing that such liquidation is necessary to reduce the cost of living. He has already taken steps that have lowered freight rates in some instances and will bring about further reductions in the near future. He has also taken steps to prevent profiteering and assure to the consumer the benefit which should result from lower production costs, which are in many cases now absorbed by middlemen and are, therefore, not reflected in retail prices.

“It takes time to accomplish all of these things, but I am convinced that by the middle of the present year the combined results of all of them will restore confidence and make for greater business stability. I am, therefore, in hopes that the last half of the year will bring us a greater volume of business and perhaps a small margin of profit.

Discussing the past year, he said: “In volume of business, in shrinkage in value of inventories, and in earnings, the year 1921 was the poorest year in the history of your company. The actual amount charged off for this reduction in value of stocks was less than in some other years, but we absorbed a considerable amount of this loss in our costs during the year which does not show in this charge.

Reduction of Wages

“On Feb. 16, 1921, we reduced the wages of all employees about 20 per cent. On July 1 we abandoned the 8-hr. basic day, which discontinued paying time and a half for all time over 8 hr. On August 16 we made a further reduction of about 20 per cent in the wages of all labor. These reductions combined reduced common labor from 46c. to 30c. per hour, the present rate. Steel plants in the East are now paying from 20c. to 25c. per hour for common labor, and in Buffalo the rate paid is 23c. per hour. We should dislike very much to further reduce wages, because we believe that employees in the steel industry have already suffered greater reduction of wages than those in most other lines, and we do not believe that the cost of living has declined sufficiently to justify it. We are not willing, however, to dissipate our capital in meeting conditions as we find them to-day, by selling our products at less than cost. There is a very serious question involved as to whether we should give the men more employment at

a lesser wage by trying to meet conditions as we find them, or close down those departments which are operating at too great a loss.

“The steel industry, in its anxiety for business, has tried to name prices during the past year to meet the ideas of the consumer. The published statements of most of the steel companies for this year show considerable loss. Some of this is due to shrinkage in value of inventories with which labor has nothing to do, but a large percentage of it has been lost in operation of plants.

Reducing Expenses

“We have reduced our overhead expenses during the year to the very minimum by eliminating employees in every department where it was possible to do so, and also by reducing the salaries of officials, superintendents and men holding important positions.

“Relations with employees during the year have been very harmonious and we believe that this is due in a great measure to our representation plan. Representatives and their committees meet at stated times and discuss any questions pertaining to operation or working conditions, and they are usually settled to the satisfaction of all concerned. We believe that there is closer contact between the management and the men than heretofore, which leads to a better mutual understanding.

Proposed Mergers

“You have probably read much in the public press with reference to proposed combinations in the steel industry, in which your company has been mentioned. There has been considerable discussion on this subject during the past year among executives of different steel companies, who have hoped that such combinations would make it possible to reduce cost and improve the distribution of their products, owing to the different geographical locations of the plants under consideration.

“We have attended the conferences held and have had valuations of our properties made, with a view to joining in the proposed consolidation of interests when we are convinced that we can do so without impairing your position. You can rest assured that we will not make any recommendation to the stockholders with reference to these combinations until we are thoroughly convinced, after careful consideration, that your interests will be better served by joining with other companies.”

The company's financial statement for 1921 shows:

Earnings from operations including miscellaneous income, but after deducting repairs and maintenance expense, special charges and reserve for general taxes, \$3,878,011.60; less provision for depreciation of plants and equipment, \$3,139,110.72; provision for exhaustion of coal properties, \$36,848.79; reduction in value of inventories to cost of market at Dec. 31, 1921, \$721,947.73; net loss for year, \$19,895.64.

Dividends paid on preferred stock, \$695,401; on common stock, \$1,988,727.50; deficit for year, \$2,714,024.14.

Gross sales of the Sheet & Tube company and its subsidiary properties were \$39,277,979.57; gross receipts of the parent company, including pig iron, coke, by-products, etc., \$29,963,919.48; payroll for year, \$10,105,667.95. Shipments of finished and semi-finished iron and steel products, 367,410 tons.

Cutting fluids is the subject of technologic paper No. 204 of the Bureau of Standards soon to be issued. The difficulties attending the proper lubrication of the cutting tool in machine work and the reason why lard oil is particularly suitable are discussed. Part 2, dealing with actual practice, will consider the correspondence which the bureau conducted with many large machine shops as to their experience with cutting fluids. The bulletin, when ready, may be had from the superintendent of Documents, United States Printing Office, Washington, at 15 cents per copy.

Z. L. Sault, Boston, delivered an address on heat treating before the Boston chapter American Society of Steel Treathers at the City Club, Boston, Feb. 10. His address took the form of a practical discussion of experiences in the treatment of steels during heating, and methods employed in overcoming defects.

Machinery Markets and News of the Works

MORE INQUIRIES ISSUED

General Electric Co., Lynn., Mass., in Market for Considerable Equipment

Trade Is Disappointed, However, That So Few Inquiries Result in Buying

Inquiries for machine tools continue to come out in fairly encouraging volume, but the trade is still disappointed in the small number of orders being placed. Whether the greater interest that prospective buyers appear to be taking in new equipment betokens a larger measure of buying this spring is a question for which machine-tool manufacturers have found no answer.

Some of the inquiries now pending are of fairly good size, as for example, one from the General Electric Co.,

Lynn., Mass., for 42 machines for an experimental laboratory and another list from the same company for about 30 tools for its Gloucester, Mass., works.

Railroad buying is very limited, but a few inquiries are being quoted on. The Nickel Plate has issued at Cleveland an inquiry for about a dozen tools and the New York Central Lines west of Buffalo want five machines.

Some business continues to come from the automobile manufacturers and there is quite a little under negotiation. A Michigan manufacturer has bought seven turret machines. The Ford Motor Co. is expected to close shortly on two planers.

Good used tools are in demand. A Cincinnati valve manufacturer bought about 10 used machines and two orders each for \$10,000 worth of used tools have been received by Cincinnati dealers from Louisville manufacturers.

New York

NEW YORK, Feb. 14

No signs of improvement in the machine-tool trade in this district are apparent. A large machine-tool company doing a national business reports that it is receiving more inquiries, but most of these come from sections of the country other than the New York territory. Locally, both orders and inquiries are at low ebb. Sellers of tools have very few live prospects to work upon and everyone in the trade seems at a loss to predict when there will be an improvement. There is disappointment over the slowness of the railroads to buy, and it is admitted that little may be expected from this quarter until a decision has been reached at Washington in the matter of freight rates.

Although few closings on either electric or hand power cranes are reported for the past week, inquiries continue to pile up. Increased activity is noted in electric hoists. One fair sized export inquiry appeared during the week from New York exporters. All bids are in on the two 10-ton, 90-ft. span overhead traveling cranes inquired for by the American Car & Foundry Co., for Huntington, W. Va. The Kelsey Motor Co., Newark, N. J., is interested in quotations on monorail hoists (electric) and will later purchase a 5-ton electric overhead crane. The Wallingford Steel Co., Wallingford, Conn., which issued an inquiry several weeks ago for a 15-ton and 3-ton, overhead traveling crane, is reported to have purchased. The L. B. Foster Co., 154 Nassau Street, New York, has asked for prices on a 20-ton, used locomotive crane. The electric cranes for the Narragansett Electric Light & Power Co., Providence, R. I., will probably consist of two 10-ton and three 1-ton electric cranes.

Among recent sales were: Shepard Electric Crane & Hoist Co., two 3-ton and one 7½-ton electric hoists to the American Circular Loom Co., Kenilworth, N. J.; Whiting Corporation, a 5-ton, 58-ft. span overhead traveling crane to the Lamson Co., Boston, Mass.; H. D. Conkey & Co., a 5-ton, single I beam hand power crane to the General Engineering & Management Corporation, 141 Broadway, New York.

The Remington Arms & Ammunition Co., 25 Broadway, New York, is perfecting plans for the conversion of a part of its former munition plants to manufacture cash registers and parts, and will establish headquarters for this branch of the business at 13 East Forty-second Street.

The Perfect Brick & Hollow Tile Co., Brooklyn, care of Silverstein & Infanger, 188 Montague Street, architects, is taking bids for the erection of a one-story plant at Grand Street and Newtown Creek, 100 x 100 ft., estimated to cost about \$50,000, including machinery.

The Bureau of Supplies and Accounts, Navy Department, Washington, is taking bids until Feb. 28, for a large quantity

of miscellaneous tool steel for use at the Brooklyn Navy Yard and other navy yards.

The Consolidation Coal Co., 67 Wall Street, New York, has disposed of a bond issue of \$10,000,000, the proceeds to be used for the purchase of the properties of the Carter Coal Co., in the Pocahontas field, W. Va., and other properties, and for the installation of tipples, electrical and mechanical equipment, etc. C. W. Watson is president.

The Aeromarine Plane & Motor Co., Locust Street, Keyport, N. J., is arranging for increased production with additional working force, to manufacture 25 Martin-type airplane bombers for the War Department, Washington. The order approximates \$500,000. Paul G. Zimmermann is engineer.

The Jefferson Co., 732 Jefferson Street, Hoboken, N. J., is making inquiries for a 200-hp boiler, with 100-kw., 220 volt generator.

The Kelsey Motor Co., 25 Brantford Place, Newark, N. J., will install machinery at once in the first unit of its new plant on Washington Avenue, Belleville, N. J., comprising about 34,000 sq. ft. of space. A portion of the works will be used for the manufacture of power transmission equipment for the Kelsey friction drive unit, and the remainder for assembling. E. E. Shade is president, and C. W. Kelsey, general manager.

The Solar Electric Mfg. Co., Newark, has been organized with a capital of \$100,000 to operate a plant at 24 Mechanic Street, Newark, recently leased in the name of the Solar Light Co., 69 Wooster Street, New York. It will manufacture high-power electric lamps and kindred products. Charles E. Gluckman and Joseph Illum head the company.

Refrigerating machinery to cost about \$122,000, will be installed in the new municipal market building, now being erected by the Department of Parks and Public Property, City Hall, Newark, N. J., and which complete, will cost in excess of \$1,000,000. An electric light and power house also is being planned, estimated to cost \$117,000. Charles P. Gillen is director of the department. George B. Hooper and Frank Grad, 245 Springfield Avenue, are associated architects.

Philadelphia

PHILADELPHIA, Feb. 13.

The Philadelphia Electric Co., Tenth and Chestnut streets, Philadelphia, is arranging for an increase in capital from \$60,000,000 to \$150,000,000, a large part of the proceeds to be used for extensions and improvements in generating plants and system. It is planned to install a new 30,000-kw. turbo-generator at the power house at Beach and Palmer streets, and to build an entire new plant unit at this location with like output. Extensions will be made

in the power plant at Christian street and the Schuylkill River, and new equipment installed.

Motors and other electric power equipment will be installed in the three-story printing plant, 120 x 150 ft., to be erected at Sanson and Seventh streets, Philadelphia, by the Curtis Publishing Co., estimated to cost about \$200,000. S. C. Roberts & Co., Real Estate Trust Building, are engineers.

The Bath Portland Cement Co., Finance Building, Philadelphia, will take bids at once for a new cement plant on property acquired at Sandts Eddy, Northampton County. It will comprise a power plant, machine shop, etc., and is estimated to cost \$1,750,000. The company has also arranged an appropriation of \$300,000 for extensions in the electrical and operating departments at its plant at Bath, Pa. It is planned to completely electrify this works. Louis Rafetto is president, and John Barnes, treasurer.

The Bureau of Water, City Hall, Philadelphia, will soon call for bids for the construction of a one-story electrically operated pumping plant at the Lower Roxborough waterworks, Eva Street and Shawmont Avenue.

The Standard Smeltary Mfg. Co., Bessemer Building, Pittsburgh, has leased a building to be erected at Glenwood Avenue and Oxford Street, Philadelphia, for a local branch.

The Frick Co., Waynesboro, Pa., manufacturer of agricultural machinery, tractors, etc., has awarded contract to A. E. Warner, 41 East Main Street, for a one-story shop addition, 50 x 100 ft., for engine work and assembling. A. O. Frick is vice president and general manager.

The Pennsylvania Edison Co., Easton, Pa., a subsidiary of the General Gas & Electric Co., operated by W. S. Harstow & Co., 30 Pine Street, New York, will commence the immediate erection of an addition to its electric generating plant, to include the installation of a 10,000-kw steam turbo-generator and auxiliary equipment, estimated to cost about \$800,000.

Following the complete electrification of its local properties, the Jamison Coal & Coke Co., Greensburg, Pa., will proceed with similar installations at its properties in the Farmont, W. Va., field. Plans have been completed for the electrification of the No. 9 mine at Farmington, W. Va.

The Queens Run Fire Brick Co., Lock Haven, Pa., has taken over the North Branch Fire Brick Co. and the West Branch Fire Brick Co., both operating plants in the section, and will consolidate the companies under its present name. A number of improvements will be made. William Schleicher is president, and George H. Black, general manager.

The Wyoming Valley Water Co., Hazleton, Pa., will install electrified equipment at its pumping plant for light and power service at Hudsondale and vicinity. John T. Seamon is superintendent.

H. A. Feering, Bethlehem, Pa., care of Howard J. Wegner, Bethlehem Trust Building, architect, will soon take bids for a three-story automobile service and repair works, 60 x 100 ft., estimated to cost \$45,000.

A vocational department will be installed in the new high school to be erected at Doylestown, Pa., estimated to cost about \$75,000, plans for which have just been ordered prepared.

Fire, Feb. 5, destroyed the sheet metal shop of the Philadelphia & Reading Railroad Co., Reading, Pa. The exact amount of loss has not been announced, but is reported as considerable, including building and equipment.

The Gelsinger Garage, C. S. Gelsinger, 5323 Derry Street, Harrisburg, Pa., head, will soon commence the erection of a new one-story and basement automobile service and repair works, 60 x 100 ft., at Twenty-eighth and Main streets, Penbrook, Pa.

The Gurney Electric Elevator Co., Honesdale, Pa., manufacturer of elevators, hoists, etc., has abandoned plans for the removal of its works to another location and operations will be continued at the present plant. A bond issue of \$300,000 has been sold, a portion of the proceeds to be used for extensions and improvements.

The Board of Education, Easton School District, Easton, Pa., has commissioned William H. Michler, Drake Building, and John Shay, Easton Trust Building, architects, to prepare plans for a two-story and basement high school, 65 x 230 ft., to include vocational department, and estimated to cost about \$350,000.

The Traylor Engineering & Mfg. Co., Allentown, Pa., will devote a portion of its plant to the manufacture of a special type of steel spring. Production has been under way on this specialty at the Cornwells plant of the company, and the full capacity of this works will be used for this line of manufacture, in addition to the steel spring output to be developed at the Allentown plant.

A vocational department will be installed in the new high school to be erected at Nazareth, Pa., estimated to cost \$100,000.

Electric motors, ranging from 500 to 300-hp., and smaller, and other electrical equipment will be installed for coal breaker operation at the new plant of the Lehigh Coal & Navigation Co., at Coaldale, near Lansford, replacing a plant destroyed by fire. It will cost about \$1,000,000 with machinery.

Chicago

CHICAGO, Feb. 13.

The tendency toward expansion in business noticeable in January has not been sustained and the current market is exceedingly quiet. Inquiries are fewer and orders are almost nil. The railroads have bought nothing against their lists, but the Santa Fe has added two more items to its outstanding inquiry as follows: One lathe for piston work with 36-in. swing and 9 ft. between centers, arranged for direct current motor drive, and one double-end punch and shear with 8-in. throat, capable of punching a 4-in. hole in a 2-in. plate, and shearing 12 x 2 1/4-in. flats and 4 1/4-in. rounds and splitting 1 3/4-in. plate, arranged for direct current motor drive. The only new inquiry of importance comes from the Board of Education, Hammond, Ind., and calls for 10 engine lathes, one milling machine, one sensitive drill, one arbor press, one 12-in. crank shaper, one hack saw, one grinding machine, and a sliding-head drilling machine. Here and there a few sales of individual machines are being made, as for example, a sale of a 20-in. crank shaper to the Brunswick-Balke-Collender Co., for its Muskegon, Mich., plant. The crane market is inactive.

The Donahue Steel Products Co., People's Gas Building, Chicago, has sold to the Saylor Mfg. Co., Pittsburgh, the following machinery from its Chicago stock: A 1 1/2-in. Acme upsetting and forging machine, a Pawtucket shear for bolt stock, a No. 2 Williams-White eye bender, a No. 4 Williams-White bulldozer, and a three spindle Landis threading machine.

The Cyclone Motors Co., a new company organized to manufacture motorcycles, will locate at Benton Harbor, Mich. The head of the company is John M. Eaton, Detroit, for 15 years associated with Henry M. Leland, the Detroit automobile manufacturer. The company has entered a contract to buy the plant of the Peninsula Lumber Co., Benton Harbor. While it will specialize in the manufacture of delivery cars of the motorcycle type, it will also make a three-passenger automobile. Remodeling of the Peninsula plant is to commence at once.

The Damascus Steel Products Corporation, recently incorporated to manufacture tools, will open a factory on Fourteenth Avenue, Rockford, Ill., where it has leased floor space, and is now installing equipment. The company has \$50,000 capital stock.

The United Light & Power System, Abilene, Kan., has purchased the Williamson power plant and dam on Republican River at Clay Center, Kan., and will improve the property.

The W. T. Safety Tool Co., Taylorville, Ill., was recently incorporated to market tools, on which it has patents, for use on high-tension electric transmission lines, these tools being intended to make all repairs of lines without interruption in the service. The company will not build a plant for the present for the reason that its president operates a machine shop, and part of its products will be made there, while the remainder will be let out on contracts. The officers are C. R. Wood, president; M. T. Tipsord, vice-president; W. D. Williams, secretary-treasurer.

The Pacific Malleable Iron Co. has been incorporated with \$50,000 capital stock at Gresham, Ore. A \$10,000 foundry will be constructed on a site which has already been purchased. M. Moga is the head of the company.

The Wisconsin Steel Works, 106th Street and Torrence Avenue, Chicago, has let contract for a one-story electric station, 29 x 52 and 16 x 52 ft., to cost \$10,000.

The Oettinger Ice & Coal Co., 1725 West Fifteenth Street, Chicago, has let a contract for a one and two-story ice manufacturing plant to cost \$35,000.

C. A. Esser, architect, 38 South Dearborn Street, Chicago, is receiving bids on a three-story factory and boiler house, 30 x 214 ft., to be equipped with high-pressure boiler, for the Gurinlan Candy Co., St. Joseph, Mich. It will cost \$75,000.

The Hug Co., Highland, Ill., has been incorporated with \$100,000 capital stock to manufacture road building equipment. It is constructing a one and two-story plant, 36 x 300 ft., and has purchased most of the machinery required. C. J. Hug is president and general manager.

The National Stamping & Electric Works, 426 South Clinton Street, Chicago, has let contract for an addition to its plant at 3238-50 West Lake Street, 156 x 118 ft., to cost \$20,000. It manufactures electrical household appliances.

The Edward Katzinger Co., manufacturer of bakers' tools and machinery, 910 West Washington Boulevard, Chicago, will build an additional unit to its plant, 332 x 599 ft., at Armitage and Cicero avenues.

A deed was recently filed in the probate court at Edwardsville, Ill., calling for the transfer of a tract of land in the south extension of Granite City, Ill., to the American Locomotive Co. This is another step toward the proposed location of a large plant in the St. Louis district by the locomotive company.

The Union Utilities Co., Rutland, Iowa, has plans under way for a new hydroelectric generating plant to cost about \$150,000. Toltz, King & Day, 1410 Pioneer Building, St. Paul, Minn., are engineers.

A vocational department will be installed in the three-story high school, 101 x 162 ft., to be erected at Fremont, Neb., bids for which are being received until Feb. 20. Equipment bids will be taken later. It is estimated to cost \$200,000. The A. H. Dyer Co. is architect. James A. Donahue is secretary of the board.

The Northwestern Paper Co., Cloquet, Minn., has plans under way for a new three-story pulp and paper mill, estimated to cost \$500,000, including machinery. George F. Hardy, 309 Broadway, New York, is engineer. C. J. McNair is general manager.

C. R. Berglund, 2630 Wentworth Avenue, Chicago, is taking bids for a new one-story plant, 100 x 125 ft., at South Park Avenue and Sixty-seventh Street, to manufacture automobile bodies. A. G. Lund, 449 West Sixty-third Street, is architect.

A vocational department will be installed in the new Theodore Roosevelt high school to be erected at Des Moines, Iowa, to cost in excess of \$1,000,000. Bids for the building have been taken and contract will soon be let. Bird & Rawson, 810 Hubbell Building, are architects. George L. Garton is secretary of the board.

The Arkansas Valley Railway, Light & Power Co., Pueblo, Col., has construction under way on a new power plant, and plans the installation of generating and other equipment at an early date.

Jacobson Brothers, 410 Columbia Building, Duluth, Minn., have completed plans for the erection of one-story automobile service and repair building, 75 x 140 ft., estimated to cost about \$100,000, including equipment. Halstead & Sullivan, 409 Palladio Building, are architects and engineers.

Baltimore

BALTIMORE, Feb. 13

Slaysman & Co., Pratt and President streets, Baltimore, machinists, will install a number of machine tools at their works, including drilling and milling machines.

A filtration plant to cost about \$1,200,000 will be erected by the Water Board, City Hall, Baltimore, at Montebello. It will include pumping plant with electrically operated machinery, settling basins, filtering equipment, etc. Plans are being drawn. William A. Megraw is water engineer.

The Chicago Nipple Mfg. Co., Richmond, Va., manufacturer of oil well machinery, nipples, fittings, etc., is planning for the establishment of a new factory at Baltimore and is negotiating with the local Merchants' & Manufacturers' Association for a building to approximate about 25,000 sq. ft. of floor space. It is planned to remove the Richmond works to the new location. Dixon C. Williams is president.

The property of the National Ship Supply & Machinery Co., Sollers Point, Baltimore, will be offered for sale Feb. 28-March 2, inclusive, including buildings, machinery, etc.

The Town Commission, Littleton, N. C., has completed plans for a municipal electric light and power plant and will commence work at an early date. The J. B. McCrary Engineering Corporation, Atlanta, Ga., is engineer. H. C. Smith is town clerk.

The Wilson Motor Co., High Point, N. C., will take bids in the spring for a three-story repair and service building, 75 x 100 ft., on property recently acquired, estimated to cost about \$75,000.

The Thomasville Variety Works, Thomasville, Ga., is planning to rebuild its woodworking factory, recently destroyed by fire with loss estimated in excess of \$100,000, including machinery. K. E. Mack heads the company.

Freight handling and conveying machinery, hoisting equipment, etc., will be installed by the Port Commission, Norfolk, Va., at the new docks and warehouses to be erected at Sewells Point, bids for which will be asked early in March. Neff & Thompson, Seaboard Bank Building, are architects. The Folwell-Ahlkog Co., 332 South Michigan Avenue, Chicago, is engineer.

The City Council, Hertford, N. C., has authorized the sale of bonds to an amount of \$100,000, the proceeds to be used for the construction of a municipal electric light and

ice-manufacturing plant, with portion of the fund for water-works.

The Dyson Brothers Hardware Co., Olanfa, S. C., is making inquiries for machinery to manufacture axe handles and kindred turned wood products.

A vocational department will be installed in the two-story and basement high school to be erected at Fayetteville, N. C., to cost \$150,000, plans for which are being prepared by Millburn & Heister, 710 Fourteenth Street, N. W., Washington, D. C., architects. John A. Oates is president of the board.

The Town Council, Wilson, N. C., is arranging for the construction of a municipal electric light and power plant. A bond issue of \$70,000 has been approved.

The Virginia Machinery & Well Co., 1319 East Main Street, Richmond, Va., is inquiring for a second-hand steam hoisting engine, double drum type.

The Winchester Lumber Corporation, Winchester & Western Railroad Building, Winchester, Va., recently organized, has acquired about 3,000 acres of timber properties in Hardy and Hampshire counties, W. Va., and contemplates the construction of twenty sawmills and a number of general wood-working and finishing plants, including power houses. A cooperage plant is also being considered. William B. Cornwell, head of the Winchester & Western Railroad, is president of the company, and T. D. Kenny, secretary.

Detroit

DETROIT, Feb. 13

A vocational department will be installed in the new two-story high school to be erected at Traverse City, Mich., estimated to cost about \$300,000, bids for which are now being asked. S. E. Patterson, 406 Hochsman Building, Kalamazoo, Mich., is architect.

The Reading Corporation, 113 West Fort Street, Detroit, is asking for quotations on a high lift steam shovel.

W. P. Papworth, receiver for the Fox Typewriter Co., Grand Rapids, Mich., is planning for the sale of the plant to a corporation, now in process of formation, for about \$300,000. The new organization, J. C. Goldmar and William Remington, is planning for changes and the installation of equipment to manufacture a new typewriter, with special keys for short words.

About \$100,000 will be expended by the Kalamazoo Vegetable Parchment Co., Kalamazoo, Mich., manufacturer of paper, for the erection of a two machine unit plant addition, two-stories, 90 x 925 ft. Billingham & Cobb, Press Building, are architects. J. Kaulbacher is president and manager.

The Owen Santaroni Co., Ypsilanti, Mich., will build a power house in connection with its new two-story and basement building for light manufacturing service, estimated to cost about \$75,000. O. W. Henz is general manager.

The Auto Specialty Mfg. Co., St. Joseph, Mich., manufacturer of automobile equipment, is taking bids for its one-story addition, estimated to cost \$100,000. Davidson & Weiss, 53 West Jackson Boulevard, Chicago, are architects.

The Department of Motor Transportation, City Hall, Detroit, is having plans prepared for a three-story municipal garage and service building, 760 x 140 ft., estimated to cost about \$600,000. William C. Markham, 312 Marquette Building, is engineer.

The Michigan State Prison Commission has been authorized to purchase a steel factory building for erection at the Ionia State Reformatory, the cost not to be in excess of \$45,000. It will house a shoe shop, toy factory and other metal industries.

The Village Council, Union City, Mich., has completed plans for a municipal hydroelectric power plant, to cost about \$150,000.

The Curran Motor Product Co., Detroit, will open manufacturing headquarters in Philadelphia. Temporary executive headquarters in Detroit will be in the Book Building.

Indiana

INDIANAPOLIS, Feb. 13.

A vocational department will be installed in the new two-story high school to be erected at Bloomington, Ind., estimated to cost about \$175,000. A. Grindle, 122½ Walnut Street, is architect.

Edward E. Dean and William S. Carleton of the Kokomo Machine Co., Kokomo, Ind., have recently acquired the Wiley interests in the company, and in the future will operate

as sole owners of the business. C. W. Adams is general manager.

A vocational department will be installed in the new two-story high school, 125 x 160 ft., now being erected by the Board of Education, North Jifflon, Ind., and estimated to cost about \$125,000. Freymuth & Maurer, South Bend, Ind., are architects.

The Inter-State Car Co., Indianapolis, Ind., completed the addition to its foundry last November and is not making a second extension as reported.

The Varney Electrical Co., Evansville, Ind., is planning for enlargements and improvements in its factory, including the installation of additional equipment. It has increased its capital from \$250,000 to \$400,000 for expansion. H. A. Robertson is manager.

William O. Mainer, trustee in bankruptcy for the Elwood Foundry Co., Elwood, Ind., is planning for the sale of the plant and property of the company, as a going concern, Feb. 23.

A vocational department will be installed in the new one-story high school to be erected at Butlersville, Ind. H. M. Griffin, McFarland Building, Connersville, Ind., is architect.

Pittsburgh

PITTSBURGH, Feb. 13

In a prospective way the past week has been the most active in the equipment market for several months. This is particularly true of cranes, inquiries for which total about 34. The Wheeling Steel Corporation is inquiring for about 20. One list includes one 30-ton and one 40-ton for the blooming mill, one 30-ton for the continuous mill, one 20-ton for the power house, two of 25-ton capacity for the slab yard, two 25-ton overheads for the sheet bar yard, two 150-ton ladle cranes and a 7½-ton revolving jib crane. The latter is for the galvanizing plant at Beech Bottom, W. Va., and was inquired for sometime ago, and the other cranes are for installation at the Steubenville, Ohio works, for which a 30-ton crane also is wanted. The company also has put out a list of eight cranes for its Portsmouth, Ohio works, six of 5-ton capacity and two of 15-ton. The Ritter-Conley Mfg. Co. is asking for bids on six cranes for installation at its plant at Leetsdale, Pa. A 10-ton crane is wanted with a 5-ton and a 10-ton trolley, two 7½-ton cranes, each to be equipped with two 5-ton trolleys, and three 3-ton cranes with single trolley and floor control. The Lorain Steel Co., Johnstown, Pa., is in the market for two 5-ton and a 10-ton crane, all mill type. In addition to these there are individual inquiries for two cranes and three cranes from undisclosed sources.

Business remains extremely limited, but the trade is encouraged by the big increase in inquiries, especially as some give promise of closing at an early date. Machine tool sales also are light, but practically all local dealers and manufacturers' agents are figuring against inquiries and orders are expected to materialize before the end of the month. One house is figuring on six heavy face grinders and expects to close on some shortly. The price situation shows no appreciable change. Competition for orders is keen and buyers are sitting back and letting sellers slash prices and sacrifice profits.

The Allen-Chalmers Mfg. Co. has taken the order for equipment for the slag-crushing plant of the Shenango Furnace Co., Sharpsville, Pa., which is rebuilding the works recently destroyed by fire.

The Keystone Driller Co., Beaver Falls, Pa., manufacturer of oil drilling machinery and parts, has taken bids for three one-story additions, 80 x 100 ft., 60 x 110 ft., and 80 x 80 ft., estimated to cost about \$200,000, with machinery.

The Pen Public Service Co., Johnstown, Pa., has arranged for a bond issue of \$750,000, a portion of the proceeds to be used for plant and system extensions and improvements.

The National Auto Co., Uniontown, Pa., is planning the erection of a new automobile service and repair works, estimated to cost about \$300,000, including equipment.

The Board of Directors, Joint Consolidated Elementary and Vocational High School, Unionville, Pa., will hold in abeyance until spring the completion of the new high and vocational school, two-stories, 112 x 160 ft., foundation work for which has been completed, and will take equipment bids later. Ritter & Shay, North American Building, Philadelphia, are architects.

The Wilton Tool Mfg. Co., 2123 Grand River Avenue, Detroit, will soon commence the erection of a new plant at Sharon, Pa., consisting of two one-story buildings, 50 x 200 ft., and 20 x 100 ft., for general tool manufacture.

The S. B. Dickey Coal Co., Johnstown, Pa., has pre-

liminary plans under way for a new coal mining and handling plant in the vicinity of New Florence, Pa. Bids for electrical and mechanical equipment will be asked later.

The Gilmore Coal Co., Oliver Building, Pittsburgh, will soon commence the erection of a new power house, 35 x 90 ft., at its properties at Venice, Pa., estimated to cost about \$50,000. T. E. Cornelius, Megee Building, Pittsburgh, is engineer.

The Seminole Automotive Accessories Corporation, Charleston, W. Va., recently organized with a capital of \$100,000, will establish a machine and repair department for automobile work in connection with a local accessories plant. H. K. Flynn, 1028 Virginia Street, is president and manager.

The Board of Education, Wayne, W. Va., is taking bids until March 2, for a two-story high school, 110 x 160 ft., with vocational department, and estimated to cost about \$150,000. Holmboe & Pogue, Empire Bank Building, Clarksburg, W. Va., are architects.

Bids will be taken until Feb. 21, by the Board of Education, Charleston, W. Va., for a two-story high school, 60 x 218 ft., to include vocational department, estimated to cost about \$250,000. Warne, Tucker & Patterson, Masonic Temple, are architects.

A power house will be erected in connection with the two-story school to be built by the Board of Directors, Orange Rural School District, Chagrin Falls, Ohio, estimated to cost \$200,000, plans for which are being prepared by Charles W. Bates, 701 National Bank Building, Wheeling, W. Va. Bids will be called for early in March.

Milwaukee

MILWAUKEE, Feb. 13

Unmistakable evidence that there is a definite recovery in the metal-working industry in this territory is imparting confidence to the machine-tool trade. Operating schedules of foundries as well as machine shops are steadily, if slowly, increasing. Most encouraging is the first sign of a revival in the agricultural implement and farm operating equipment industry, which has been out of the tool market for about 18 months. Sharp reductions in selling prices, especially tractors, have brought about an improvement in demand similar to that following the further let-down of automobile selling prices. The immediate benefit of enlarged operations to the tool industry is of small consequence, considering the small margin of profit left by present reductions, but there seems every reason to believe that a fundamental step has been taken toward an enlarging demand which will require a commensurate extension of production. Presently there is no broad need for tools except perhaps for replacement and small additions, but this small requirement is an improvement upon the almost absence of demand for many months past.

The Wisconsin Public Service Co., Green Bay, Wis., a subsidiary of the Wisconsin Securities Co., Milwaukee, has been granted 1922 budget appropriations amounting to \$825,000 for new construction, equipment and development. The most important item is the construction of a new hydro-electric generating plant costing approximately \$500,000 and developing 6200-hp. at Johnson Falls, on the Peshtigo River, near Peshtigo, Wis., a project intermitted three years ago because of unfavorable conditions. Mead & Seastone, consulting engineers, Madison, Wis., are now revising original plans and specifications and will take bids for the construction of a concrete dam, power house, etc., about March 1. C. R. Phenecle, Green Bay, Wis., is vice-president and general manager Wisconsin Public Service Co.; Clement C. Smith, Milwaukee, is president Wisconsin Securities Co.

The Minneapolis, St. Paul & Sault Ste. Marie Railway Co., Minneapolis, has tentative plans for the construction and equipment of a new terminal plant at Park Falls, Wis., involving an investment of approximately \$500,000 in round-house, repair and machine shops, car sheds and other facilities with a 200-car capacity. The engineering department is at work on plans and specifications, which probably will be available to contractors about the middle of March.

The Board of Education, Ashland, Wis., has engaged Kelley & Schefchik, architects, Ashland, to design a manual arts building as an addition to the present high school. It will cost about \$100,000, including machinery and other equipment for vocational training. Bids will be taken about March 20. Samuel Wheeler is secretary of the board.

O. P. Chatfield, formerly of Marinette, Wis., has concluded negotiations with the Commercial Club of Iron Mountain, Mich., by which he will establish a new brass and aluminum foundry, using the abandoned electric light plant building, which he has purchased. The club has contributed \$2,500 in

The St. Croix Falls Wis. Board of Education will be ready to bid about March 1 for the erection of an \$5,000 addition to the present high school for use as a manual training institute and vocational school. The architect is W. L. Albion, St. Paul, Minn. The Terry Schulte Engineering Co., St. Paul, is in charge of the mechanical engineering, and

CONFIDENTIAL

The Pierce Body Co Fomoria Ohio has been incorporated with a capital stock of \$20 000 and has elected J L Carter, president, and M C Lloyd secretary and treasurer

On the 1st of March 1861, the following was sent to the
of the United States, at the residence of the Hon. E. C. Mendenhall, at Spring
City, Ohio, and the following was received from the Hon. E. C. Mendenhall, at
Spring City, Ohio, on the 1st of March 1861.

ENCLOSURE 1 of 3

The Terminal 1 Access Study conducted by Ohio Department of Transportation (ODOT) in 1997, completed plan for new white box refueling and old station plant. It is estimated that it cost about \$80,000 in budget equipment. I right () 103 Marquette Building Detroit, Michigan.

51 JUNE 1963

The Southland Motor & Body Corporation Old Hickory, near Shelbyville Tenn. will install new equipment at its plant. P. A. Wells is secretary and treasurer.

The Ozark Power & Water Co., Joplin, Mo., has arranged for a bond issue of \$2,000,000, a portion of the proceeds to be used for plant and system extensions and improvements.

The S. G. Hoffman Magneto Co., 3932 Olive Street, St. Louis, has broken ground for its one-story works at 3872 Washington Avenue, 100 x 235 ft., estimated to cost about \$50,000. S. G. Hoffman is president.

Lawler & McKinney, Monett, Mo., P. O. Box 311, are making inquiries for machinery for use at a wood-working plant.

F. W. Parks, Prince Building, St. Louis, has plans under way for a three-story automobile service and repair building, 100 x 140 ft., on North Euclid Avenue, estimated to cost about \$50,000.

The American Foundry & Mfg. Co., 2027 Brooklyn Avenue, Kansas City, Mo., will hold in abeyance the erection of its new plant, one story, 90 x 135 ft., estimated to cost about \$35,000, contract for which recently was awarded. It is expected to commence work early in the spring.

The Big Sandy Refining Co., Paintsville, Johnson County, Ky., recently organized, has plans under way for a new refinery with initial daily capacity of about 100 bbl. utilizing crude oil from the Berea fields. Ralph Stafford is president, and Earl Stafford, secretary and treasurer.

The E. B. Hartwell Handle Co., 120 Dock Street, St. Louis, has leased a building for the manufacture of handles and will develop an initial daily capacity of about 40,000. Equipment will be electrically driven, with power furnished from the company's plant. E. B. Hartwell is secretary and manager.

The Lucey Mfg. Corporation, 233 Broadway, New York, manufacturer of oil drilling machinery, engines, pumps, etc., has acquired property at Henryetta, Okla., 100 x 200 ft., for the erection of a new factory branch, 70 x 120 ft.

A vocational department will be installed in the three-story junior high school building to be erected at Springfield, Mo., 60 x 172 ft., with wing, 50 x 70 ft., estimated to cost about \$200,000, bids for which are being taken by Hawkins & Moener, 400 McDaniel Building, architects.

The Universal Co., Oliver and Beaumont streets, St. Louis, manufacturer of automobile tops and other automotive equipment, has acquired property, 135 x 250 ft., for a new three-story plant, to approximate about 100,000 sq. ft. of floor area, and estimated to cost in excess of \$250,000, including equipment.

The Acme Brass & Machine Works, 1628 Oak Street, Kansas City, Mo., has awarded a contract to S. W. Hite, South Park, Kan., for a two-story machine shop, 25 x 115 ft., at 609 East Seventeenth Street.

The Wilson Slaughtering Device Co., 511 American Bank Building, Kansas City, Mo., is arranging for the erection of a new plant in the vicinity of Raystown, Mo., to manufacture special meat cutting and slaughtering equipment estimated to cost about \$50,000. John A. Wilson is president.

Adolph Schmolinski, who has been operating an automobile repair shop at 1552 South Seventh Street, St. Louis, under the name of the Red Star Motor Co., has organized the Cert-N-The Piston Ring Co., with a capital stock of \$50,000, \$30,000 paid, to manufacture piston rings at the address named.

The University of Missouri will open bids at Columbia, Mo., Feb. 21, for the construction of a power plant, also boilers, traveling cranes, etc. Jamieson & Pearl, Arcade Building, St. Louis, are the architects.

Canada

Toronto, Feb. 13

Machinery and equipment dealers are securing a fairly steady volume of business. While big lists are still absent, buyers are entering the market in larger numbers with small lists. Inquiries for various lines are being received, and although some of these are turning into almost immediate sales, the majority appear to be sent out by users who are contemplating buying later. Municipal governing bodies are spending money more freely on equipment for waterworks, sewage and electric plants. On the whole this market is beginning to show steady signs of improvement and the outlook is brighter than it has been at any time since the close of the war. Practically all lines of small tools have been moving freely of late and users are beginning to buy in larger quantities, and at the same time some orders are coming in for future delivery.

The city of Sarnia, Ont., will enter the market soon for the following equipment for its new technical school, which is expected to be opened by next September: Five lathes with 6-ft. bed, 14-in. swing, one to be a tool-room lathe with quick change gears; one 16-in. shaper; one drill press; one universal milling machine; one power hack saw; forges, anvils, vises, etc. In the wood-working department the following machines will be required: One combination cut-off

planer and three wood-turning lathes of different sizes. In addition, a blue print machine will be purchased. All machines will be motor driven.

T. J. Moore, Warton, Ont., is in the market for a double-end matcher for hardwood flooring.

The Dresden Machine Shop & Garage, Dresden, Ont., is in the market for equipment for a machine shop and auto repair shop.

The Malcolm Furniture Co., Listowel, Ont., is in the market for equipment for a machine shop, including small metal working tools, drills and lathes.

The Canadian Tobacco Growers' Co., Kingsville, Ont., is in the market for tanks, shredders and special machinery for the manufacture of fertilizers for tobacco growers.

The Holden Co., 354 St. James Street, Montreal, has assumed control of the Canadian Brake Shoe Co., Sherbrooke, Que., manufacturer of electric steel castings, etc., and is in the market for a punch and shear. New tools are preferred, but second-hand or re-manufactured machines in good condition will be considered for prompt delivery. N. J. Holden, president Holden Co., is president of the reorganized Brake Shoe company. The board of directors of the Holden Co. comprise largely the directors of the Canadian Brake Shoe Co., and as the Holden Co. has interests in other plants, machinery from some of these is being moved to Sherbrooke in an endeavor to consolidate the Holden manufacturing activities in one plant.

The Fraser Bruce Co., Montreal, will shortly commence construction on four ships at its Three Rivers, Que., shipyard.

The Canadian Pacific Railway will construct mechanical coaling plants at Estevan, Sask.; Swift Current, Sask.; Medicine Hat, Alta., and La Riviere, Man., to cost \$17,000 each. J. C. Holden, Winnipeg, is district engineer.

La Cie de Machinerie Merciere, St. Laurent Street, Levis, Que., will build an addition to its machine shop at a cost of \$20,000. N. J. Merciere is manager.

The town of Bright, Ont., is contemplating the installation of an electric light and power plant. George Oliver is clerk.

The town of Southampton, Ont., contemplates installing a power system. D. MacAuley is clerk.

T. Dick, Jr., president National Sand & Material Co., Welland, Ont., has signed a contract with the Collingwood Shipbuilding Co., Collingwood, Ont., for the construction of a sand and gravel carrier with a capacity of 2200 cu. yd. Mr. Dick stated that he could have let the contract in Glasgow, Scotland, at a saving of \$30,000, but as the boat is to be used on Canadian public and municipal works, also in view of the unemployment in Ontario, he thought it best to have the shipbuilding done in Canada. The company has increased its staff by 150 men.

The Fleming Publishing Co., Ltd., Owen Sound, Ont., is in the market for a 3-hp., variable speed 550-volt, three-phase, 60 cycle motor, about 1200 r.p.m.

The Bain Wagon Co., Ltd., Woodstock, Ont., advises that its plant has not been acquired by the Ford Motor Co., as stated in these columns Feb. 2.

The Gulf States

BIRMINGHAM, Feb. 13.

The Todd Shipyards Corporation, 25 Broadway, New York, has acquired property of the Mobile Shipbuilding Co., Mobile, Ala., for the establishment of a new branch plant. William H. Todd is president.

The Dallas Power & Light Co., Dallas, Tex., has preliminary plans under way for extensions in its electric power plant and system, including the installation of considerable new equipment. C. W. Davis is vice-president and general manager.

The Sterling Carbon Co., Sterlington, La., is planning to rebuild the portion of its plant, including machine shops and power house, destroyed by fire, Jan. 11, with loss estimated at close to \$30,000.

The Common Council, Dothan, Ala., has arranged a special election to vote bonds for \$70,000, a portion of the proceeds to be used for the erection of an addition to the municipal electric power plant.

The Singer Sewing Machine Co., 149 Broadway, New York, has tentative plans for a new works at Tallulah, La., to manufacture sewing machine cabinets, cases, etc. It has a large tract of timber property in this section.

The Humphreys-Pure Oil Co., Mexia, Tex., has completed plans for a one-story machine shop, 60 x 100 ft., to be used primarily for automobile repair and parts manufacture, in conjunction with a new one-story service building and garage, 60 x 100 ft., for company trucks and cars, now in course of construction.

The A. B. C. Millwork Co., 8 Jackson Street, Fort Myers, Fla., is planning for the establishment of a new factory to manufacture store fixtures, show cases, etc. A list of equipment is being prepared.

New England

Boston, Feb. 13.

The General Electric Co., Lynn, Mass., the past week issued a list of 42 machine tools for an experimental shop, to be applied to fine measurement work. While price is a consideration, early deliveries are the primary factor. In addition, the company is inquiring for a comparatively large amount of heavy equipment, including 12 large vertical milling machines, two 42-in. vertical boring mills, six heavy plain horizontal milling machines, four large horizontal boring mills, four medium sized lathes and other equipment, presumably for its Gloucester, Mass., works. The heavy equipment is part of a list originally issued months ago and abandoned because of business conditions. Since then the company has drawn on several of its New England subsidiary plants for equipment needed at Lynn.

With the exception of the above list the local machine-tool market has been without special feature. Sales have been small, amounting in the aggregate to perhaps a dozen pieces of equipment to as many different concerns. The H. B. Smith Co., Westfield, Mass., list has not been covered. Prices given this company by used machine-tool dealers here and elsewhere practically eliminate representatives of builders.

It is believed the Maine Central Railroad will close on its three tools, one of which is a driving wheel lathe, before the end of the week. While nothing authentic has been given out, it is the opinion that the Bangor & Aroostook, the Central Vermont and the Rutland railroads will take some definite action on their lists within the next month or two. Purchases against the Boston & Albany list probably will be extended over the entire year.

The inquiry of Gray & Davis, Cambridge, Mass., for special automatic machinery, involves large equipment and competition is keen. Prices for automatic equipment, on the surface, appear weaker than the ordinary run of machine tools. Certain makers of lathes, however, are willing to make concessions, provided the business warrants, and prospective customers report low prices have been named.

The prospect of a general strike in the cotton textile industry, as a result of a cut in wages, has resulted in a few withdrawals of inquiries for machine tools. The rubber mold making trade, on the other hand, is more active, most of the plants operating on full schedules and showing more or less interest in metal-working equipment.

The crane market is slightly more active. The Lanson Co., Boston, has purchased one 10-ton crane for its new New York State plant and a Rhode Island oil refinery bought two 2-ton cranes. Stone & Webster, Boston, are inquiring on one 15-ton crane with a 33 ft. span, three motor, for the Ford, Flat Rock, Mich., development.

The Rhode Island Malleable Iron Works, Hills Grove, R. I., will shortly erect a one-story, 67 x 252 ft., manufacturing unit.

The Hartford Electric Light Co., Hartford, Conn., has awarded contract for a one and two story addition, 80 x 160 ft., to its plant on Sheldon Street.

The Board of Fire Commissioners, New Britain, Conn., have plans for the erection of a repair shop to cost about \$6,500.

The Eastern Mfg. Co., Norwalk, Conn., has recently been incorporated under Connecticut laws to manufacture timer protectors, internal combustion engines, tools and equipment for motor vehicles. The capital stock is \$50,000 and the officers are Phillip H. Fielding, 20 Pleasant Street, East Norwalk, president and general manager, Frank N. Glover, vice-president and secretary, and Charles P. Fielding, treasurer.

The Clapes Brothers Garage Co., West Main and Virgil streets, Stamford, Conn., will erect a garage and service station on the Boston Post Road, one-story, 55 x 70-ft. It will contain a repair shop.

Fire, Feb. 5, destroyed a building at the plant of the Trumbull-Vanderpool Electric Mfg. Co., Bantam, Conn., with loss estimated at about \$20,000.

A vocational department will be installed in the new two-story high school at Palmer, Mass., estimated to cost about \$168,000. E. C. & G. C. Gardner, Springfield, Mass., are architects.

The George Grow Tire Co., 323 Columbus Avenue, Boston, has awarded a contract to Coleman Brothers, Inc., Boston, for a one-story, reinforced-concrete addition to its plant on Jackson Street, Canton, Mass., 41 x 101 ft., estimated to cost about \$50,000.

A vocational department will be installed in the proposed addition to be erected to the Salem, Mass., high school, for which an appropriation of \$250,000 is being arranged.

The Crompton & Knowles Loom Works, Harris Avenue, Providence, R. I., manufacturer of textile machinery, awarded contract to Bowerman Brothers, 230 Industrial Trust Building, for a one-story addition, 26 x 105 ft.

A one-story automobile service and repair building for company cars will be erected by the National Betting Co., 28 School Street, Boston, to be 75 x 133 ft., and estimated to cost about \$12,000. The F. J. Van Elten Co., 80 Boylston Street, is contractor.

A one-story steam power house, 26 x 32 ft., to cost about \$30,000, will be erected by the Fall River Gas Works Co., 21 Manton Street, Fall River, Mass.

The John Hugo Mfg. Co., New Haven, Conn., has recently filed a certificate to increase the capital stock of the company from \$50,000 to \$150,000.

Buffalo

BUFFALO, Feb. 13.

The Chevrolet Motor Co., Flint, Mich., with eastern plant at Tarrytown, N. Y., has arranged for the erection of a new three story, reinforced-concrete branch on Delaware Avenue, Buffalo, totaling about 10,000 sq. ft. A portion of the building will be given over to assembling and other operations, and the remainder as a distributing plant. Elwood M. Harris is local manager.

The Pyrene Mfg. Co., Inc., 17 East Forty-ninth Street, New York, will operate a new plant in three buildings secured from the Wickwire-Spencer Steel Corporation, Buffalo, for the manufacture of tire chains. The organization will be known as the Off & On Chain Corporation, a subsidiary. It is proposed to concentrate all manufacturing at this point. O. H. Christie is local manager.

The Bolivar Refining Corporation, Bolivar, N. Y., has preliminary plans under way for the erection of a local refinery. Charles A. Chapman is president.

The iron and metal working plant of Hyman L. Lapides, Maple Street, Danville, N. Y., was partially destroyed by fire, Feb. 6, with loss estimated at about \$17,000.

A vocational department will be installed in the new high school to be erected at Corning, N. Y., to be known as the Corning Free Academy. Howard Greenley and F. H. Dewey & Co., Inc., 175 Fifth Avenue, New York, are architects and engineers.

The Pierce Arrow Sales Co., Buffalo, 1695 Elmwood Avenue, has acquired property at Main and Riley streets, 38 x 300 ft., for the erection of a building for service works and headquarters.

John P. Jackel, City Hall, Auburn, N. Y., city manager, has completed plans for a one story municipal automobile service and repair building, 38 x 119 ft., for city cars. M. J. Duffee, City Hall, is engineer.

Plans of New Companies

The Morrison Concrete Products Co., Pleasantville, N. J., has taken over the business and equipment of Horace Morrison for the manufacture of blocks, cast stone and concrete products in general. The company expects to build on a plot which it has purchased. Its present plant is in full operation.

The Automotive Appliances Mfg. Co., New Brunswick, N. J., is having all its work done by contract and has arranged all contracts with the exception of a small high speed lathe with electric motor. It is making a specialty of a patented oil cock for Ford cars.

Frank Harris Sons Co., Inc., 332 South Michigan Avenue, Chicago, has been incorporated in Illinois with power to purchase and liquidate plants of all kinds, properties, railroads, inventories, etc., and to carry on a general trading and merchandising business. The aim of this company will be to secure greater realization from assets than was heretofore obtainable through public auctions, private negotiations, etc. The company has a staff of merchandising experts in nearly every field, and will enjoy the benefits of co-operation with New York and Chicago financiers. Organizers of the company are Harvey L. Harris and Francis L. Harris, both formerly connected with Harris Brothers Co., Chicago.

Henning Brothers & Smith, Inc., smelters and refiners of metals, Engert Avenue at Eckford Street, Brooklyn, have not yet perfected plans but expect to erect a building with about 10,000 sq. ft. of ground space. The company will be in the market for equipment by next spring.

The Philadelphia office of the Hauck Mfg. Co., manufacturer of portable oil burners, torches, furnaces, etc., has been moved to 1726 Sansom Street. Herbert Vogelsang, who has been connected with the company for six years, will be in charge.

Current Metal Prices

On Small Lots, Delivered from Merchants' Stocks, New York City

The following quotations are made by New York City warehouses.

As there are many consumers whose requirements are not sufficiently heavy to warrant their placing orders with manufacturers for shipment in carload lots from mills, these prices are given for their convenience.

On a number of articles the base price only is given, it being impossible to name every size.

The wholesale prices at which large lots are sold by manufacturers for direct shipment from mills are given in the market reports appearing in a preceding part of THE IRON AGE under the general heading of "Iron and Steel Markets" and "Non-ferrous Metals."

Iron and Soft Steel Bars and Shapes

Bars:	Per Lb.
Refined bars, base price	2.53c.
Swedish bars, base price	10.00c.
Soft steel bars, base price	2.53c.
Hoops, base price	3.38c.
Bands, base price	3.13c.
Beams and channels, angles and tees	
8 in. x 1/4 in. and larger, base	2.63c.
Channels, angles and tees under 3 in. x 1/4 in., base	2.53c.

Merchant Steel	Per Lb.
Tire, 1 1/2 x 1/2 in. and larger	2.50c.
(Smooth finish, 1 to 2 1/2 x 1/4 in. and larger)	2.70c.
Toe-calk, 1/2 x 3/4 in. and larger	3.20c.
Cold-rolled strip, soft and quarter hard	6.25c. to 7.25c.
Open-hearth spring steel	3.55c. to 6c.
Shafting and Screw Stock:	
Rounds	3.45c.
Squares, flats and hex.	3.95c.
Standard cast steel, base price	12.00c.
Extra cast steel	17.00c.
Special cast steel	22.00c.

Tank Plates—Steel

1/4 in. and heavier	2.63c.
---------------------	--------

Sheets

Blue Annealed

	Per Lb.
No. 10	3.28c. to 3.53c.
No. 12	3.33c. to 3.58c.
No. 14	3.38c. to 3.63c.
No. 16	3.48c. to 3.73c.

Box Annealed—Black

	Soft Steel C. R., One Pass Per Lb.	Blued Stove Pipe Sheet, Per Lb.
Nos. 18 to 20	3.55c. to 3.80c.	.....
Nos. 22 and 24	3.60c. to 3.85c.	4.10c.
No. 26	3.65c. to 3.90c.	4.15c.
No. 28	3.75c. to 4.00c.	4.25c.
No. 30	4.00c. to 4.25c.	.....
No. 28 and lighter, 36 in. wide, 10c. higher.		

Galvanized

	Per Lb.
No. 14	3.85c. to 4.10c.
No. 16	4.00c. to 4.25c.
Nos. 18 and 20	4.15c. to 4.40c.
Nos. 22 and 24	4.30c. to 4.55c.
No. 26	4.45c. to 4.70c.
No. 27	4.60c. to 4.85c.
No. 28	4.75c. to 5.00c.
No. 30	5.25c. to 5.50c.
No. 28 and lighter, 36 in. wide, 20c. higher.	

Welded Pipe

Standard Steel		Wrought Iron	
	Black Galv		Black Galv
1/4 in. Butt...	—56 —40	1/4 in. Butt...	—30 —13
1/2 in. Butt...	—61 —47	1 1/2 in. Butt...	—32 —15
1-3 in. Butt...	—63 —49	2-in. Lap....	—27 —10
3 1/4-6 in. Lap.	—60 —46	2 1/2-6 in. Lap.	—30 —15
7-8 in. Lap...	—56 —34	7-12 in. Lap..	—23 —7
9-12 in. Lap..	—55 —33		

Steel Wire

	Per Lb.
Bright basic	3.50c. to 3.75c.
Annealed soft	3.50c. to 3.75c.
Galvanized annealed	4.25c. to 4.50c.
Coppered basic	4.00c. to 4.25c.
Pinned soft Bessemer	5.50c. to 5.75c.

*Regular extras for lighter gage.

Brass Sheet, Rod, Tube and Wire

BASE PRICE

High brass sheet	17 1/4 c. to 17 1/2 c.
High brass wire	17 1/4 c. to 17 1/2 c.
Brass rod	14 1/4 c. to 15 c.
Brass tube, brazed	26 c. to 27 1/2 c.
Brass tube, seamless	18 1/2 c. to 19 c.
Copper tube, seamless	21 1/4 c.

Copper Sheets

Sheet copper, hot rolled, 24 oz., 21c. to 21 1/2 c. per lb. base.	
Cold rolled, 14 oz. and heavier, 2c. per lb. advance over hot rolled.	

Tin Plates

Bright Tin	Grade	Grade	Coke—14-20	Primes Wasters
	"AAA", Charcoal 14x20	"A", Charcoal 14x20	80 lb....	\$6.05 \$5.80
	IC..	\$8.50	90 lb....	6.15 5.90
	IX..	11.25 10.00	100 lb....	6.25 6.00
	IXX..	13.00 11.50	IC...	6.40 6.15
	IXXX..	14.75 13.25	IX...	7.40 7.15
	IXXXX..	16.25 15.00	IXX...	8.40 8.15
			IXXXX..	9.40 9.15
			IXXXX..	10.40 10.15

Terne Plates

8-lb. Coating 14 x 20

100 lb.	\$7.00
IC	7.25
IX	7.50
Fire door stock	10.00

Tin

Straits, pig	34c.
Bar	40c. to 45c.

Copper

Lake ingot	15 c.
Electrolytic	14 1/4 c.
Casting	14 1/2 c.

Spelter and Sheet Zinc

Western spelter	6 1/4 c. to 7c.
Sheet zinc, No. 9 base, casks	10 1/2 c. open 11c.

Lead and Solder*

American pig lead	5 1/4 c. to 6 1/4 c.
Bar lead	6 1/4 c. to 7 c.
Solder, 1/2 and 1/2 guaranteed	24c.
No. 1 solder	22c.
Refined solder	18c.

*Prices of solder indicated by private brand vary according to composition.

Babbitt Metal

Best grade, per lb.	75c.
Commercial grade, per lb.	35c.
Grade D, per lb.	25c.

Antimony

Asiatic	6 1/4 c. to 6 1/2 c.
---------	----------------------

Aluminum

No. 1 aluminum (guaranteed over 99 per cent pure), in ingots for remelting, per lb.	26c. to 28c.
---	--------------

Old Metals

Business is very discouraged and transactions are scarce. Dealers' buying prices are nominally as follows:

	Cents Per Lb.
Copper, heavy crucible	11.00
Copper, heavy wire	10.00
Copper, light and bottoms	8.00
Brass, heavy	5.25
Brass, light	4.50
Heavy machine composition	7.75
No. 1 yellow brass turnings	5.25
No. 1 red brass or composition turnings	7.25
Lead, heavy	3.75
Lead, tea	2.50
Zinc	3.50

THE IRON AGE

New York, February 23, 1922

ESTABLISHED 1855

VOL. 109, No. 8

Side Line Tides Foundry Over Depression

Sporting Goods Castings Kept Foundry Going—Showed
Considerable Increase in 1921—Application of
Special Metal to New and Difficult Field

BY MORRIS A. HALL

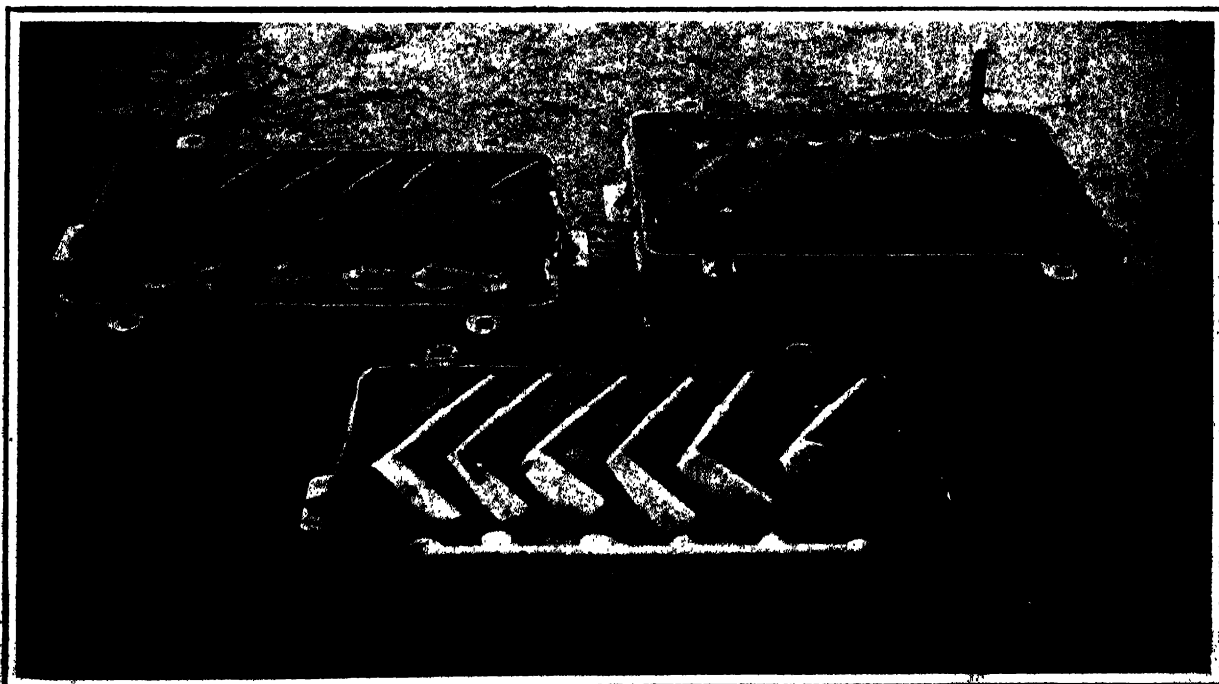
IT has often been said in jest, "If your business interferes with your pleasure, give up the business." Yet there is a great deal of truth hidden in that supposedly humorous remark, for, no matter how poor business may be, the business man seldom gives up his pleasures or recreations, especially the out-of-doors ones which help conserve his health. One foundry has learned this in the last two years, and has continued to do a fine business in a small side line, which happened to be of a sporting nature, when all other business fell off or was canceled because of dull times.

This foundry is that of the Monel Metal Products Corporation, Bayonne, N. J., a subsidiary of the International Nickel Co., and the active agent for pushing the latter company's natural copper-nickel alloy. This metal is not an easy one to handle, and the plant is primarily a laboratory for the purpose of finding out all there is to know about the metal, its melting, molding, casting, and general handling and use, and is actively engaged in disseminating this information. Incidentally, in seeking new fields of use for the metal, the

plant takes in a considerable amount of job foundry work in monel metal, and some in nickel.

In seeing new fields for the metal and more work for the foundry, golf club heads were tackled several years ago. It is a well-known fact that the advanced golfer is very particular about his clubs, especially his irons. In caring for these, however, it is found that they rust easily. This is probably due to the fact that, in use on the links, they become wet or damp, with no means of drying them until the club house is reached an hour or two later. When the iron has rusted, it can be cleaned up only by buffing, or grinding and buffing, according to how badly it has rusted. This process changes the size and shape, and with it the hang of the club, for no matter how minute the amount of metal taken off, several repetitions of this treatment make an appreciable difference.

Monel metal is both rust- and acid-proof, consequently it fits well into this service. Moreover, it has a nice white color, not unlike silver, which gives it a good appearance. As it is hard, like steel, it wears well;



Cope and Drag Molds for a Group of Six Golf Club Heads; in the Foreground is Another Drag Mold with the Pattern and the Gate Pattern in Place

as it is strong, it will withstand the hard knocks equally as well as steel heads. In addition, it is slightly more resilient than steel, so that the ball will leave a monel metal head "clean," and with just the right "feel."

If desired, it can be given a very high polish, and when polished, it will retain this beautiful surface sheen much longer than other metals. When given its normal dull finish, that of a razor or of a nickel piece



Group of Twenty-eight Representative Golf Club Heads Made in Monel Metal

after some use, it can quickly be restored by the use of soap and water, or by rubbing with sand.

The fact that it is a cast metal, and when cast has the properties of forged steel, makes it possible to duplicate any head or to copy the best imported forged heads from the leading Scotch cleek makers, without variation, quickly and, comparatively speaking, cheaply. Granting all these qualities, it was simply a matter of getting golfers to try the new metal, when it was at once established as satisfactory. Since that happened, several years ago, the plant has been making these heads in considerable quantities for a New Jersey firm, which finishes them up in final club form with handles, and markets them.

This business has grown slowly, but surely, and now has reached the point where it forms a considerable portion of the work done. Moreover, it has not dropped off during the recent dull times. In fact, some 35,000 of these heads were turned out in 1921, up to the middle of September, with the business continuing so strongly as to indicate the year's total at above 45,000. For 1922 the company expects to turn out about 60,000. In 1920 the number was very much less.

This could hardly be classified as "tonnage," for the heads average 0.6 lb. each. This makes a gate of six of them, with very large risers and wide gates, total less than 10 lb. One illustration gives an idea of the wide variety of the styles which are being made now; these 28 shapes, however, do not represent all that are made, as new shapes are constantly being added as demand develops for them. As has been said, the metal is not an easy one to handle, but so many of these golf heads have been turned out from the plant that valuable experience has been gained and they are now handled very readily, cheaply and quickly.

It has been found that this metal gives the best results only with baked molds, as well as baked cores; but in very small articles, weighing a pound or less, such as these golf heads, the molds are made in green sand. A complete mold is shown ready for closing; in the background at the right is the cope, at the left

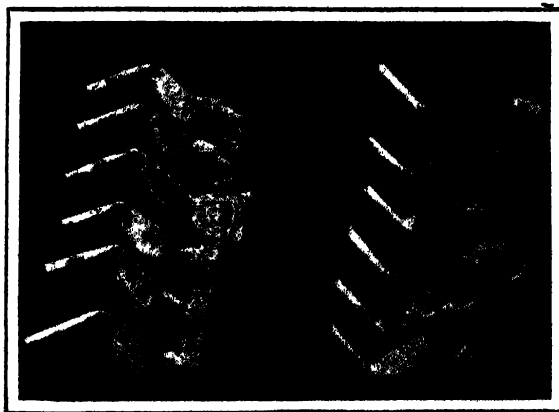
the drag, and in the foreground another mold with the patterns in place.

While cast as a gate, these patterns are individually not gated, so that it is possible to change the shapes very quickly. A new pattern is simply substituted for the one which is least wanted, and the molding goes on exactly as before. In molding the metal, very wide gates and many large risers must be used, because the metal is not easily held in a fluid state. It has to be heated to 3000 deg. Fahr. in melting, but does not hold this high temperature for any length of time, and must be poured quickly. Hence the molds are made up with wide gates and easy bends, so as to lead the metal to the molds quickly, while still hot. This can be noted in the pattern for the gate, used for quickness and convenience, to be seen in the front of the cut, and also visible in the cope at the rear.

Another photograph shows a front and a rear view of a gated group of golf heads, where the gates will be noted to be practically as wide as the widest part of the molds. The large amount of metal in the gates and risers, approximating 50 to 55 per cent of the total metal, will be noted, as well as the size and shape of the leads from the main gate to the individual patterns, very short, wide and with easy bends, to lead the molten metal to place quickly.

The metal is poured from ladles holding 100 to 150 lb., after pouring and deoxidizing with magnesium, using 1½ oz. per 100 lb. This is a continuous process, as many molds being poured each heat as are ready for pouring, and the molding going on continuously. They are bench molded, and are rammed up by hand.

After castings, like those shown, are ready, the excess metal of gates and risers is cut off, and is cleaned before being charged back into the furnaces. An average furnace charge is 40 per cent scrap and 60 per cent new metal. The cutting off is done with a very fine alundum wheel for this small stuff, but large risers are



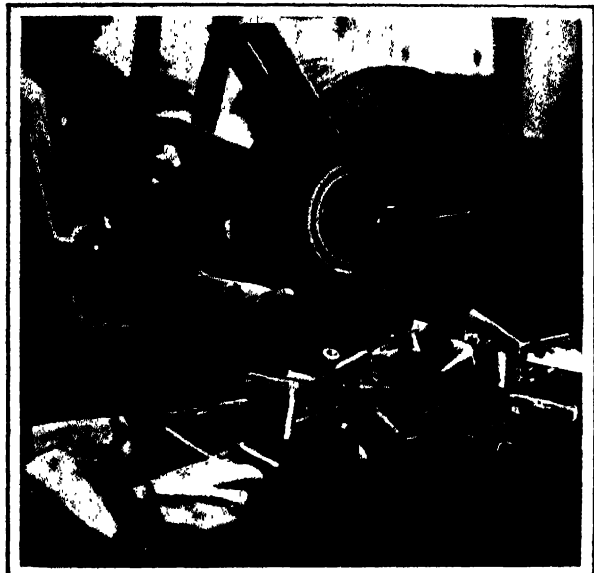
Front and Rear Views of a Complete Gated Group of Six Heads, Showing the Unusual Width of Gates and Size of Riser

cut off with the oxy-acetylene torch. After cutting apart, the individual castings are ground to a clean, smooth surface.

This is rather a nice job, because the shape as cast closely approximates the shape desired, and only enough metal should be taken off to produce a smooth, even surface. Special holding fixtures are not used, since this would run the expense up too high, but these are approximated by holding the heads in formed soft pine blocks, and grinding them while so held. These blocks are 4 x 3 x 1½ in., this being large enough, on the one hand, to receive the golf head, and a good size for the workman, on the other.

The head is slipped into a block and held up to the grinding wheel and the grinding completed as quickly as possible. But this is not an instantaneous process, as one might think, for the surface is quite hard and

a number of applications are necessary. One photograph shows this work, with a supply of the partly ground heads visible at the right, and, at the left, some of the wooden forms for holding them in contact with the wheel. As this view shows, a large and wide wheel is used, this being a Norton alundum, 14 x 2½ in., grain 29, grade 2. The operator soon acquires great skill in producing the required smooth surface without



Simple and Quick Method of Grinding Golf Club Heads to a Commercial Finish by Use of Wooden Holding Forms

taking off much metal, and this, in turn, becomes a factor in turning the heads out quickly and cheaply.

After the grinding is completed, the socket for the handle, which has been cored out slightly, is reamed. For this purpose a special taper reamer is used and the heads, which usually have a very mean shape with nasty angles, are held in a special vise with hinged jaws. Both the reamer and the vise can be seen in one view, a drill press being used for this work. The heads are slid into the vise from below, a turn of the handle catches them, the drill press arm is drawn down, moving the reamer into the cored hole. A little more pressure, and in a second the socket is complete. In this form, the golf heads are completed so far as this plant is concerned, and are ready for delivery to the sales agents, who fit the handles and distribute them.

As can be seen, this small part, forming very much of a side line in the beginning, and still not important from a tonnage basis, has nevertheless kept the plant turning over through the dullness of 1920 and 1921, and bids fair to go even further in 1922. The number of heads in 1921 will show close to 40 per cent increase over 1920, and the present estimate for 1922 shows a further increase of about 35 per cent. Considering general business conditions and these figures, we have to go back to our starting point for an explanation that business may be poor, but certain sports or recreations go on forever. A good tip for foundrymen, taken from this instance, would be: "in dull years, get into some form of sporting goods production."

T. E. Keating, general engineer of the Westinghouse Electric & Mfg. Co., presented a paper before the Cleveland section of the American Institute of Electrical Engineers Feb. 21, on "Power Plant Economics with Special Reference to the Steam Turbine."

In 1921 the United States imported 3,365,732 tons of manganese ore, 1,952,848 tons coming from Brazil, 734,516 tons from British India, 965 tons from Japan, 679 tons from Cuba and 676,724 tons from other countries.

Railroads of Japan

An annual report for the year ending March 31, 1919, with supplementary data for the following year, has just been issued in English by the Department of Railroads of the Government of Japan. This consists of a book of 116 pages, 8½ x 12 in., and includes a large amount of tabulated data concerned chiefly with the financial operation of the state railroads. Some attention is paid also to the privately operated railroads and tramways in Japan. A folder in the back contains a comprehensive map of Japan with the railroad systems clearly outlined.

Some of the outstanding features in the 1920 report include the railroad extent as 6133 miles, the train mileage as 77,222,058, and car mileage as 1,644,562,327. This works out at 21.1 cars average per train and at 26,815 car miles per mile of line. It shows also 1259 train miles per mile of line. Passengers to the total of 357,881,957 were carried a total distance of 7,942,632,396 miles, or an average journey of 22.2 miles. Freight to the extent of 59,939,635 tons was carried an aggregate of 6,293,798,261 miles, or an average of 105 miles per ton. This works out at 1,311,000 passenger miles and 1,026,000 freight ton miles per mile of line.

Small cars are the rule, for the aggregate capacity of the 51,067 freight cars is 570,192 tons, or 11.17 tons per car, on the average. And the average number of passengers carried per car is but 14.8, there being an average of 13.6 cars in each passenger train. Locomotives number 3120, with an aggregate weight of 194,655 tons, or an average of 62.4 tons each.

Labor Efficiency Related to Hours of Work

Labor efficiency, in a statement by the American Engineering Council, is said to be higher with three 8-hr. shifts than with two 12-hr. shifts. This is the conclusion of a committee on work periods in continuous industries, with special reference to the steel industry. Investigations thus far have been to a great extent



Swivel-Jaw Vise and Special Taper Reamer Used in Drill Press to Ream Out Sockets to Fit Handles

outside the steel industry. There are said to be from 40 to 50 industries involving a certain amount of continuous operations, and, as a class, these industries underlie a large portion of our industrial fabric.

As there are still a great many plants operating with 12-hr. shifts, the matter of fatigue and labor efficiency assumes importance. It is estimated that the number of shift workers in the United States is somewhere between 500,000 and 1,000,000. It is also estimated that the number of men on 12-hr. shifts in the period preceding the depression was about 300,000. About as many of these were outside the steel industry as were in it, and, as might be expected, the results in efficiency of working have varied enormously in different plants, depending upon conditions. It is stated that in most of the plants which have recently changed from two shifts to three, efficiency was not greatly improved, due to unfavorable labor conditions.

TAKING INITIATIVE IN BUYING

Importance of Knowing the Market Where to Get Machines, Supplies, Men

BY JOHN J. RALPH

With the realization that purchasing is an opportunity, that the neglect to buy costs money and that unwise buying is inexcusable, there logically follows the realization that the initiative should be taken by the buyer and not by the seller. The tenseness of the conditions of the past six years has added appreciation to the importance of buying, but not particularly to the betterment of the technique. There developed a realization that buying was a necessity its perfection was assumed to be simply a lengthening of the purse at the buyer's disposal.

There has grown up in our popular business literature a curious appreciation of love and sentiment in the relation between buyer and seller. At times this has been quite pushing. Just a little common sense. There is but one real long time basis for relations between buyer and seller:—"The biggest possible re-sale value for a dollar." That is all, just simply value that we can pass on to those who buy from us.

Another bit of cynicism—"Loyalty, like gratitude, is a lively expectation of favors to come." There has been a rather naive feeling that loyalty of the buyer meant coming back as a customer regardless! Nay, nay. True loyalty, like parental love, chasteneth.

It is due to the seller to bring it sharply to his attention when he has failed to come up to or beyond the average. There has grown up a system of extraneous services which have been and are very costly. The buyer has paid for them. When the use of automatic and semi-automatic machinery, and high capacity cutting steels, was in its infancy the services were justified. To-day, he who demands them pays for them and they should not be a general charge on all buyers.

No buyer is interested in anything in his purchase that he cannot sell. Any other service his dollar buys is sheer waste, from a profit standpoint.

Determination of Needs

One of the largest expenses of the seller is that of searching for business and selling. Just as those who buy from you must pay for this, so do you pay for the expense to which those who sell to you have been put. This is particularly interesting, because that additional expense is an item for which there is no tangible equivalent, but which must be passed on to the next customer. If your competitor has found a way to eliminate this, there is only one fund to pay it from—the profit account.

Day after day salesmen tell customers: "If you need it, you pay for it, whether you get it or not." Perfectly logical, is it not? If the material being sold would save them money, they are paying for it and more too—and the profit account shows the loss. If the machine offered is needed, but not bought, the operating and capital account show the expenditure, but inventory and profit account are shy.

Day after day salesmen are saying it to you. And they are proving it. Sometimes it takes three, four, five, even twenty years to prove it. Talk to your own salesmen about their experiences, and check back on that last piece of apparatus purchased, that proved up so handsomely, and see when it was that the salesman handling that line of machinery first approached you on the subject!

You finally came to it and are now enjoying the fruit of it, but how are you going to get back the profits lost through not buying when you first needed it?

Knowing What the Market Affords

The market? How many of us have any realization of the extent of the available supply?

In a little village in Massachusetts is a real buyer. For twenty years he had patronized a small section of the earth for a certain material. He bought in New

York from one of three or four jobbers, who in turn bought from three or four German firms. Without doubt they were his best suppliers. For years they had faithfully met his requirements. Having a canny knowledge of the world, and being a real citizen of it, he knew what was happening in 1914, and went into the markets of the world.

Two years later he showed me curiously marked and odd sized barrels and boxes from the interior of China, from India, from Honduras, from Spain, from the Dutch East Indies. Yes, and there were packages which came from New York and California, from Canada and Mexico, and from all between.

Have you asked your salesmen to tell you of their experiences from 1914 to 1921? How purchasing agents, superintendents, owners, came to them seeking this and that? Asking how certain operations could be done. What machines would do the work best, what substitutes could be used for some material to obtain this effect or that? In New York men ran around with rich contracts in their hands, eagerly hunting for men to take them. Some paid three and four prices for second-hand machinery, and begged for supplies.

That was the test of the advancement of purchasing art in this country. Overloaded and at sea, forced to listen to wild demands, and wildly searching for assistance, much of our purchasing talent lost its head and neglected the commonest assistance. Ask your salesmen what purchasing agents they assisted, just by searching the index of THE IRON AGE and turning to the proper page.

Do they remember how cordially they were thanked, and how their word was taken as that of a priest, when they gave information about some other fellow's line—and the dark looks of suspicion when they told of machine capacities, delivery situation and probabilities in their own line?

Conditions have changed. No more do salesmen avoid factories because they cannot make deliveries. Once more they are combing the highways and byways for business. It is once more a buyer's market, but the necessity of purchasing is not relieved. Nor are the rewards of intelligent buying less than they were.

To-day's Opportunities

As the market is world wide, competition will be world wide. Sellers and buyers do not fully realize this. As sellers, how many of us look out of the beaten path for business? How many have considered going away from home to supply other needs? How many have investigated other industries, and far away sections of this country, to see what they have and want?

Who sells us, and from whom do we buy? Do we know what this country affords in materials? Do we know from whom they are to be obtained? Do we know the relative values of materials of different kinds? Do we know the trade practices, how they work to our advantage and how to our disadvantage?

If the foundry now supplying your castings burns up, and your patterns with them, do you know who could turn out patterns for you in the shortest possible time, and whom you could call upon to deliver castings of superior quality?

Suppose the "Old Man" were to bring home a contract to make a new line of machinery, to fit a new mill, to be running before the sugar cane is ripe.

Where will you get the extra drafting and design talent? Who has equipment and shop facilities you can use to supplement your own? Who can supply the special materials necessary in this work? How will you go about to obtain the information you do not know?

How can you send out information of your wants to the concerns specializing in supplying materials for this work—concerns of whom you have never heard?

How will you check up to find the reliability of your new suppliers?

It is not a repeat order. It is a chance to make a single profit, and to fill in the present gap in production, he has seized. Some additional machines will be needed. Second-hand ones will do. Who has them? Where can you find out about them? Who is reliable?

French Investigation of Rail Failures

Causes of the Increasing Number—Effect of Exfoliation
—Rapid Corrosion of Rails—Segregation
and Poor Quality Metal

IN *Le Genie Civil* for Nov. 19, there is an article taken from a paper on rail failures by the eminent French investigator, Charles Fremont, who was led to carry out this work because of the frequency of rail failures in France. It is estimated the number in France is 2500 to 3000 per year. Records show also

detached, leaving a fissure which gradually increases and divides the head of the rail, as shown in Fig. 2.

The question arises whether the exterior fissures are the cause of the interior cavity or, on the other hand, whether the interior fissure is not formed first and finally reaches the surface. To determine this,

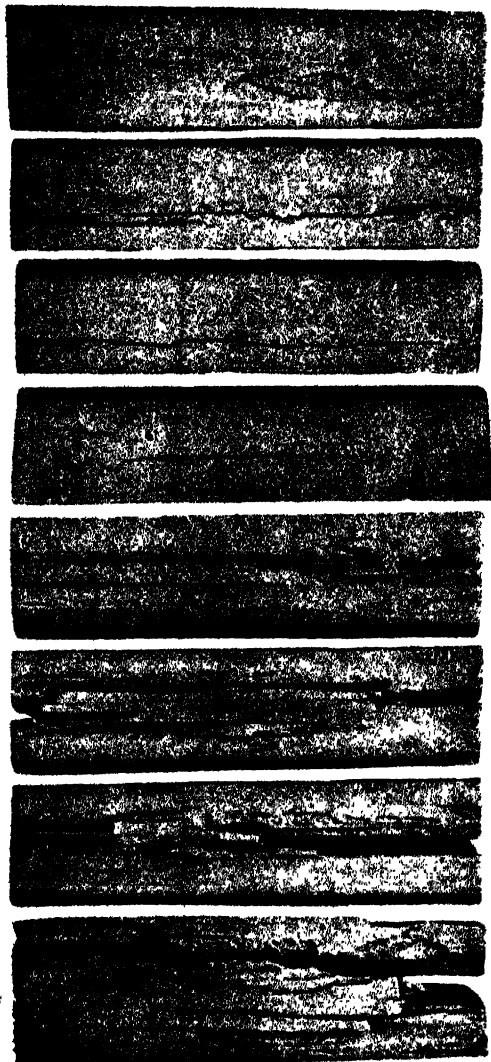


Fig. 1—Exfoliation or Scaling of French Steel Rails

the number to be increasing, on some systems such as the Midi and L'Est, at a rapid rate. The rapid corrosion of certain rails in tunnels he finds to be due to the presence of non-metallic inclusions in the metal. This corrosion is also a cause of rapid wearing away because it reduces the useful rolling surface.

Exfoliation of French rails is shown by the samples in Fig. 1, which exhibit this scaling in different degrees. At the beginning small longitudinal fissures are seen on the running surface. These fissures elongate and join. Often only one line is seen, as shown in the third sample, then later a second line at a distance usually of 1 or 2 cm. Sometimes these two lines appear at about the same time, the part between them is gradually

Fig. 2—Formation of Surface Fissure and Split Head

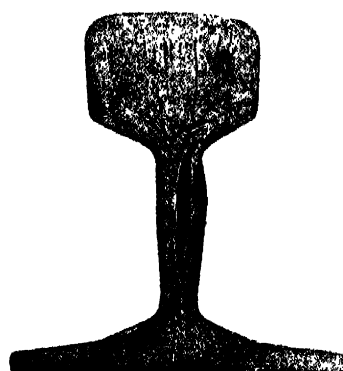
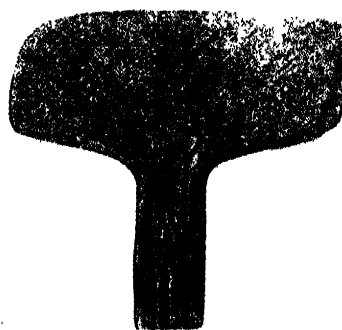


Fig. 4—Blister from a Pipe

Fig. 3—Large Interior Cavity in French Rail



cross sections show that wherever the exterior fissure is found, even when very small, an interior cavity is always present; and sometimes wide cavities are found, as shown in Fig. 3, which have not yet reached the surface. The beginning of such a defect is then always in the interior of the rail. In cases where not sufficient discard is taken the pipe is reduced to a fissure. Fig. 4 shows the section of such a rail in which this fissure, enlarged, has formed a blister in the web. In other cases the internal fissure, especially that in the head, does not come directly from the pipe cavity. After etching the section it is seen, Fig. 5, that the fissure passes through several nuclei of impurities. In this case the fissure is produced by the effects of shock

from the passing trains. Mr. Fremont believes it comes from segregation of the metal and depends on the distribution and composition of this segregation.

The distribution of this segregation in the heads of the rails takes widely variable forms. Sometimes it is condensed in a central compact zone distinct from the sound metal. At other times the central zone is surrounded by nodules of small nuclei. It may be divided into secondary nuclei. Finally the heads of many rails are spoiled by the presence of a zone of

ticular to this rail, and finally caused failure. Experimental tests would indicate that the fissures travel from one small nucleus of impure material to another, as shown in Fig. 8 of heads fractured in service.

After a further discussion of the matter Mr. Fremont believes the exfoliation or scaling of the rails to be due to bad initial quality of the steel, and not to fatigue of the metal brought about by cold work, as has been sometimes suggested. Careful tests with a specially designed hardness measuring device show



Fig. 6 (Above)—Interior Cavity Passing Through Nuclei



Fig. 7 (Left)—Rail Fractured in Use

Figs. 6 and 7 (Right)—Upper Is a First Fissure at Central Nucleus; Lower Is a Fissure at Periphery of Central Zone. Both are reduced one-half from an original magnification of two diameters



blowholes parallel to and a little distance below the surface.

All these zones of impurities, almost concentric, are the cause of various defects. Figs. 6 and 7 give two examples of failure in which the influence of the central zone can be seen. Fig. 7 shows a central nucleus of good material, but surrounded by a segregated zone, from which emanate the radial fissures that are par-

that the cold worked material on the head only extends in 0.14 mm., and even with a softer rail the depth was only 0.23 mm.

The article closes with a description of superficial quenching of the metal of the rolling surface, as mentioned in a recent report by Mr. Howard, and the danger of the cracks in this hardened layer extending through the rail if the metal is not sound. G. B. W.

Budget of the St. Louis-San Francisco Railway Co.

The budget of the St. Louis-San Francisco Railway Co. for 1922, providing for considerable buying, has just been completed. President Kurn, writing to THE IRON AGE, says:

"Our 1922 budget does not provide for any additional locomotives, but we do contemplate purchasing eight 70-ft. all-steel coaches and six 70-ft. all-steel chair cars, which equipment is to be used in two of our important through main line trains.

"We propose to lay approximately 185 miles of new 90-ft. rail, but all of this rail is on hand or contracted for.

"On shop tools and machinery we figure on expending approximately \$200,000, most of which is in the nature of machinery for maintaining equipment and consists of engine lathes, traveling cranes, steam hammers, forging furnaces, and miscellaneous mill shop machinery. The largest single item contemplated is the erection of a 200-ton electric traveling crane at our West Shops, Springfield, Mo. This crane will enable us to handle our Santa Fe type locomotives much more economically than at the present.

"So far as additional shop buildings are concerned, we have nothing in mind for the present year except a few minor extensions to round houses.

"We propose to do considerable grade reduction at Crocker, Garnsey and St. John, Mo., where grades will be reduced for a distance of 1.62, 1.50 and 3.57 miles respectively at an estimated cost of \$675,000, and we also contemplate the construction of 4.75 miles of second main track from Windsor Springs to Valley Park, Mo., which will give us double track from St. Louis to Valley Park, where our traffic is exceptionally heavy, due to the number of regular freight and passenger trains and suburban trains which operate in this territory. Between Spring Hill and Paola, Kan., a distance of 12.7 miles, we are going to construct the second main line which will give us double track from Kansas City to Paola. Our traffic in this territory is exceptionally heavy, due to the M. K. & T. using our track between these two points. We have already asked for bids from responsible contractors on the two pieces of double track and the three pieces of grade revision."

A joint convention of the Indiana State Sheet Metal Contractors' Association and the National Sheet Metal Contractors' Association will be held May 15-19 at Indianapolis, in the Cadle Tabernacle, a building that seats 10,000 persons. One of the features will be the sheet metal products exposition. All of the space for the exposition has been taken. Joseph Mattingly, president of the Indianapolis association, is one of the committee on arrangements.

Operation of Oil-Burning Steam Plants

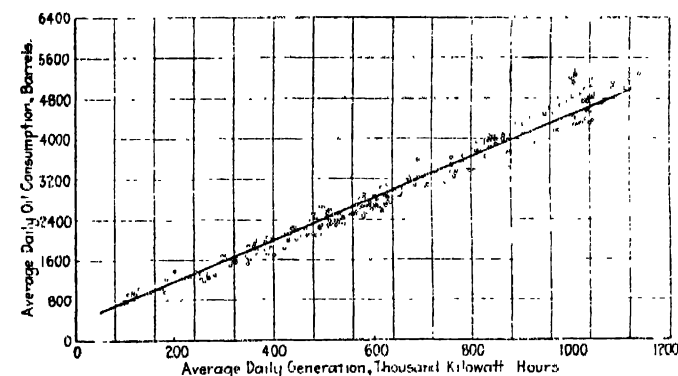
Discussion of the Plant Characteristic Diagram, with Particulars Regarding Its Use in the Establishment of a Standard of Performance and in Increasing Plant Efficiency

BY C. H. DELANY*

TEN years ago there were many plants operating reciprocating engines, in which the maximum performance obtained was not over 150 kwhr. per bbl. of oil. With the high-pressure steam-turbine plants of to-day a record of 330 kwhr. per bbl. has been made. This increase in efficiency has been brought about by introducing more efficient machinery and increasing the range of steam pressure in the prime mover. The introduction of the steam turbine to replace the reciprocating engine effected a remarkable saving in fuel. Moreover, the steam turbine caused a saving in operation due to the fact that its operation does not depend on the personal element in the plant.

In reciprocating engines there were many adjust-

ments to be made by the engineer in charge, and the economy obtained depended very largely on his skill and the care with which he made these adjustments. With the steam turbine, however, there is nothing that the operator can do to improve the efficiency, after the machine is once installed and placed in good operating condition. While this is true as regards the prime mover, it is not true in regard to many other features of the power plant.



Plant Characteristic Diagram for a San Francisco Station

ments to be made by the engineer in charge, and the economy obtained depended very largely on his skill and the care with which he made these adjustments. With the steam turbine, however, there is nothing that the operator can do to improve the efficiency, after the machine is once installed and placed in good operating condition. While this is true as regards the prime mover, it is not true in regard to many other features of the power plant.

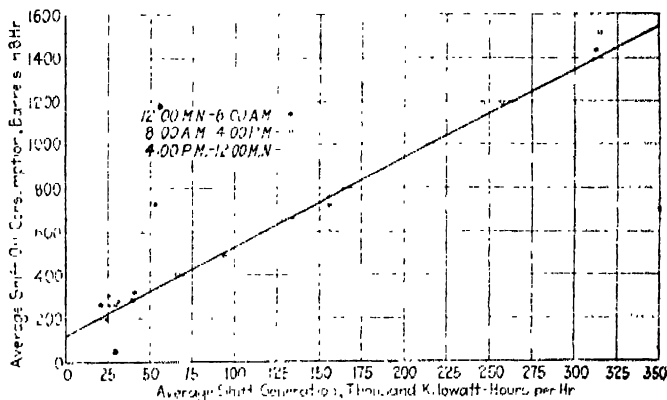
In the boiler room, particularly, there are many points where the operating engineer can effect a saving if he carefully studies the situation and pays attention to the small details. In condensers and vacuum pumps also a great saving can be made if proper attention is paid to maintaining a high vacuum. There is still, therefore, a large field for the operating engineer in improving the economical operation of the plant, and the question of operating efficiency is consequently one worthy of careful study.

Many tests have been published showing high efficiency of boilers fired with fuel oil, efficiencies as high as 80 and 82 per cent being not uncommon in test reports. It is very rare, however, that any such high efficiencies are obtained in the regular operation of power plants. To maintain high efficiency in regular operation, the first requisite is some means of comparing one day's operation with another.

In oil-burning electric power plants it is customary to report the economical operation of the plant in terms

of kwhr. generated per bbl. of oil. This is an excellent method of comparing one day's operation with another, provided there is steady load on the plant and conditions remain the same from day to day. With a variable load, however, such as occurs in an ordinary central-station plant, it is always found that the economy is much better at periods of heavy load, and poorer at periods of light load. Thus it is possible, with a fairly heavy load on the plant, to secure from 220 to 230 kwhr. per bbl. of oil without difficulty, whereas with the same plant operating at a light load, it may be difficult to secure more than 150 kwhr. per bbl. of oil.

When the good results are obtained with the heavy load, the operating men consider results better than the average. On the days of light load, when the results are poor, they do not worry but say, "What's the use, you can't expect any results with such a light load." Thus in neither case is there any incentive to improve the economical operation. Another reason for more or less lax methods, so far as efficiency is concerned, is the fact that efficiency must always be secondary to continuity of service. The men know that any interruption to service will be a matter of close investigation on the part of the management, and they devote all of their energies to maintaining the plant in operation and keeping the lights burning. For instance, if a fireman in endeavoring to adjust carefully the air supply in his boilers neglects to keep up the steam pressure, with the result that the turbine slows down and some of the load has



Plant Characteristic Diagram with Scale Altered to Show Results Obtained on an 8-Hour Shift

to be dumped, he is sure to be called on for an explanation. If, on the other hand, he keeps up the steam pressure, but neglects to regulate the air in the proper proportion, there usually will be no complaint; and the boilers may be allowed to operate in this inefficient manner for a considerable length of time.

The author is far from disputing the fact that continuity of service is a matter of prime importance, but he does wish to point out that efficiency is a close second. The problem before us, therefore, is so to interest the operating men in the matter of efficiency that they will not neglect the various operating details that must have attention to secure good results.

To improve these conditions and to interest the men in the problem of efficiency, it is essential to devise

*Pacific Gas & Electric Co., San Francisco; abstract of a paper presented at a joint meeting of the San Francisco sections of the American Society of Mechanical Engineers and the American Institute of Electrical Engineers.

some means of comparing the performance of a plant from day to day. For this purpose, the diagram here called the "plant characteristic diagram" has been plotted.

Such a diagram, as shown for one of the San Francisco stations, consists merely in plotting the oil consumption against the kwhr. generated. Each point in this diagram represents one full day's operation, and while the points as shown are more or less scattered, it is apparent that they form a well-defined line. It is thus possible to draw a straight line through the midst of these points in such a way that it will represent the average location of all points in the diagram.

Use of Diagram as Standard for Guidance

Having once been drawn through the points as described, the diagonal line may be used as a standard

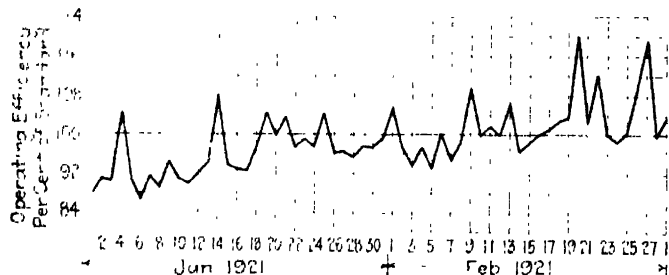


Diagram of Operating Efficiency of a Plant Over a Two-Months' Period

for the guidance of the men in future operation of the plant. Thus each day the kwhr. generated and the oil burned the day before may be plotted on this diagram. If the point so plotted falls below the diagonal line, it is evident that the results obtained are better than the standard. If the point falls above the line, too much oil has been used, and something requires a special investigation. Since the diagram takes in all loads from zero up to the full load on the plant, it allows for the poor economy obtained at light loads. It is thus possible for the operating men to know immediately whether they are keeping up to the required standards of efficiency or running behind. They can therefore investigate causes of low efficiency immediately, while all matters entering into the plant operation are fresh in their minds.

In adopting the standard it would be possible, instead of drawing a line through the average of the points, to draw a line through the best points, thus establishing a standard that would represent the best results yet obtained from the plant. Again, it would be possible to establish a higher standard by drawing a theoretical line below all of the points, this line to be based on the steam consumption of the turbines and auxiliaries, as determined by tests, a boiler efficiency of, say, 80 per cent and the best possible vacuum; in other words, a line representing ideal conditions.

In adopting the average line as the standard it is felt that the men will have greater confidence in the method than if a theoretical line had been adopted. The average line is really a standard that has been established by the men themselves. It is not an arbitrary ideal impossible to attain, but as it represents the average already attained, it should be as easy to improve on the results represented by the line as to fall below them.

If the men are successful in improving on the standard each day, it is obvious that the average for a given year will represent better efficiency than the average for the previous year. With all of the points falling below the line on the diagram, another line drawn through the average of these new points would also fall below the original line.

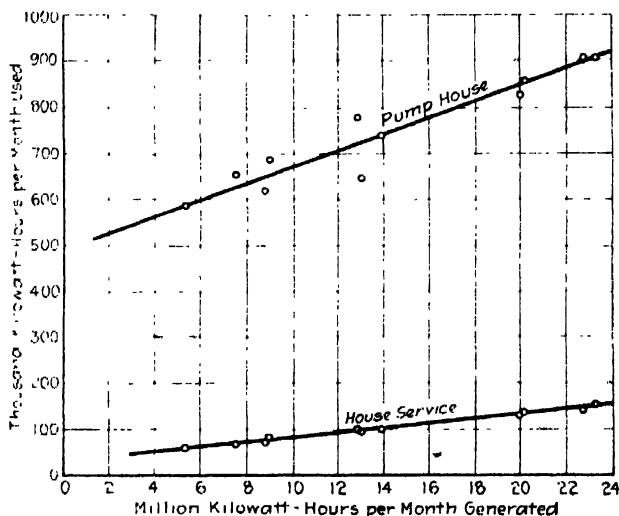
A similar diagram, but with the scale altered so as to show the kwhr. generated and the oil burned during a period of 8 hr. instead of 24 hr., may be used by the different shifts in the station, so that each shift can check up its own performance and compare it with the performance of the other shifts. A large diagram of this form is posted on the wall of the fire room, and

different colored pins to represent the different shifts are inserted each day, so that the diagram shows at all times which shift is running above the line and which below it. This system has a far-reaching effect in awakening interest, and leads to such rivalry and competition to improve the efficiency that the laxity which previously existed is disappearing.

Operating Efficiency Determination

There is one objection to the diagram—it does not indicate the order in which the records are plotted, and therefore does not show whether the results are improving as time goes on.* To overcome this objection, and also to enable the operation of different plants to be compared with each other, the term "operating efficiency" has been introduced. Operating efficiency as used in this connection means the percentage of standard attained for the day's run. "Operating efficiency" is entirely distinct from "boiler efficiency" or "turbine efficiency" or "thermal efficiency" or "Rankine-cycle efficiency." All of these enter into the operation of the plant in determining the standard. Operating efficiency is merely a comparison of the results, actually obtained, with the standard.

Determining operating efficiency can best be shown by an example: During one 8-hr. shift there were generated 313,000 kwhr., and 1440 bbl. of oil were burned, representing 217 kwhr. per bbl. From the diagram it is found that for a load of 313,000 kwhr., with standard efficiency, there would be burned only 1400 bbl.



Power Used by Electric Auxiliaries in a Station, Plotted Against the Total Generation

of oil, which would be equivalent to 224 kwhr. per bbl., as against the actual result obtained of 217 kwhr. per bbl. The operating efficiency is therefore 97 per cent. During another 8-hr. shift, where there were only 25,000 kwhr. generated, the oil burned was 200 bbl., equivalent to 125 kwhr. per bbl. From the diagram it is found that for 25,000 kwhr. with standard efficiency the oil burned would be 220 bbl., equivalent to 114 kwhr. per bbl. This operating efficiency is therefore 110 per cent. It is thus seen that, although in the second case there were only 125 kwhr. per bbl. obtained, as against 217 in the first, the operating efficiency was actually higher in the second case.

This method of determining operating efficiency makes allowance for inefficient machinery, for it is just as easy to obtain 100 per cent operating efficiency in a plant having old-fashioned turbines of poor design as in a plant having the most up-to-date machines, for the standard is based on the actual records of the plant itself.

One chart shows operating efficiency plotted for

*There is a second: it does not distinguish between a day or shift during which the average kwhr. and the maximum kwhr. are nearly the same, and one during which they vary heavily. In the former case the results should be much better than in the latter.

each day during the months of January and February. In this diagram, the horizontal line at 100 per cent represents standard efficiency, and the zigzag line the actual operating efficiency obtained each day. The records show a gradual improvement during the period, which is a direct result of the attention to small details brought about by this method of checking up efficiency.

Since the diagonal line in the plant characteristic diagram is usually a straight line, it can of course be represented by a simple equation, namely:

$$y = a + bx$$

where y is the oil consumption in a given period in barrels or pounds, x the kw-hr. generated in the same period, and a and b are constants.

Evidently the constant a is equal to y when $x = 0$. In other words a represents the quantity of oil burned for zero load; that is, the amount required to keep up steam on the boilers, keep the turbine running up to speed, operate the vacuum pumps, circulating pumps and other auxiliaries, and keep the entire plant in readiness to take on load at a moment's notice. Obviously a will be larger if two turbines with their auxiliaries are kept in operation than only one, so that its value depends on the amount of load the plant is expected to take on. Where a plant is operated as a standby to a hydroelectric system and is kept in readiness to pick up its full load instantly in case of trouble, a will have a higher value than where it is possible to shut down the turbines gradually, one after the other, as the load falls. The constant b evidently represents the additional amount of oil burned in proportion to the load carried on the plant. It determines the slope of the line in the diagram, and is large for uneconomical turbines or engines and small for the most efficient types. The equation of the line for an 8-hr. shift, in terms of barrels of oil and kw-hr., is

$$y = 120 + 0.0041x$$

Other Uses of the Diagram

The diagram may be used for many other purposes besides the overall efficiency of the plant. By plotting the steam generated against the oil burned in one diagram, and the steam consumption against the kw-hr. generated in another, it is possible to study the boiler-room and engine-room operations separately, and thus quickly locate the cause of low efficiency. By setting separate standards for the boiler-room and engine-room crews, responsibility can be more definitely fixed, and the advantages of the system of operation greatly enhanced.

Since boiler efficiency usually decreases rapidly as the load increases above the boiler's rating, a single boiler will naturally have a curved characteristic. In a plant containing a large number of boilers, however, the boiler-room characteristic will be approximately straight until the load exceeds the economical capacity of all the boilers in the plant, after which it will begin to curve upward. A curved line, based on previous performance, is just as satisfactory as a straight line for setting standards and calculating operating efficiency in the manner described. A last diagram shows the power used by electric auxiliaries in a station, plotted against the total generation, and is of interest in showing that the points do form well-defined straight lines, and that the same methods may be used for standardizing these items as for fuel consumption and steam consumption.

To sum up, the essentials for securing the best efficiency in power-plant operation are:

1. A fair standard by which the daily performance can be measured and compared with previous results, at the same time giving the operating men a definite goal to which to work.
2. Means of comparing results obtained by different groups of men, such as different shifts of one plant or the crews of different plants, and the posting of this comparison so that the men can see the results of their efforts.
3. A system of reports that keeps up the interest of the men, combined with suggestions and advice that show where losses occur and how they may be avoided.

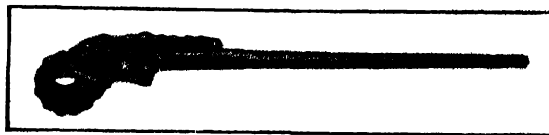
If the operating men are kept interested, see the

results of their work, and have a definite standard to reach, they will do their best. As interest flags, some sort of bonus or prize for the crew showing the best operating efficiency will stimulate them to greater effort, and by guiding this effort by means of thoughtful analysis of the technical features of the power plant, maximum efficiency may be obtained.

New Chain Pipe Wrench

An improved chain pipe wrench made in seven sizes for pipe and fittings from $\frac{1}{4}$ to 16 in. in diameter is being offered by the Armstrong Brothers Tool Co., Chicago. The illustration shows the wrench equipped with flat link chain; cable chain is also supplied.

The improved design is intended to eliminate some of the weak points of the usual tool of this kind, especially the tendency of the jaws to work loose on the bar, resulting in spreading of the rear end of the jaw and wedging of the chain. Increased bearing of jaw sockets upon the bar, combined with two hardened chrome-nickel steel bolts are said to effectively hold the jaws in place under the most severe usage. The rear



Improved Chain Pipe Wrench

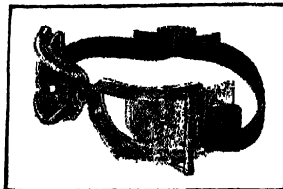
bolt is located directly under the chain socket where the spreading strain is greatest.

Chain guides are provided on the jaws. The handles are forged from high carbon steel and the jaws are drop forged from special steel, treated and hardened.

New Eye Protector

The goggle shown in the illustration is a recent addition to the line of eye protectors offered by the Chicago Eye Shield Co., Chicago. It is known as style No. 220 and is intended to permit of unusually wide range of vision and comfort.

The special features are the lens-retaining bar which is locked with the headband and the collapsible



The Lens Retaining Bar Is Locked with the Head Band

and adjustable nose bridge which permits adjustment of the goggle to the correct pupillary distance of the wearer. The goggle is regularly furnished with a rubber binding which provides a smooth bearing against the face.

Eriesson's Monitor to Be Commemorated

A DeLamater-Eriesson commemoration, with the unveiling of four bronze tablets, will be held March 9, the sixtieth anniversary of the battle between the Monitor and the Merrimac. One of these tablets will be fixed to the site of the residence of Captain Eriesson, Beach Street, New York, with the ceremony in charge of the American Society of Swedish Engineers. Another will be raised on the site of the Phoenix foundry, where some of Eriesson's work was done; another at the Cunard pier No. 54, the site of the DeLamater Iron Works, and the fourth at the Continental Iron Works, Brooklyn. A banquet will be held at the Waldorf-Astoria Hotel, New York, and a simultaneous banquet will be held in Stockholm, Sweden. Further information may be obtained by applying to H. F. J. Porter, of the DeLamater-Eriesson Commemoration Committee, Engineering Societies Building, 29 West Thirty-ninth Street, New York.

Disintegration of Blast Furnace Linings

Split Furnace Shells Undoubtedly Due to Expansion of Zinc-Impregnated Linings—Remedies Suggested

BY PAUL O. MENKE*

WITHIN recent years blast furnace men have become more or less alarmed over the repeated failures of blast furnace linings. In some districts it is no uncommon occurrence to burst furnace shells; in fact it became such a regular thing at one plant, that it has led to the design of a very ingenious banding lug for banding shells whenever they show signs of giving way. The first few failures were confined to a certain well known brand of steam pressed brick. Shortly afterward, other well known and popular makes of furnace linings began to give out. All of these early failures were confined to steam pressed linings, but recently there has been found disintegration in some well known hand made linings. The probable reason that the failures have not been more numerous in the hand made brick is on account of the popularity of steam pressed linings.

Poorer Brick Not Wholly Responsible

There is no doubt that the quality of most of the popular brands of fire brick has greatly deteriorated during the last five or six years, principally due to careless and inefficient labor, over which the maker had no control, but some of this is probably also due to mixing in some inferior clays. The proportion of plastic clay was increased beyond the usual ratio. The flint clays were ground finer in order to make a nice looking brick; in fact most of the furnacemen in recent years have laid too much stress on getting a smooth, nice looking fire brick that would lay up with minimum cutting and labor. Nevertheless, all of these changes do not account entirely for the trouble.

Early last year, while visiting a large Eastern plant, the author's attention was drawn to some shell failures. Some of these were light shells, but one of them was built out of 1 in. plate, well riveted and butt strapped—in every way a first class job. It had a steam pressed lining laid against the shell without any packing space. This shell had started to split vertically several sheets above the mantle. At the time, this was attributed to the probable expansion of the steam pressed brick.

On looking over the shell, some matter was noticed at the point of fracture which looked like a deposition of zinc fumes. On having the deposit analyzed, in addition to taking a drilling through the crack and having some of this brick material analyzed, zinc was found.

Several Furnaces Examined

Shortly afterward, there occurred a very bad shell failure with fatal results, which was generally attributed to an explosion. As this mishap was so unusual, and of such fatal consequence, it alarmed most all of the furnacemen who heard of it. Photographs of this wreck seemed to show the action of zinc impregnation

and disintegration. The manager insisted there was no zinc, as he did not use any zinc bearing raw material. Examination of the furnace revealed a distinct vertical separation and cleavage of the remaining portion of the inwall and although no metallic zinc was found particles of zinc oxide were discernible in this cleavage. Later analysis of the brick material showed zinc to be present in the oxide, chloride and metallic state, as high as 40 per cent down to 0.15 per cent.

With zinc impregnation as high as shown in the analysis presented, it does not seem unreasonable at all, knowing the terrific strain that a zinc saturated lining exerts, that it split this shell, particularly as it was water cooled. A splash jacket prevented the operators from promptly detecting any signs of the splitting of the furnace shell. With the shell split it would not necessarily take a very heavy slip to put on enough additional strain to tear horizontally and open up.

Some furnaces that had been banked for several months were shoveled out. One of these had a considerable "belly" in the lining, extending from the

mantle to 30 ft. above the mantle, reaching less than one-third of the way around the furnace. The brick was well glazed and hard for a depth of 4 to 12 in. back to the inner face of the lining. Beyond that, was a zone of separation and spalled cleavage for a distance of $\frac{1}{4}$ in. to 2 in. This space was filled with zinc oxide, metallic zinc and large carbon deposits; zinc oxide from 2 to 20 per cent. Beyond that, for a distance of 2 to 4 in., the brick was disintegrated and crumbly, saturated to the extent of 0.03 to 6.82 per cent of Zn. Beyond that point, extending to the shell, the brick was firm and in a good state of preservation, with practically no zinc impregnation. The balance of the lining seemed very good, and had worn back less than 2 in.

Two test holes through the good lining back to the shell, opposite the bad place, disclosed no disintegration. The face of the brick was glazed and firm, and really harder than it would be in the original state. Metallic zinc appeared in the joints, also some oxide of zinc about 12 in. back from the inner face of the lining, but this had in no way penetrated the brick.

Some spray cooling on the outside of the shell on the thin spot of this furnace may have been the cause for disintegration at this point. This furnace was lined up with the same make of steam pressed brick that had given more than 800,000 tons during the preceding blast, and was in good serviceable condition when blown out.

On finding this condition at this furnace test holes were cut above the mantle at another furnace that had been lined up with the hand made brick of a popular make. This lining had been stored over five years, so must have been made at a time before disintegration of furnace linings had become alarming. The inner face was glazed and firm for a distance of about 4 in.

On Jan. 12 an editorial appeared in THE IRON AGE suggesting that zinc played an important part in the disintegration of blast furnace linings and consequent bursting of furnace shells. Investigations carried out by Paul O. Menke and set forth in the accompanying article very largely confirm this interesting theory. His findings may suggest to furnace operators a line of study that will eventually eliminate trouble from this source.

*Superintendent of blast furnaces, Shenango Furnace Co., Garyville, Pa.

From there on, zinc was found, both metallic and oxide, and disintegration to the extent of making the brick soft and very easy to cut, to within 4 or 5 in. of the shell. The conditions were identical at the two opposite points of the furnace. However, the holes were plugged without further repairs, and this furnace is operating to-day.

On the strength of these observations some of the more prominent cases of disintegration were made the subject of closer investigation. In one particular case where two linings had been lost zinc was found up to 18 per cent in this brick. Considerable of this was metallic, but apparently was not blamed for the disintegration of these linings.

Zinc Evidently the Cause of Failure

Our own experience in this matter has been expensive, and the cause of great delay. Nine or ten years ago, on account of low phosphorus content, our furnaces had used a proportion of Blue Billy agglomerates in our burden. First a shell split on the smaller furnace which had seen considerable service. This shell had to be renewed. Within two years a larger, newer furnace opened up her shell both in the vertical and horizontal seams, in the heavy section. We promptly banded this furnace. She burst these bands until we put on 12 by 1½ in. bands, very closely spaced. After that, the pressure sheared the horizontal seams of the shell, and showed swellings and distortions on the side of the furnace. This furnace was excessively water cooled in the bosh, and also had cooling plates above the mantle. Most of the trouble and breaks in the shell took place in the cooled zone. More or less metallic zinc was evident around the bosh plates of the furnace.

When it became necessary to put this furnace out for renewal of stack, it was impossible to blow it down more than thirty-five ft. as it shook so badly as to make it unsafe. On taking this lining out we found the most complete disintegration we ever saw. It was not burned out in any way, but had the full thickness of the lining, in addition to some scabs on the inside. It was not necessary to use any picks or steel bars, but the lining was shoveled out. The full outline of the brick and joints was visible until we got to the water cooled portion, where the zinc showed up, mostly in the metallic form, probably due to the water cooling.

On making an analysis we found zinc up to 49.86 per cent in the lining, and up to 40 per cent in the scab and scaffold. In fact lining and scab were so rich in zinc that it was sold to a chemical company for the recovery of the zinc. A considerable portion above the water cooled section was in the form of chloride of zinc.

On finding this condition, we put up a 1 in. shell, discontinued the cooling above the mantle, reduced the cooling below the mantle, and cut out Blue Billy agglomerates and other zinc bearing material. A steam pressed lining was laid tight against the shell, following the same practice used on our other furnaces with the lighter shells. Results were satisfactory, until we ran into zinc recently. Very probably we would not have encountered any difficulties even then, if we could have kept our furnaces running, but banking, shoveling out and cooling largely aggravate this condition.

Chemical Reaction Quite Simple

It might be well to give a brief outline of the action of the zinc in the furnace. Being charged into the top as zinc oxide, finely disseminated through the ore, it descends unchanged to the fusion zone, as the reduction temperature is 1000 deg. C. and over. The zinc oxide is reduced by solid carbon to metallic zinc; liberated as vapor, it ascends with the gases to the

cooler zones. The zinc is re-oxidized through the temperatures from 1000 deg. to about 500 deg. C., the reaction being $Zn + CO_2 = ZnO + CO$, and is carried up by the gases as zinc oxide. The larger portion passes out into the stoves, dust catcher, boilers or into the atmosphere. A portion redeposits on the descending stock to repeat the before-mentioned cycle of changes.

Some of the zinc vapor is absorbed by the lining up to as high as 50 per cent. It usually shows up as small yellow crystals. Sometimes it is found with carbon deposits in the disintegrated and laminated portions of the lining. Some of this zinc shows up in the metallic form. It usually is around the water cooled part of the furnace, also in the part of the lining that is not water cooled but had a chance to cool down after banking or blow out.

In scabs that adhere to the water cooled portion of the furnace, it probably combines with the alumina, forming zinc spinel, which is practically irreducible, as these scabs are largely intact, after the furnace has been blown out. It is also generally assumed that the zinc oxide combines with the alumina in the fire brick. As the coefficient of linear expansion of zinc is like 60 to 1, compared to silica, which is the principal constituent in fire brick and is about 3 to 1 compared to steel, it can readily be seen that it would not take a great deal of impregnation to destroy the bond of the brick and exert great expansive stresses. The hand made brick, on account of its greater porosity, has a tendency to take up more of this element than the steam pressed.

Remedies Suggested

Most of the Blue Billy agglomerates carry zinc, which can easily be guarded against, but as some limestones carry traces of zinc, also some of the Lake Superior ores, it makes it rather hard to be absolutely sure there is no zinc bearing material charged into the blast furnace. No matter how low the percentage of zinc is in the raw material, gradual accumulation will cause it to show up in time.

It is hard to see why it should be in any way detrimental to lay a lining against the shell without packing space, and particularly so, steam pressed brick which is a good conductor of heat, and would warm up the shell to a point where it can expand with the brick work. Most blast furnace lining brick should be somewhere near neutral and not subject to a great deal of expansion under heat. By using a heavy shell, (if necessary above 1 in. thick), eliminating the water cooling above the mantle the trouble should be reduced to a minimum. It might also be well for the fire brick makers to make experimental tests to find the resistance to zinc fumes of their various makes of bricks.

Automatic Train Control Devices

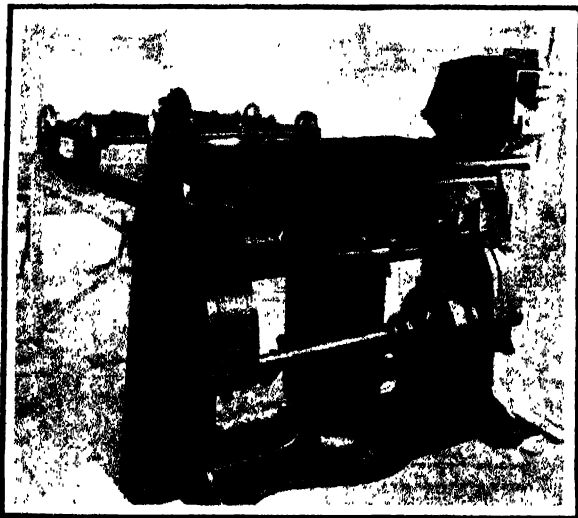
WASHINGTON, Feb. 21.—Taking official notice that parties interested in particular automatic train control devices are giving the impression to the public that it has approved their devices and ordered the railroads to install them, the Interstate Commerce Commission last week issued a memorandum to the press saying that it desires it to be understood that the commission's order of Jan. 10 requiring 49 carriers to show cause why they should not install control devices does not prescribe any type to be used. The only requirement, the statement points out, is that installation shall pass certain technical specifications and requirements which have been found to be necessary for the successful operation of devices of this character. These are so broad, the commission says, through Secretary G. B. McGinty, as to afford the desired freest field of opportunity for inventors and for trying out all automatic control and train stop devices.

NEW OSBORN MOLDING MACHINE

Air-Operated Jolt — Electrically-Operated Roll-Over Pattern Draw and Run-Out Car

A molding machine equipped with the standard air-operated jolting mechanism, combined with an electrical roll over, pattern draw and an electrically-operated run-out car has been developed by the Osborn Mfg. Co., Cleveland.

The machine is shown in the accompanying illustration. It is compact and self-contained. The mechanism is assembled on a large frame which is cast integral and without bolted parts. The mechanisms are inclosed and where necessary operate in an oil bath. The



The Roll-Over Device Is Electrically Controlled. Pattern draw and run-out car are electrically operated also. Ramming is by compressed air

machine rotates on the approximate center of gravity of the load, an arrangement intended to reduce rolling-over strain. The jolting operation is performed by compressed air at 80 lb. pressure and the jolt controlled by the company's single-piece, air-balance piston-type valve, adjustable to give the desired force of blow.

The roll-over operation is effected by an electric motor transmitting its power through a worm wheel and a pair of spur gears directly connected to a narrow drum for coiling the cable attached to the bottom of the lifting rods. Either push button or manual control is used. The motion is said to be steady and positive and the table, being rigidly held throughout its travel, cannot sway or swing. Although the operation is automatic, rolling over is under control of the operator and may be stopped in any position.

Pattern drawing is by one rolling-over mechanism, but is electrically controlled to secure a speed of only 1½ ft. per min. during the time necessary to loosen and start the pattern. The remainder of the draw is accomplished at high speed. Rolling over, lowering and drawing of patterns are all performed by moving the handle around the marked dial of the controller.

After the mold is rammed and ready for rolling-over, the controller handle is placed at the "rolling-over" position. After the roll, the machine stops automatically. The run-out car is brought into place by its motor and also stopped automatically. The table is locked into position and the controller handle swung to the "lower" mark on the dial. The mold then lowers until it makes contact with the automatic lowering device on the run-out car and stops automatically. The mold is then prepared for drawing by releasing the clamps and setting the vibrators in motion, after which the controller handle is turned to "slow draw." As the slow speed is used only to loosen the pattern, the controller is left at this point only for 2 or 3 sec., after which it is moved to the notch marked "fast draw." The pattern is then rapidly withdrawn from the mold, automatically stepping at the top of the stroke.

In lowering the machine to the jolt position the run-

out car is propelled from under the table to the end of its track. The table is unlocked and the controller handle is placed again at the lowering position, and the table automatically comes to rest on the jolt table. This completes the cycle of rolling over the mold and withdrawing the pattern which, with the jolting operation, makes the total time consumed by the machine per mold approximately 2 min.

The number of blows desired to jolt the mold is predetermined, and by moving the jolt-operating lever to the number of blows desired, the machine will continue jolting, automatically stopping when that number is reached. The machine is easily lifted into place on the foundation by a crane or hoist. Very little assembling is necessary. The foundation is cast in one piece, and since the machine operates on its own center of gravity, it is not necessary for the foundation to be heavy enough to counterbalance over-hanging loads.

Close control is obviously a feature. Among other advantages it is claimed that electrically-operated pattern draw eliminates jerky motion so dangerous to the mold, the speed of drawing being certain and instantaneous; lowering of the roll-over table is begun instantly upon placing the control handle in the lower position; and the motion in rolling over the mold is constant, steady and positive, without strain or shock. When lowering the roll-over table to its jolting position it is unnecessary to start the table rolling by hand.

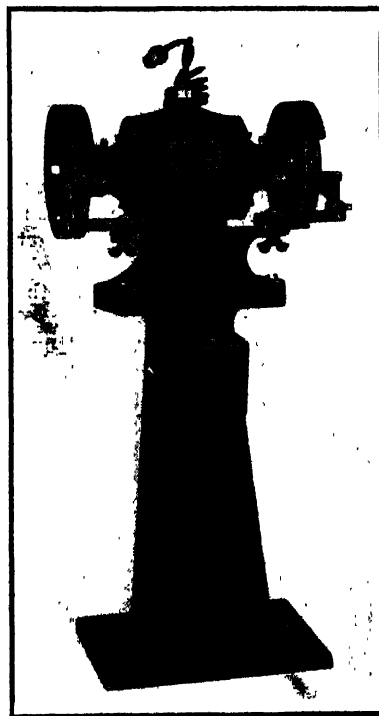
The machine is built in capacities from 5000 to 20,000 lb. and in various heights and flask lengths.

Alternating-Current Grinder

A ½ h.p. alternating-current electric grinder in both floor and bench style has been placed on the market lately by the Standard Electric Tool Co., Cincinnati.

The machine is shown in the accompanying illustration. It is fitted with double-row ball bearings, and a Westinghouse motor with the latest type of Westinghouse circuit breaker is used. The machine can be equipped for either 110 or 220 volts, single, two or three phase. The grinding wheels are 8 in. in diameter, with ¼ in. face and ⅝ in. hole, and are extended well out from the body of the motor to facilitate the grinding of long and irregular work. The floor type is fitted with a water pot and both types have adjustable tool rests.

The motor is powerful and is quick to start on a single-phase line and a quick make-and-break switch is located on top of the motor within easy reach. Ten feet of re-inforced cord fitted with a plug is furnished, the regular equipment including also one fine and one coarse grinding wheel. The bench type machine weighs 110 lb. net and the floor type, 225 lb.



Grinder for Operation on Alternating Current

The next annual convention of the Southern Supply & Machinery Dealers' Association will be held in Birmingham, Ala., April 24, 25 and 26, 1923, with headquarters in the Tutwiler Hotel.

THE X-RAY IN METAL ANALYSIS*

Some German Results — Work of Von Laue — Detecting Presence of Tungsten

The idea of using the X-ray as an aid in determination of the internal structure of metals followed closely Roentgen's momentous discovery. More than 20 years ago the English scientists Heycock and Neville investigated the nature of alloys by these means. They found that the opacity of metals to the rays was in general closely related to the atomic weight. They therefore made alloys of the light metals, such as sodium and aluminum, with the heavy ones, lead, silver and gold. From these alloys, after rapid or slow solidification, were cut horizontal and vertical slices of about 1 mm in thickness from which X-ray photos were made. These showed in some cases (the sodium-gold alloy for example) a simple separation of the components without the formation of either alloy crystals or compounds. In the sodium-gold alloy the shadows of the sodium crystals and the heavier ones of the gold alloy, both imbedded in the eutectic mixture, give a complete picture of the metal structure.

In considering the use of X-rays in the metallography of iron and steel we are confronted with the fact that the most important elements met with in ferrous alloys, namely manganese, nickel, chromium and vanadium, have atomic weights so close to that of the principal constituent that a practical differentiation of their opacity cannot be expected. Carbon and silicon have indeed less opacity than iron, and separated graphite which is 400 times as translucent as iron will be recognizable in the X-ray photograph. On the other hand the transparency of cementite or the carbide of iron Fe_3C cannot be more than 25 per cent greater than that of ferrite, while the low carbon alloys show still less difference. Under these conditions the X-ray method of analysis cannot compete with the splendidly perfected methods of metallography. For the separation of silicon the conditions are still more unfavorable.

The X-Ray and Tungsten Steels

Only in the case of tungsten steels is it possible that the X-ray method might be preferable to the microscopic. Tungsten has the atomic weight 184 which is more than three times that of iron, while its opacity is 100 times that of the principal metal. The presence of tungsten in steel can be detected even in the presence of pearlite or the double carbide, and indeed in cases where the metal consists of a homogeneous mixture of martensite crystals. In fact, in the latter case a quantitative determination is possible by measuring the depth of shading in an X-ray photograph of the alloy and comparing it with the photograph of a similar strip of soft steel.

The measurement of the depth of shading has been brought to a high degree of perfection, so this method is promising. Other constituents which may be present do not interfere with the result. Molybdenum, for instance, which may replace the tungsten does indeed increase the opacity but not nearly to the same extent as tungsten. Its atomic weight is 96 and its opacity six times that of iron.

On the same principle the lead content of glass or the metal content of copper ore may be determined. The fact that in these cases the metals exist in chemical compounds is of no importance as the opacity is a property of the atom itself and does not depend, as in the case of ordinary light, on the form of combination.

The relationship between opacity and atomic weight is not proportional. The determining factor is not the atomic weight but the place number in the natural system of the elements. Except in special cases where selective absorption of the rays takes place, the opacity which is dependent on diffusion is in general proportional to the fourth power of the ordinate number.

Accordingly the greatest opacity is possessed by uranium and thorium, the least among the solids by

lithium and beryllium. The latter metal is one which should prove itself extraordinarily useful for many most important physical experiments. It has the advantage over lithium that it is unaffected by air. It is less opaque to both Roentgen and cathode rays than aluminum or even water and such organic substances as rubber and paper. Its physical characteristics at low temperature must be very striking. It would doubtless be profitable to produce this remarkable metal on a somewhat larger scale.

Nature of X-Rays

The author comments briefly on the nature of X-rays. A decade or more elapsed after Roentgen's discovery before Barkla, by succeeding in partial polarization of the ray, proved the transverse nature of these ether waves. He also showed the way to their approximate measurement which is 10,000 times smaller than the waves of visible light. At the same time the difference between the penetrating "hard" rays and the more easily absorbed "soft" rays was shown, like that between violet and red light rays, to consist only in the length of the waves. The hard rays have a short wave length and great frequency, the soft rays greater wave length and slower frequency. Both are extremely short-waved light.

The greatest step in our knowledge of these rays since 1912 is due to von Laue. His discovery puts at our disposal resources which permit us to penetrate more deeply into the interior of solid bodies than any of the existing methods of metallography.

A well-known means of determining the wave length of light consists in passing a monochrome ray through a lattice of bars placed very close together. The bars deflect the light, which causes to be seen on a screen set up behind the lattice not only the direct effect of the ray, but also a number of reproductions of the same effects deflected to the side. The shorter the wave length of the light to be examined the finer the lattice must be.

To adapt this optical method to the extremely short-waved X-rays would require a lattice finer than could be made by the hand of man. Nature comes to our aid, however. In crystalline structures lattices already exist built up of atoms or molecules, with a constant of 10^8 , and it was von Laue's happy idea to use them for the investigation of the rays. These crystal lattices are of a different nature from the Rowland gratings used for spectroscopic measurements. They are not only crossed but consist of a whole system of such crossed gratings placed one behind the other. Laue's discovery was the foundation of a new epoch in crystallography in the midst of which we now are. The art of making the plates has attained a high degree of development and a rich mass of data has been collected.

We await with great interest the result of experiments as yet unfinished on metallic alloy crystals in which the presence of a second kind of atom in the lattice introduces disturbances of the electrons, made manifest in a lessening of the diffraction of the electrons and with it of the electrical conductivity and a change in the mechanical properties, such as increased hardness, etc.

Possibly the investigation by the aid of the X-rays, of materials which play such an important part in industry will throw light on the causes of the principal characteristics.

F. E. N.

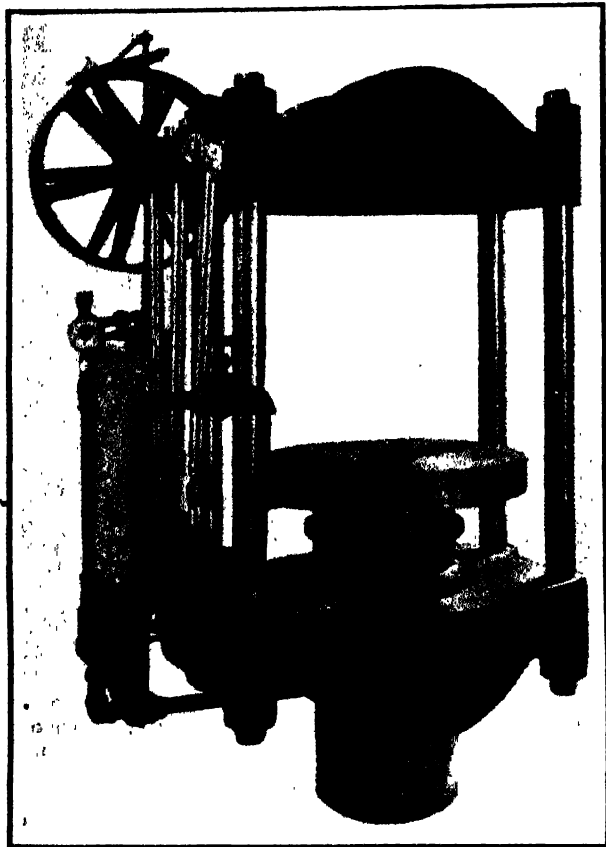
Business conditions, according to a survey of current business issued by the Department of Commerce, are improving. The preliminary survey for January states that the iron and steel industry is still without definite trend, though activity in certain lines was greater than in December. Although the automobile industry showed the usual seasonal dullness, marked interest was exhibited in the shows, and greater activity in the tire industry gave every prospect of a satisfactory season. Industries depending upon rural purchases have shown little recovery, and cannot be expected to show much until the new crop year. This is particularly true of agricultural implements.

*From Dr. R. Schenck in *Stahl und Eisen*, Oct. 13, 1921.

Press for Tires and Other Uses

A new 250-ton hydraulic press designed primarily for forcing solid rubber tires on and off truck wheels, but adaptable also for a variety of other uses, has been brought out by the West Tire Setter Co., Rochester, N. Y.

The frame or resistance pieces are of cast steel. The top platen is of steel, cast solid with the top resistance piece, the bottom platen being also of steel and removable from top of the ram. The area of the



The Distance Between Platens Is 37 In. and Horizontal Distance Between Strain Rods, 43 In

ram is said to be sufficient to produce the required tonnage with comparatively low initial pressure, thus permitting longer life of valves and other working parts. It is claimed that where this press will use 2000 lb. initial pressure, other designs frequently require 5000 lb. initial pressure.

The pump is of the 3-plunger type with automatic cut out for large plunger and has one 2-in. low-pressure plunger, for throwing a greater volume of oil, to fill pipes and cylinder quickly. When about 200 lb. pressure has been obtained the larger plunger is automatically cut out by a special by-pass valve, leaving the two smaller plungers in operation for completing the higher pressure required for maximum tonnage.

The vertical measurement between platens is 37 in. and the horizontal measurement between strain rods, 43 in. The diameter of the platens is 42 in. and the travel or stroke of ram, 33 in. The bore of the cylinder is 16 in. The height from floor line to top of pulleys is approximately 7 ft. 9 in. and the overall height, approximately 9 ft. 3 in. The strain rods are of 4 1/4 in. round steel.

New Safety Code for Use in Grinding

A new safety code for the use, care and protection of abrasive wheels has recently been approved by the American Engineering Standards Committee and released for publication, the date of approval being Feb. 11. This code has been in the process of preparation for about two years. It was prepared under the rules and procedure of the American Engineering Standards

Committee and has as its sponsors the International Association of Industrial Accident Boards and Commissions and the Grinding Wheel Manufacturers of the United States and Canada. These sponsors appointed a sectional committee to draft the code, consisting of 28 members representing various branches of both Federal and State Governments, several national manufacturing associations, a number of individual employers, associations of employees using grinding wheels, several technical societies, insurance associations and others interested in the manufacture or use of grinding wheels. Dr. L. W. Chaney of the U. S. Bureau of Labor Statistics is chairman and A. Rousseau of the Norton Co., secretary of the sectional committee.

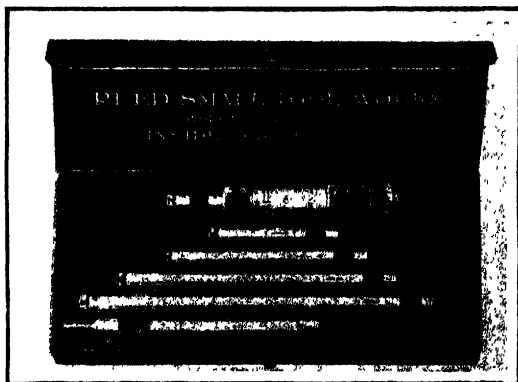
The new code is said to be a distinct improvement over the codes previously issued by the grinding wheel manufacturers, and contains much information not found in any other publication. The size and scope of representation of the organizations sponsoring and endorsing the code give it an air of authority which cannot but commend it to the careful consideration of everyone interested in any way in grinding wheels.

The code is now in the hands of the printer and will be ready for general distribution about the middle of March. Copies can be obtained from any grinding wheel manufacturer on request.

New Inside Micrometer

The Reed Small Tool Works, Worcester, Mass., has placed on the market the inside micrometer caliper shown in the accompanying illustration. The barrel, spindle and thimble have the same diameter as the corresponding parts of the company's outside micrometer, large surfaces allowing for generous sized figures on the barrel and spindle.

A feature of the tool is the detachable handle, easily and quickly adjustable, making it convenient for right or left hand work. Measurements can be made in inaccessible places or the entire length of a cylinder bore can be gaged. With a range of one inch, time



The Detachable Handle Is a Feature

lost, while in actual use, is less than with tools having a smaller range. Extra rods, fitted with anvils, are intended to permit of quick change with little possibility of error. The rods are interchanged by unscrewing from a threaded stud at the end of the barrel and each rod is internally threaded and ground square at the hardened end, which sets squarely against the barrel shoulder. At the point of measurement the rod is fitted with a hardened tool-steel anvil, adjustable for lengthening the rod and compensating for any anvil wear. Anvil faces are ground on a comparatively small radius, making the tool especially adaptable for measuring parallel or curved surfaces.

The Pittsburgh-Des Moines Steel Co. has consolidated its structural and plate sales departments and W. W. Hendrix, who for some time has had charge of plate sales, has been placed in charge of the consolidated division. Mr. Hendrix, who has been with the company for 20 years and is vice-president, now has the title of assistant general manager of sales and sales manager for the Pittsburgh territory.

NO BONUS BILL

Belief in Washington That the Measure Cannot Be Passed at This Session

WASHINGTON, Feb. 21.—Predictions are being freely made in official quarters that there will be no bonus legislation enacted at the present session of Congress. It is apparent that the interminable controversy over this largess to soldiers will be passed on to the next session and the legislation indefinitely postponed. At present there are indications that the House may jam the measure through at the current session purely as a matter of supposed political expediency, realizing that the Senate and the President favor postponement of action.

There is a strong element in the House, manifestly at variance with the Administration, who would like to return to their constituents at the forthcoming fall election as sponsors of a bonus regardless of how the money should be raised. The Administration is insistent that the bill shall include a plan for obtaining the revenue and has recommended a sales tax. The Chief Executive has announced himself in favor of a production tax to be collected at the source because of its so-called simplicity of collection and equitable distribution. The agitation for a retail tax apparently has not impressed the President, for he has expressed the belief that it would be too complicated and would involve more expense in collection than a manufacturer's tax. The President refrained from suggesting the rate which could be levied at the source, but it is said that he would approve a 1 per cent tax on wholesale sales of manufacturers' products. It is estimated that approximately \$350,000,000 could be obtained annually from this source and this would be sufficient to meet the demands of a cash bonus plan.

The agricultural bloc in Congress is strongly opposed to the sales tax plan. It is supported in this view by the American Federation of Labor. Business interests of the country, as Congress is well aware, are opposed to any kind of bonus legislation because of its serious economic effects. The attitude of agricultural interests is reflected by the statement of T. C. Atkeson, representative of the National Grange, in a formal statement to Congress. He said "The Grange is opposed to the introduction of the new principle of taxation variously known as sales tax, consumption tax, manufacturers' tax or turnover tax in any form and by any name, and considers the effort to enact it into law indefensible, wrong in principle and designed to shift the burden of taxation from those most able to pay, and receiving the greatest benefits to the shoulders of those least able to pay, and receiving the least benefit from the Government. The National Grange has suggested an excess profits tax for the bonus." He pointed out that, should this be inexpedient, a tax should be levied which will not be added to the cost of living of the millions with limited incomes. The President is unalterably opposed to the restoration of the excess profits tax, which proved so burdensome to business and industry. It is generally conceded that a levy on manufacturers' products could not be added to prices paid by ultimate consumers. Business men feel that it is not feasible to raise prices at this time. They also realize that they are the first to feel the effects of extra pressure from taxation in diminution of profits and would undoubtedly be compelled to absorb this assessment through narrowing of the margin of profits. Judging from the volume of protests received by Congress from business interests it is evident they are convinced that the study of the economic effects of a bonus by the legislators is exceedingly superficial and that the political side only has been considered.

January Fabricated Steel Business Relatively Good

In January 72,100 tons of fabricated structural steel work was contracted for throughout the United States, against 71,500 tons in December and 63,000 tons the monthly average for 1921. In January, 1921, the total was only 32,000 tons, but in January, 1920, it was 135,000 tons. Taking into account the hesitation evident in consummating investment enterprises, the fact that January is slightly better in tonnage than December may be significant. In the last ten years January has always shown a falling off from December with two exceptions, 1913 and 1914. January bookings for a decade have averaged 82,800 tons, while December bookings have averaged 111,200 tons. Thus January is about 15 per cent better than the 1921 rate and not quite 13 per cent under the January rate. February has normally been 10 per cent better than January.

The statistics of the volume of business taken by the bridge and structural shops of the country are those of George E. Gifford, secretary of the Bridge Builders and Structural Society, 50 Church Street, New York. The January business indicates that 40 per cent of shop capacity was covered, the total monthly capacity being put at 180,000 tons.

Improvement in Michigan Foundries

BATTLE CREEK, MICH., Feb. 20.—Considerable improvement in the business of Michigan foundries was reported at the quarterly gathering of the Michigan Foundrymen's Association, held last week in Battle Creek. A. W. Blodgett, secretary of the organization, made the report to that effect.

Mr. Blodgett stated that at one time during the summer of 1921 business had dropped as low as 20 per cent of normal, but that at the present time it is 35 per cent of normal.

S. T. Plimpton, Cleveland, led a discussion on the subject of the "Universal Iron Contract." It is a uniform iron purchasing contract designed for use

between the foundry and the furnace companies and which has been drawn up and submitted by the National Association of Purchasing Agents.

Other matters discussed were a uniform cost accounting contract and the important research work that is now being done by the University of Michigan along lines of particular interest to the iron industry.

Reorganization of Commonwealth Fuel Co.

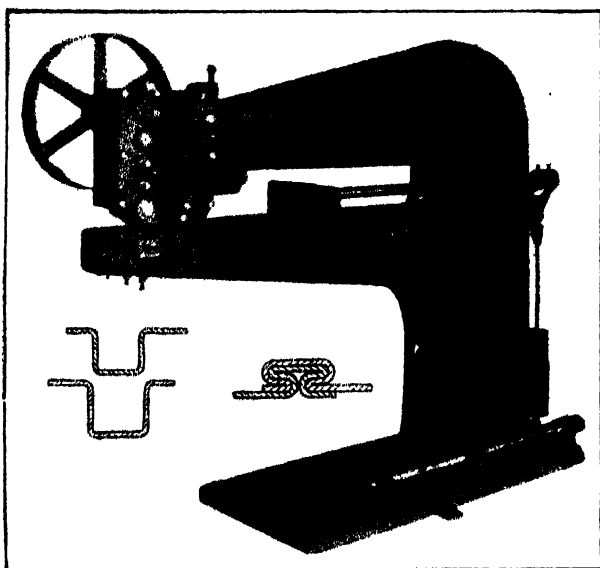
PITTSBURGH, Feb. 21.—Announcement is made of a reorganization and an increase in the capitalization in the Commonwealth Fuel Co., principal offices of which are in the Oliver building, Pittsburgh, with branch offices in Philadelphia, New York and Clarksburg and Morgantown, W. Va., a result of which is that W. G. Ireland, for the past 10 years sales manager the Jamison Coal & Coke Co., Pittsburgh, becomes financially interested in the company and has been elected its vice-president. The Commonwealth Fuel Co., which was incorporated and began business in 1913, owns and operates a mine in the Fairmont, W. Va., district and acts as sales agent for several bituminous operations, including the Simpson Creek Coal Co., and the Maryland Coal Co., with properties in West Virginia. George Paull, president of the Commonwealth Fuel Co., is a director in those companies. The company will continue to conduct a general brokerage business in coal and coke and will handle sales in this district of foundry coke produced from coal from the Jamison mines in the Greensburg basin, recently taken over by the Keystone Coal and Coke Co. Officers of the Commonwealth Fuel Co., in addition to Mr. Paull and Mr. Ireland are J. P. Fife, secretary and J. H. Roelofs treasurer. Robert Dickey is sales manager.

The Danbury Mill Supply Co., Inc., 37 Liberty Street, Danbury, Conn., which was recently incorporated to deal in mill supplies, machinery, etc., has chosen the following officers: President, George A. Seagrave; secretary and treasurer, Winfield S. Holman, who is in the plumbing and heating business in Danbury.

Compound Seam Closer

A machine for producing a side seam tighter and more substantial than the single lock seam has been developed recently by the Niagara Machine & Tool Works, Buffalo. It is shown in the accompanying illustration and is known as the No. 42 compound seam closer.

The seam produced by the machine can be filled with sealing compound to make it air tight, although the seam is said to be practically air tight without the filling. Calcium-carbide drums and calcium-chloride cans are examples of containers requiring air-tight



Offsets Are Formed in Double Crank Press and the Sheet Rolled to a Cylinder and Placed Over the Horn

seams and the machine is especially adapted for this class of work.

The offsets shown in the left hand insert are formed by dies in a double crank press. The sheet is then rolled to a cylinder and placed over the horn of the seam closer, with the offsets laid on the guide piece set into top of horn. The machine runs continuously and therefore does not require tight and loose pulleys or a clutch. By depressing the treadle connected to the sliding gage, the work is moved forward along the horn, and fed between the first set of rolls, which squeeze the seam together at the bottom. After these rolls take hold, the body feeds automatically through the machine. The next set of rolls flatten and thereby close in one operation the double-lock seam, shown in the right hand insert.

The machine weighs approximately 2700 lb. The pulley is 20 in. in diameter, 3 in. face and is run at 100 r.p.m. The maximum length of work that can be seamed is 42 in., the minimum diameter of the longest work being 13½ in. Shorter diameters, for work of short length, can be seamed. The capacity is given as No. 22 gage soft steel and lighter.

Patent Office Bill Now a Law

WASHINGTON, Feb. 21.—President Harding last Saturday signed the Lampert patent office bill. Now that the measure has become a law, much to the gratification of industrial, engineering and other interests of the country, salaries in the patent office will be increased, and the force of examiners and other employees expanded in order to relieve the congestion of work. The measure also is expected to check the resignations of experts, who as is well known, receive totally inadequate salaries.

The bill passed the Senate last week, after having been previously passed in the House, without any opposition and in the exact form in which it came to the Senate. It was in charge of Senator Johnson, chairman of the Committee on Patents.

"Familiarity with the patent office demonstrates the necessity of the bill," said Senator Johnson. "Increase in business has been so disproportionate to aid accorded the office that it has fallen far behind. The receipts of the office are sufficient to justify additional expenditure and make unnecessary draft on the treasury."

St. Louis Companies Merged

The Hagen Metal Products Co., 119-127 Bowen Street, St. Louis, and the Western Screw-Products Co., 3219-25 South Broadway, St. Louis, have been merged. The combined interests are capitalized at \$125,000, and business will be conducted in the name of the Western Screw-Products Co., which is the older of the two companies.

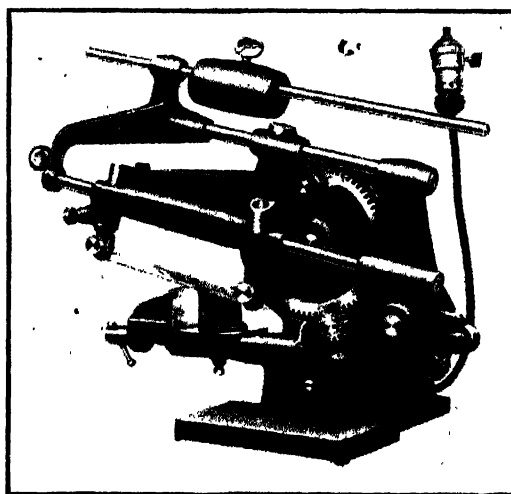
Jos. J. Hagen, president Hagen Metal Products Co., since its organization in Detroit in 1919, and who was secretary and treasurer of the Western Screw-Products Co., prior to that time, has assumed the management of the combined interests.

The company specializes in screw machine products, cap screws, plain and castle nuts and light metal stampings. The officers of the Western Screw-Products Co., are as follows: Jos. J. Hagen, president; Jno. T. Soy, vice-president; Herman Giesecke, secretary and treasurer.

Portable Power Hack Saw

The bench hack saw shown in the accompanying illustration has been placed on the market recently by the Edlund Machinery Co., Inc., Cortland, N. Y.

The machine is of the portable type, intended to eliminate the labor of hand sawing and to handle a large share of the work usually done on larger machines. It cuts tool and machinery steel efficiently



Cutting Is Done on the Backward Stroke

and is especially adaptable for use in tool rooms and machine shops.

Power is supplied by a small motor, direct connected, the power being transmitted through cut gearing. The machine can be attached to any electric light socket. The cutting is done on the backward stroke, the saw blade being relieved automatically on the forward stroke, an arrangement intended to diminish the wear and prolong the life of the blade. The feed is regulated by a weight, which can be instantly adjusted for various cuts and sizes of work from the lightest tubing to the heaviest bars.

The saw arm when raised for placing the work is held automatically in position until released by the operator. The machine also stops automatically when the cut is finished and can be stopped or started at any time while the cut is being made. Any standard 8-in. blade can be used and the blades can be easily replaced without the use of tools.

CONTENTS

February 23, 1922

Side Line Tides Foundry Over Depression 519

Sporting Goods Castings Kept Foundry Going—Application of Special Metal to New and Difficult Field

French Investigation of Rail Failures 523

Causes of the Increasing Number—Effect of Exfoliation Rapid Corrosion of Rails—Segregation and Poor Quality Metal

Operation of Oil-Burning Steam Plants 525

Plant Characteristic Diagram, with Particulars Regarding Its Use in the Establishment of a Standard of Performance

Disintegration of Blast Furnace Linings 528

Split Furnace Shells Undoubtedly Due to Expansion of Zinc Impregnated Linings—Remedies Suggested

Opposition to Foreign Valuation Plan 540

Action of Senate Committee Members Not Favorably Regarded Arguments Presented by John A. Topping for American Valuation

Railroads of Japan.....	521	Scrap Dealers for Lower Rates.....	539
Labor Efficiency and Hours of Work.....	521	Distribution of Overhead.....	539
Taking Initiative in Buying.....	522	Midvale Shuts Down Munition Depart-	
St. Louis-San Francisco Railroad Budget.....	524	ments.....	539
New Chain Pipe Wrench.....	527	Basing Point Hearing.....	541
New Eye Protector.....	527	Plates Containing Zirconium and Other	
Ericsson's Monitor to Be Commemorated..	527	Elements.....	542
Automatic Train Control Devices.....	529	Ford New Brass Foundry.....	542
New Osborn Molding Machine.....	530	Leather Belting Research.....	543
Alternating-Current Grinder.....	530	Powdered Coal Installation.....	544
The X-Ray in Metal Analysis.....	531	Bids on Tunnel Job.....	545
Press for Tires and Other Uses.....	532	Foreign Market Conditions.....	545
Grinding Safety Code.....	532	Steel Manufacturers Elect Officers.....	545
New Inside Micrometer.....	532	To Auction Ship Steel.....	545
No Bonus Bill.....	533	Bids off Navy Copper.....	555
January Fabricated Steel Business.....	533	Merger of Japanese Furnaces.....	558
Improvement in Michigan Foundries.....	533	Spanish Iron Mines.....	558
Reorganization of Commonwealth Fuel Co.....	533	Steel Corporation Stock Subscription.....	560
Compound Seam Closer.....	534	Railroad Rate Hearings.....	560
Patent Office Bill a Law.....	534	Canadian Iron Output.....	562
Portable Power Hack Saw.....	534	Ferromanganese Supplies.....	563
Editorials.....	536	Book Reviews.....	564
Steel Production Costs—Changes in		New Trade Publications.....	564
European Steel Industry—Progress in		Coming Meetings.....	565
Steel Welding.....		Trade Changes.....	566
Correspondence.....	538	Industrial Finance.....	567
Joint for Electric Furnace Electrodes -		Unemployment.....	568
Warwick Furnace Characteristics.....			

Iron and Steel Markets.....516

Comparison of Prices.....517

Prices Finished Iron and Steel f. o. b. Pittsburgh.....559

Personal Notes.....560

Obituary Notes.....561

Non-Ferrous Metal Market.....562

Machinery Markets and News of the Works.....569

New York Jobbers' Prices.....576

ESTABLISHED 1855

THE IRON AGE

EDITORS:

A. I. FINDLEY

WILLIAM W. MACON

GEORGE SMART

CHARLES S. BAUR, *Advertising Manager*

Member of the Audit Bureau of Circulations and of
Associated Business Papers, Inc.

Published every Thursday by the IRON AGE PUBLISHING CO., 239 West 39th Street, New York

J. J. Frank, *President*

PROVIDED IN U. S. A.

George H. Griffiths, *Secretary*

owned by the United Publishers Corporation, 243 West 39th
Street, New York. H. M. Sweetland, *Treas.*, Charles G. Phillips,
Lieut. Pres., A. C. Pearson, *Treas.*, F. J. Frank, *Secy.*

BRANCH OFFICES: Chicago: Otis Building. Pittsburgh:
Park Building. Boston: 410 Unity Building. Philadelphia:
1120 11-2 Widener Building. Cleveland: Guardian Building.

Detroit: 317 West Fort St. Cincinnati: Mercantile Library
Bldg. Buffalo: Ellicott Square Building. Washington: 816
Fifteenth St., N. W. San Francisco: 320 Market St.
London, Eng.: 11 Haymarket, S.W.1.

Subscription Price: United States and Possessions, Mexico,
Cuba, Shanghai, \$6.00; Canada, \$8.50; Foreign, \$12.00 per
year. Single copy 50 cents.

Entered as second class matter, June 18, 1879, at the Post Office at New York, New York, under the Act
of March 3, 1879.

Steel Production Costs

It is common knowledge that many of the steel mills have been losing money in the past few months, but the remarkable thing is that the losses are not greater. The losses are chiefly of overhead, i. e., a mill fails to earn all its overhead expense, but if it were idle, it would have an overhead nevertheless. There are, of course, losses in depreciation of inventory, but those are caused by extraneous conditions and are not chargeable to operation.

Speaking generally, comparisons of selling prices lately ruling with prices obtaining before the war and in the early months of the war, with allowance for known and inescapable increases in various items of cost, such as freight rates and wage rates, indicate that in some respects steel is being produced more economically than before the period of inflation, or the losses would be larger than are being reported.

There are two expensive factors in present operating conditions whose influence is not commonly appreciated, the low operating rate and the very mixed character of the specifications being filled. Before the war, it was considered almost impossible, from the profit and loss standpoint, to operate the average mill at less than about half its capacity, but of late many mills have had to contend with a much worse operating rate than that.

The other condition, the mixed specifications that have to be filled, is well understood by all who have any familiarity with mill operations, but is given little thought by the average buyer of mill products. It is the natural and unavoidable consequence of the hand-to-mouth buying, on the most conservative scale, that has characterized the market for months past. The buyer is unwilling to wait for delivery until a convenient and economical rolling schedule can be made up, but insists on immediate attention, and if one producer will not agree to almost instant rolling another producer will. In all the ups and downs of the steel market in the past, managers have noticed the sudden increase in costs that comes when orders run short, and the sudden drop in

costs that occurs when it becomes possible to schedule mills a little distance in advance.

With the various handicaps existing, the showing of efficiency and economy made by the mills is noteworthy. In many respects, perhaps minor individually, but important in the aggregate, steel mills are undoubtedly being operated more efficiently than before the war. The efficiency of labor is not excluded as an item in this connection, for there are cases in which a direct comparison can be made between results in 1913 and results to-day, showing a greater labor efficiency at the present time.

Further decreases in costs and increases in efficiency are to be expected, although there can be no sudden improvement except such as may come from enlarged operation and better scheduling of rollings. No further general reduction in wages seems at all probable in the near future, although there may be readjustments in spots. The "general freight rate reduction" that used to be looked upon as a certainty, the time only being in doubt, now seems likely to come rather gradually.

Some reductions may occur of such character as to be considered more or less "general," but, if so, they will not be large. If the rate makers consider this matter with an eye to the traffic producing possibilities of reductions, they may well turn their attention to iron and steel scrap rates, which are in many cases too high to permit scrap to move. Scrap dealers point out that there are piles of scrap that can be looked at, ocular evidence that traffic movement can be developed. The holders can afford to wait, for the interest cost of holding is practically nothing.

Steel prices are now so low, considering all conditions, that no decreases in production costs are likely to appear in recognizable form in changes in selling prices. Steel prices are not fixed, but they are as nearly stabilized as can possibly be expected in the circumstances.

One of the striking effects of the steel depression of 1921 has been the decline in the output of electric furnaces making steel ingots. It has been out of all proportion to that in either open-hearth or Bessemer steel. The slump in the

electric ingot output began in August, 1920. In December, 1921, the production was less than half that of January of the same year or 1539 tons contrasted with 3629 tons. In January, this year, it fell still further to only 822 tons, which compares with 10,687 tons in January, 1920. While the open-hearth output last year was about 50 per cent less than that of 1920, the electric steel ingot production was hardly one-sixth of that of 1920. Compared with 1913, when the American electric steel industry was in its infancy, the present rate of operations is less than it was then and, in proportion to capacity, it is less than the Canadian production.

Changes in European Steel Industry

Several captains of the American steel industry have made trips to Europe, but none has brought back a more comprehensive or interesting analysis of conditions in the European steel industry outside of France, than the one published as an interview in THE IRON AGE of Feb. 16.

Two significant facts stand out from the result of the intimate talks of this traveler with nearly 300 steel men of Europe. In Germany the 48-hour week, and in Holland and Belgium the 45-hour week, legally prevail. In those countries, as well as in England, the 8-hour day prevails throughout the steel industry, even in the operation of blast furnaces and open-hearths, with three 8-hour shifts. The conviction prevails everywhere that labor conditions and wages will not return to the pre-war levels, but that a new era is dawning.

The other fact is a corollary of the first. It being admitted that labor is to be more expensive than before the war, European steel men, in order to compete with each other and with America, must lower costs by the modernization of equipment and the adoption of every possible labor saving device. Larger blast furnace units and improved open-hearth and rolling mill equipment are being widely discussed and in some cases planned. Even the ancient conservatism of British pig iron makers has collapsed and they confess that a change is necessary. Conditions generally in those countries are pointed to as paralleling those in the United States before the war and as likely to remain so. These industries, therefore, face new conditions in the future.

With taxes high and likely to be so for some time to come, with labor more expensive and on a changed basis, with transportation and fuel charges high and with economic and metallurgical conditions radically changed both in Germany and England, those industries are sure to develop along new lines with the ultimate result of larger capacity units and labor saving devices. The effect on the American steel industry cannot now be measured, but the competitive conditions of 1913 and 1914 have disappeared. The introduction of the 8-hour day in those steel industries may have its bearing on the American and perhaps cause its introduction here. In any event the progress of these changes will command the careful attention of American iron and steel makers.

Two pertinent facts characterize the copper export movement in 1921. Sales to foreign consum-

ers were the largest for any year since the war, exceeding both 1920 and 1919 by a liberal margin, and they were over 60 per cent of the 1913 exports. In a year of acute depression and light exports in all other products of the American steel and metal industries, this record is noteworthy. The other striking fact is the heavy purchases by Germany of American copper last year. According to official data just made public, German purchases were not only the largest of any other country, but they were in excess of those of France, Great Britain and Japan combined. German consumers bought about 39 per cent of the total exports and, if Holland's receipts be credited to Germany, this amount would constitute over 44 per cent of the total. Before the war, or in 1913, Germany took only 33 per cent of American copper exports, largely, as a preparation for war. The renewed movement reflects not only the acute need of copper in Germany, but is an example of what a country can do under the handicap of a depreciated currency.

Progress in Steel Welding

That rapid strides have been made in the fundamental principles of welding metals, so that the practice is more of a science than an art, is clearly an inference from an article in THE IRON AGE last week on welding rods. In the early stages of welding steel and even up to recently, the practice consisted too often in filling a steel weld with whatever rod was ready at hand. This often resulted in poor or weak welds and in a prejudice against the art in general.

Much research has been conducted recently both on the correct mixture of gases and the proper distribution to attain controllable temperatures as well as on the kind and composition of the rod which is to supply the welding metal. Attention has also been paid to the use of proper fluxes, as well as to the needs in obtaining a high grade weld, of being certain that the base metal and the welding rod are fused at the proper temperature to insure a thorough mingling of the metals. It has been conclusively demonstrated that to obtain a weld as good or better than the original metal it is necessary to use a rod of a composition which will produce a joint better than the original or base metal. To attain this rods of various compositions, including nickel steel, manganese steel and other alloys, have been developed. Their judicious use in the hands of experts is producing results hitherto unexpected.

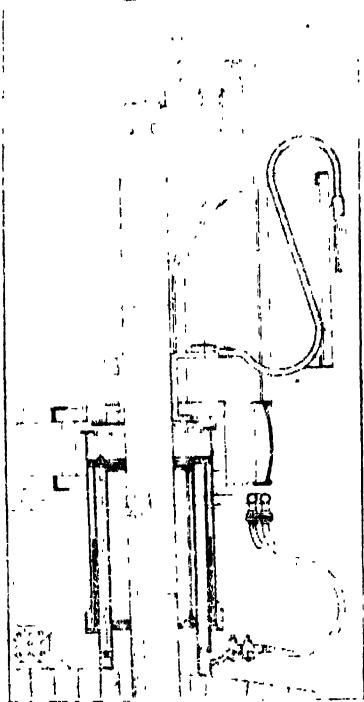
It may safely be said that the art of welding has developed to a stage where, by controlling the temperatures, the materials and the fluxes, furnace conditions originally existing in the actual manufacture of the metal are imitated as nearly as possible at the welding point, to the decided improvement of the welded portions. Reinforced by modern practice and apparatus in heat treatment as well as by new magnetic devices, already in use or in prospect, for testing the reliability of welds, it is probable that still more advances may be looked for, not only in steel but in brass, copper and other non-ferrous metals.

CORRESPONDENCE

Joint for Electric Furnace Electrodes

TO THE EDITOR: Mr. Moore in his very interesting report on the present development of the electric furnaces, (*THE IRON AGE*, Sept. 22, 1921) emphasizes very intelligently the great importance which should be given to the furnace heat losses.

In most cases the heat loss is increased due to the poor joint between the furnace frame and the electrodes. Few electric furnaces on the market possess such a tight joint at the electrodes as to prevent air flowing through, especially when the furnace is pour-



Section of Electric Furnace Electrode Holder to Indicate Scheme to Secure Air Tightness of Joint

ing. This air current not only cools off the furnace interior, but causes injury to the electrodes.

Mr. Moore gives as an example the Stobie electric furnaces (England) which has an improved electrode joint, but I think that the Fiat electric furnace has solved this problem by the use of a patented device which was developed after many years of study and experience. By using this device on six Fiat furnaces of 5 and 6 tons capacity in our foundries at Turin, we saved 650 kw. hr. of power and 3 kg. of electrodes per ton of steel, and with the furnaces cool at the start. This device gave so tight a joint that the efficiency of the furnace was greatly increased and the use of a larger electric current and electrodes was made possible. Another saving was made in extending the life of the refractory furnace lining which was destroyed often before the adoption of this device.

This device is protected in the United States by patent No. 1,320,884, Nov. 4, 1919, and by other patents throughout the world.

Fig. 1 shows a transversal section of a 5-ton Fiat furnace and the general design and assembly of this joint device. A steel bridge mounted on the sides of the furnace, supports the three electrode housings which are made out of a cooled steel cylinder. Inside of the cylinder a series of insulated rings acts as guides to the graphite electrodes and prevents it coming in contact with the metal wall of the cylinder. At the top of the cylinder a large asbestos disk is fixed, sup-

ported by a metal ring, over which is placed a bell shaped flange attached to the external steel covering. An opening is made at the center of this covering to allow the electrode to pass through. The current terminals for the electrodes are attached to the top of this covering by means of insulated disk and bolts. The movement of this covering is made by two bolts on the side and the electrodes are adjusted by a combination of gears driven by a small electric motor. This motor is operated by a drum controller located on the switchboard.

All parts of this device are accessible to be cleaned or inspected. The entire outfit forms a completed unit which can easily be placed or removed from the furnace by a small hoist.

This device can be attached to almost any type of electric furnace and will shortly pay for itself. With our 6-ton furnaces, manually charged, we can do nine charges in 24 hr. operation.

The Fiat electric furnace works are at the present time using electric furnaces of 5 to 20 tons capacity in their foundry shops. Knowing the results obtained from all the furnaces equipped with this Fiat joint device here in Italy, especially in the steel car wheel industry, which is rapidly progressing. I thought the readers of *THE IRON AGE* would be interested.

DR. ALFREDO STROMBOLI.

General Commercial Manager of the Fiat Electric Furnaces.
Turin, Italy

Warwick Furnace Characteristics

TO THE EDITOR: My attention has been called to the article in your issue of Feb. 2, relating to the Warwick furnaces, and to certain statements made therein. The Warwick No. 2 furnace plant was built under the designs and supervision of my firm; furthermore, my firm had been the engineers for the Warwick Iron Co. for several years prior to the construction of No. 2 furnace. It may, therefore, be safely assumed that I am familiar with the conditions that controlled the design of the furnace lines adopted in both the old and the No. 2 furnace.

It is faint praise, indeed, to state that a man of the initiative and scientific attainments of Edgar S. Cook determined the lines of No. 2 furnace by a "proportionate enlargement of those of the older stack," as stated in the article; furthermore, such a statement is incorrect. The lines adopted for No. 2 furnace were the result of many conferences on the part of Mr. Cook and myself, in which the operating result of several furnaces 100 ft. in height were carefully considered and analyzed.

At that time six 100-ft. furnaces designed by my firm were in use, and the results of their operation were at our disposal; i. e., No. 3 Lebanon (the first furnace 100 ft. in height built in the east), Nos. 1 and 2 Lorain, Nos. 2, 3 and 4 Jones & Laughlin Eliza Furnaces. The lines adopted for Warwick No. 2 furnace were as follows: hearth 14 ft., bosh 21 ft. (not 22 ft., as given in the article); angle of bosh 72 deg., stock line 14 ft. and height 100 ft. On the other hand, the lines of the old Warwick furnace were of the following dimensions: hearth 10 ft.; bosh 16 ft., 4 in.; angle of bosh 74½ deg.; stock line 11 ft. and height 70 ft.

It is, of course, difficult to realize, under present conditions of furnace practice, that Mr. Cook's proposal to make 500 tons of foundry iron per day, in one furnace, was regarded as impossible by most blast furnace managers. Progress and initiative, however, were among Mr. Cook's ruling characteristics, and modern furnace practice is indebted to him in many particulars. Contrary to the statement contained in the article in question, the lines adopted did give expected results, and no difficulties were encountered other than those prevalent at modern furnaces, during that transition period in furnace practice.

The furnace was blown in Oct. 8, 1901, and no changes whatever were made in the lines or plant, until the furnace was blown out for relining in 1904.

when the following lines were adopted: hearth 15 ft., bosh 22 ft., angle of bosh 75 deg. and stock line 15 ft. In the relining of 1907 the lines were changed to provide the following: hearth 15 ft. 6 in.; bosh 22 ft. 6 in.; angle of bosh 75 deg. and stock line 15 ft. In the relining of 1911, the lines of 1907 were repeated, except that the bosh and stock lines were made 23 ft. 6 in. and 16 ft., respectively. Mr. Cook's active participation in the management ceased in 1912. At no time has the furnace been blown out except for the replacement of wornout linings.

It is an interesting fact that, except for relining periods, No. 2 furnace plant has been in continuous operation since it was first placed in blast in 1901, and further, that the original linings of the firebrick stoves are still in use.

I do not have the latest figures at my disposal, but from Oct. 8, 1901, to Dec. 1, 1920, Warwick No. 2 furnace had produced 2,663,257 gross tons of pig iron. When the depression of 1920 developed, No. 2 furnace was continued in blast and is at the present time in blast, whereas the new furnace described in the article was blown out in December, 1920, after about four months' operation, and is still out of service.

Reference is made in the article to the replacement of the Hugh Kennedy stoves at the old furnace by "those of larger dimensions and of a center combustion type;" it may be well to add that the latter stoves are of my three-pass design and are built under my patent.

FRANK C. ROBERTS, C. E.

Real Estate Trust Building,
Philadelphia, Feb. 9.

Scrap Dealers Ask for Lower Freight Rates

WASHINGTON, Feb. 20.—Iron and steel scrap dealers appeared to-day before the Interstate Commerce Commission in connection with the general rate investigation and asked that the 40 per cent advance in freight charges made in August, 1920, be removed. This is the same request as was made by most iron and steel manufacturers when the hearing was opened.

H. F. Masman, traffic manager for the National Association of Waste Material Dealers, who asked reductions of rates in all kinds of so-called waste materials, said that scrap iron and steel should take the pig iron rate instead of the billet rate as both are raw materials used in the production of steel.

J. L. Low, manager of the freight department of Briggs & Turivas, Chicago, submitted exhibits to show pig iron rates are lower than scrap iron and steel rates, but conceded that the carriers had made some adjustments recently. He asked for removal of the alleged discrimination in rates against scrap and then elimination of the general 40 per cent advance.

It was said that practically no scrap is moving from Eastern points to the central district, because of high rates, and that the business is demoralized because 70 per cent of the scrap used at Youngstown must move from distant points.

A. B. Alpirin, an Omaha scrap dealer, asked for specific reductions in rates from Omaha to Chicago, St. Louis, Kansas City, Denver and Peoria, Ill., ranging from 20 to 50 per cent. He said that 60 per cent of the scrap dealers in the small cities of Nebraska are out of business.

A jury in Pittsburgh pared \$265,318 from the claim made by the Crucible Steel Co. of America against the city of Pittsburgh for damages sustained to its property fronting on West Carson Street as a result of widening that thoroughfare and raising it from the flood level. The company asked \$292,318 but the jury awarded it only \$27,000.

The Richardson & Boynton Co., Dover, N. J., manufacturer of stoves, ranges, etc., is arranging to transfer a number of local plant departments to its works at Buffalo, N. Y., including molding, tin and sheet metal operations. The change is being made owing to continuance of local labor troubles.

Belgium's production of spelter in December, 1921, is reported to have aggregated 7370 metric tons.

DISTRIBUTION OF OVERHEAD

Industrial Cost Association Considers Merits of Productive Hour and Machine Rate Method

A paper on "Overhead Distribution Methods" was presented at the Feb. 16 meeting of the New York section of the Industrial Cost Association at Keen's Chop House, New York, by F. Brugger of the Pittsfield works of the General Electric Co. The discussion following centered chiefly upon the relative merits of the productive hour method and the machine hour rate method of figuring costs.

In defense of the machine hour rate method in a modified form, a representative of the De Laval Separator Co. explained how that company had, after investigation of both methods, introduced a greatly modified machine hour rate method, with what, up to the present, appears to be satisfactory results. In a department of 70 machines, large and small, operating on different kinds of work and on which, by way of illustration, about \$2 per hr. was formerly charged as overhead, under the new method of figuring, an overhead on the smaller machines of 30 cents to 40 cents per hr. was shown, and up to as high as \$5 per hr. on the larger machinery. As a result the company began to consider the advisability in some cases of turning certain of this larger work over to other shops.

The questions of tax, insurance, light, heat and power charges were discussed and the proper methods of charging these items, as well as the value of charging interest on the investment in a machine against overhead, as part of the operating expense.

There was some disagreement over the proper method of figuring overhead in dull and active business years, Mr. Brugger preferring the establishment of a normal overhead, to be evenly distributed over dull and active periods, arguing that business activity and depression occurred in cycles and should be so considered. Those in opposition pointed out that there was no good reason for making a period of two or three years prosperity pay the overhead run up by one year of depression.

The board of directors for the coming year was unanimously elected, the board being vested with authority to elect the officers of the organization. The elections to the board were as follows: H. D. Starr, assistant comptroller New Jersey Zinc Co.; C. A. Porter, comptroller Hardinge Co., New York; J. H. Ramsey, auditor, Electro-Dynamic Co., Bayonne, N. J.; Addison Bonen, Yale & Towne Mfg. Co., Stamford, Conn.; R. W. Matter, office manager Jenkins Mfg. Co., Bloomfield, N. J.; F. B. Van Vleet, general auditor Ruberoid Co., New York; Durlin Wade, Jr., general auditor Cross, Austin & Ireland Lumber Co., Brooklyn, N. Y.

Midvale Shuts Down Munition Departments

The armor plate, gun and projectile departments of the Nicetown works of the Midvale Steel & Ordnance Co. have been shut down, following the recent action of the Conference on Limitation of Armament in restricting the naval building programs of the United States and other countries. About 400 men were thrown out of employment.

No plans have been announced as to the use to which the idle departments may eventually be put.

The Niles Steel Products Co., Niles, Ohio, formerly the Allsteel Supply Co., has developed the production of stampings and pressed metal parts. It is located very advantageously in the Mahoning Valley for its source of supply, being surrounded by sheet, plate and strip mills. Besides its regular factory building, it has, in the past year, added a warehouse and office building. It has a completely equipped machine shop of sufficient size to supply and maintain dies for its press department. It also has a well developed department to furnish agricultural implement seats and other stampings used by implement manufacturers.

Opposition to Foreign Valuation Plan

Action of Senate Committee Members Not Favorably
Regarded by Iron Trade—Arguments Presented by
John A. Topping for American Valuation

BY L. W. MOFFETT

WASHINGTON, Feb. 21.—The iron and steel trade being on record in favor of the American valuation plan as a principle for basing tariff duties will applaud the steadfast opposition of Chairman Fordney of the House Ways and Means Committee to the foreign valuation plan, which, to the disappointment of the trade and American manufacturing interests generally, has been tentatively agreed upon by the Republicans of the Senate Committee on Finance. Mr. Fordney has made the flat statement that if the Senate sends the permanent tariff bill over to the House based on foreign valuation, that branch of Congress "may expect that it will be sent to the Ways and Means Committee, which will send back to the Senate a bill based on American valuation." Mr. Fordney added that he would "never agree to any foreign valuation and I do not know of any Republican member of the House who will or who wants foreign valuation."

This situation plainly opens a breach. Its outcome is purely problematical. It may greatly delay enactment of tariff legislation, which already has been deferred by the Finance Committee to a point where the manufacturing interests of the country have become irritated. There are even those who have no restraint in saying that the Senate Committee is purposely trying to delay tariff legislation further in the hope that the dilemma it has faced over the valuation feature will be worked out through some sort of adjustment of world-wide economic conditions. At the same time, the Republicans, who are responsible for legislation, undoubtedly would have fears of political results if they postponed tariff legislation when their platform has pledged them to tariff revision. It is clear that the Republicans fear the possible political effect if action is deferred much longer. A way out of the situation may not be found unless the President goes definitely on record in favor of some tariff valuation plan. Those in favor of the American valuation plan do not accept the statement that the Senate committee's present attitude can be logically based on any suggestion made by the President. The President, in his annual message to Congress last December in speaking of the American valuation plan, said there could not be ignored "the danger of such valuation making American tariffs prohibitive." Republicans of the House assert that this statement by no means condemns the American valuation plan and does not justify the action of the Finance Committee. On the contrary, they say the reasoning of the President is perfectly sound and simply was a warning against the danger of fixing duties too high. Manifestly a given ad valorem duty is more highly protective under the American valuation plan than it is under the foreign valuation plan. This difference obviously is due to the exchange situation and, according to House Republicans, was taken into consideration when they passed the American valuation plan.

Urged Moderate Duties

Iron and steel manufacturers in substance have expressed the same sentiment as that of the President and have consistently urged only moderate duties based on the American valuation plan. Unless it is finally adopted, they point out that higher duties than those carried in the House bill will be necessary as a measure of protection. This is one of the contentions made in a brief recently filed with the Finance Committee by Chairman John A. Topping of the Republic Iron & Steel Co., on behalf of the independent steel industry in which he asked that the American valuation plan be adopted. His brief was in reply to arguments made

against the American plan and supplemented previous statements he and other steel producers have made before both the Ways and Means and Finance Committees.

The Smoot Amendments

The tentative plan of the Senate Committee is based on amendments prepared by Senator Smoot, which Republicans of that committee maintain are designed to meet disturbed economic conditions of the world with the resulting depreciation of foreign exchange. They take into account proclaimed American valuation, flexible rates that might be moved up a maximum or down a minimum of 50 per cent and depreciated foreign exchange as well as provisions intended to prevent discrimination against American exports. Final action on the Smoot provisions is being withheld until an opinion is received from the State Department as to whether the American valuation plan and the depreciated exchange provisions would be in violation of "most favored nation" clauses of existing commercial treaties. Those favoring the American valuation plan plainly do not take much stock in the claim that it would violate such treaties and have pointed out that countries throughout the world have had no hesitancy in erecting high tariffs such as this country has not contemplated.

They also say that granting that there is any substance to the argument about the violation of the treaties mentioned, the Senate Committee has been slow to raise the point. They also are unable to reconcile the attitude of the Finance Committee with the fact that it had employed a staff of experts under the direction of James B. Reynolds to investigate the practicability of the American valuation plan, and despite the attitude of Mr. Reynolds that it is practicable, has for the present at least suggested the foreign valuation plan. The report of Mr. Reynolds has never been made public, but in a brief statement at the recent convention in Washington of the National Association of Manufacturers, who went on record in favor of the American valuation plan, he made the statement that the plan is workable. Critics of the Senate Finance Committee also have commented on the fact that it at one time had practically determined upon this system and was engaged in transferring many duties from an ad valorem to a specific basis. Then also, it is pointed out, it had been about concluded to base duties on the American wholesale selling price. The present shift consequently has aroused real interest, to say the least, but apparently the Republican members of the Finance Committee think it is the logical step to take and work now is under way of returning many duties, it is said, from a specific to an ad valorem basis. There has been a difference of opinion on the plan of duty assessment among officials of the Treasury Department as well as among members of the Tariff Commission. The final solution determined upon necessarily is being awaited with anxiety and even more concern is being shown over the outcome of the difference between the House Republicans and the Republicans of the Committee on Finance.

Mr. Topping's Brief

In his brief filed recently with the Finance Committee, Mr. Topping said that unless the American valuation plan is adopted rates of duty on iron and steel products will have to be greatly increased. He contended that the American valuation plan is necessary even to rates on iron and steel articles which take specific duties. He explains that the value of iron and steel determines in many cases the classification under which duty is assessed and to prevent undervaluation

or fraudulent methods, American valuation is necessary for protection. Furthermore, he states, there are important iron and steel rates rated on the ad valorem basis which selling methods long in vogue require should be continued and these special products, it is pointed out, are exposed.

The brief of Mr. Topping, in part, says:

It has been stated before the Senate Finance Committee by a representative of the Fair Tariff League, that the method of American valuation proposed, results in tariff discrimination, because cost varies with the country of production, and therefore, the exporting country with the minimum cost, would pay a lower rate of duty than the exporting country with the maximum cost. This may be admitted, but this objection would be also true of foreign valuations, because cost variations are not leveled by any method we might adopt in valuing importations.

American valuation, on the other hand, has the distinct merit of not being discriminatory, as all exporting countries would pay the same amount of duty, and therefore, no discrimination is practiced, whereas discrimination is unavoidable under foreign values, as the amount of duty varies with the cost of the product.

The administrative features of the American plan are practical, and can be easily operated. It has been demonstrated, that it is easier to obtain necessary data at home for appraising commodities, than it is to obtain data of a reliable character, in foreign countries.

In fact, under the present law, which permits of duty being levied upon American values, when no other method for determining values is obtainable, emphasizes the fact that American values are always obtainable, whereas experience shows, this is not true of foreign values.

American valuation will not increase the price to the American consumer, but will prevent under-valuations. Under-valuations principally benefit the exporting country and the importing agent, because the imported product is sold, like domestic products, on the basis of what competition, from time to time, suggests, rather than by what the cost of the product justifies. It is, therefore, more important to prevent under-valuation to conserve Government revenues, and to prevent the uncertainties and inequalities arising from depreciated and fluctuating currency values, than it is to legislate to support a theory with doubtful advantages to the consumer, particularly when there can be no doubt that every dollar of imported product brought into our markets, means less work for our people.

Assessment of duty on foreign valuations, converted into United States money at prevailing low rates of exchange, is now enabling foreign manufacturers to displace American products at the expense of American workmen. Unemployment is destroying the purchasing power of the people, and unless this situation is remedied, it will eventually prostrate all American industries which are exposed to this unfair competition.

BASING POINT HEARING

Sessions at Milwaukee Ended—Investigation to Be Continued This Week at Washington

MILWAUKEE, WIS., Feb. 20.—The first hearing of the series ordered held by the Federal Trade Commission upon its complaint against the United States Steel Corporation, seeking the abolition of the Pittsburgh basing point practice because of the alleged discriminatory effect upon Western rolled steel consumers, was brought to an end on Saturday, at the close of the third week of trial sessions opened Jan. 30 in the Government building at Milwaukee by Examiner John W. Bennett.

It was announced that the commission will open the second of the series of hearings on March 1 at Minneapolis.

In the meantime, however, the commission will conduct a hearing at its headquarters in Washington upon the results of the investigation in Milwaukee. Questions concerning the admissibility of evidence will be definitely decided and decisions made upon a large number of motions and objections made by counsel for the commission as well as the Steel Corporation during the hearing at Milwaukee, which during the introduction of testimony were merely noted by the trial examiner for future determination. The decisions upon these questions are expected to have an important effect upon the large mass of evidence recorded thus far, and upon the conduct of future hearings.

Points in Controversy

W. W. Corlett, general solicitor of the Steel Corporation, entered motions at the final session of the hearing in Milwaukee on Saturday, indicating that the points of evidence in controversy will be taken up under four separate headings at the hearing before the entire commission in Washington this week. These are as follows:

1. The introduction of contracts, invoices and correspondence with manufacturers of rolled steel material other than those between the respondent, namely, the U. S. Steel Corporation, and its subsidiary corporations, and concerns whose officials and representatives have testified.

2. The limitation upon cross-examination of inquiry

into the (a) profits made upon any article manufactured, and the (b) profits as a whole made by any concern, its increase in net assets, the amounts of dividends paid, and any other facts tending to show the state of prosperity of the concern.

3. The introduction of testimony intended to show a higher cost to the ultimate consumer, or in other words, "the public interest."

4. The mere expression of an opinion by a witness as to the ability of the company which he represents to compete in a given territory, heretofore admitted as expert testimony.

Last Week's Evidence

Witnesses who testified during the final week of the hearing in Milwaukee reiterated to a large extent the evidence presented by previous witnesses. A new angle was introduced by the testimony of L. E. Geer, secretary and treasurer, and Herman A. Meyer, purchasing agent, Manitowoc Ship Building Corporation, Manitowoc, Wis. This testimony in effect was that the company in the last five years purchased approximately 42,000 tons of plates and other rolled material, of which amount about 90 per cent was purchased from the Illinois Steel Co. and shipped from mills in the Chicago or Gary districts, with the freight rate from Pittsburgh to Manitowoc invariably included in the invoice price, although billed f.o.b. Manitowoc. Both witnesses testified that the Manitowoc company lost a considerable quantity of business in competition with shipyards along Lake Erie because of the more advantageous geographical location of the Lake Erie yards in relation to the cost of material purchased upon a Pittsburgh basing point. The witnesses testified that they estimated the amount of money represented by unearned freight charges paid on steel in the past five years at \$140,000.

E. E. Russell, vice-president J. I. Case Threshing Machine Co., Racine, Wis., in his testimony, revealed that his company fixes its selling prices by finding the cost of production and then adding a 10 per cent margin of profit. Thus, Mr. Russell testified, every purchaser of a Case product, wherever located, paid not only 10 per cent upon cost, but a similar percentage upon unearned freight charges when steel material was derived from mills near Racine and freight from Pittsburgh to Racine was added to the purchase price. Upon cross-examination, Mr. Russell admitted that the International Harvester Co. was able to sell threshers at a lower cost than the Case company, but that this difference did not materially affect the competition, which is

governed to a considerable extent by prestige and other considerations not related to cost and selling prices.

Fabrication in Transit Plan

Herman A. Wagner, president Wisconsin Bridge & Iron Co., Milwaukee, testified his company consumes about 16,000 tons of structural shapes annually on the average, and by reason of the imposition of unearned freight charges from Pittsburgh, it was impossible to compete on an equal basis with fabricators east of Chicago. Western competition is possible, he said, only under the fabrication-in-transit privilege, which imposes a penalty of 2c. per 100 lb. It has been the intention of the Wisconsin company to increase its capacity and enter Eastern fields of competition if it were not handicapped by the Pittsburgh basing point practice, Mr. Wagner said, but under existing conditions it is not possible to employ the capacity of the present plant to the utmost because the field is restricted.

W. T. Bastian, purchasing agent Harvey Spring & Forging Co., Racine, Wis., testified that his concern purchased about 10,000 tons of steel annually, and 84 per cent is shipped from mills of the Illinois Steel Co. in the Chicago district, but freight from Pittsburgh to Racine invariably was added, save in the last six or

eight months, when purchases have been made on a Chicago basing point. E. J. Harvey, president of the company, testified that the steel represented 68 per cent of the cost of the finished article, and that 30 to 40 per cent of the material was wasted in the process, which increased the handicap he said his company was under in competing with competitors located nearer Pittsburgh, for business in such automotive centers as Cleveland, Detroit and Flint.

Irving Smith, president Sterling Wheelbarrow Co., Milwaukee, testified that he purchases 2000 tons of steel annually and that 30 per cent of this amount is derived from Chicago district mills, but freight from Pittsburgh is charged on such purchases as well as on those delivered by mills farther east.

W. E. McCollum, secretary Western Association of Rolled Steel Consumers, which is supporting the complaint of the Federal Trade Commission, stated that according to the best information available, Milwaukee fabricators of rolled steel consume between 150,000 and 200,000 tons annually. The freight rate from Pittsburgh to Milwaukee is 41½c. per 100 lb. He figures that unearned freight charges collected on material delivered from Chicago district mills amount to more than \$1,000,000 annually under the Pittsburgh basing point practice.

Steel Plates Containing Zirconium and Other Elements

An investigation of the manufacture and properties of steel plates containing zirconium and other elements has been conducted by the Bureau of Standards and has been published as Technological Paper No. 207. The investigation originated from the need of the ordnance department of the army and navy for information regarding the effects on the ballistic properties of light armor plate of certain chemical elements such as zirconium:

A joint program was outlined according to which the Bureau of Mines was to produce and analyze ingots of the desired compositions; the Bureau of Standards to manufacture and heat treat the plates, carry out physical tests, micro-examinations and chemical analyses, and develop methods of chemical analysis, when needed, for the more unusual elements in steel and in the presence of each other; and the Navy Department was to carry out the ballistic tests.

Although the results of the ballistic tests are not available for publication, an account of the mechanical properties and tests of this series of somewhat unusual steels was considered worthy of publication. These results may be summarized as follows:

About 193 heats of steel containing in various combinations the following principal variable elements, carbon, silicon, nickel, aluminum, titanium, zirconium, cerium, boron, copper, cobalt, uranium, molybdenum, chromium and tungsten, have been studied.

None of the steels presented any difficulties in rolling into plate except those containing boron.

The usual mechanical properties and impact tests were carried out on all of the steels. It is shown that steel containing 0.40 to 0.50 per cent carbon, 1.00 to 1.50 per cent silicon, 3.00 to 3.25 per cent nickel and 0.60 to 0.80 manganese and deoxidized with a simple deoxidizer such as aluminum can be produced having a tensile strength of approximately 300,000 lb. per sq. in. with excellent ductility and toughness. This type of steel is recommended for a structural material.

Although the same high properties are obtained in steels of the above composition with the aid of additional elements, it does not appear necessary to resort to such additions of expensive alloying elements.

Zirconium, like titanium and aluminum, acts primarily as a scavenger, and when it is not removed as part of the slag remains in the steel in the form of square bright yellow inclusions not directly visible at magnifications lower than 500 diameters. It is not considered that these inclusions can be very beneficial and if they are segregated and rolled out into thin plate-like streaks they may be detrimental, especially in armor plate.

Of the other elements that are regarded as special alloying additions, chromium, tungsten, vanadium and molybdenum go into solution and produce a martensitic pattern in the air-cooled specimens. Cerium and ura-

istic inclusions. Copper goes into solution but a larger amount is required to produce a martensitic-pattern in the air-cooled samples than for the others. Boron forms a complex eutectic, probably that of an iron-carbon-boron compound with iron. This eutectic is fusible at the temperatures ordinarily used in rolling, but at slightly lower temperatures steel containing boron can be rolled successfully. Hot working breaks up the eutectic and spherical hard particles, similar to iron carbide globules, are formed.

Contract for Reconditioning the Leviathan

WASHINGTON, Feb. 21.—The contract for reconditioning the liner Leviathan, was formerly awarded by the Shipping Board last Wednesday, to the Newport News Shipbuilding & Dry Dock Co., Newport News, Va. The vessel is to be ready for service early in 1923. The work of putting the ship in condition for service will begin at once both at Hoboken, N. J., where the Leviathan now is, and at the yards of the Newport News company, which corporation will convert the steamer into an oil burner for the sum of \$6,110,000. The contract for steward's equipment and interior furnishings was awarded to Gimbel Bros., New York, at \$551,000. The total cost to the Shipping Board will be \$8,200,000. The hull of the vessel will be painted at the Boston Navy Yard at a cost of \$191,000.

Unavailing efforts were made by representatives and senators from Massachusetts to have the vessel reconditioned at the Boston Navy Yard, and qualifying legislation to this end was enacted.

Ford Co. New Brass Foundry to Use Electric Melting Equipment

The Detroit Electric Furnace Co., Detroit, has recently received an order from the Ford Motor Co. for five 2000-lb. 300 kva. Detroit rocking electric furnaces to be installed in the company's new brass foundry in the Highland Park plant. These furnaces are to be equipped with automatic electrode control and, together with the first Detroit unit already installed, will afford a melting capacity of approximately 150,000 lb. of metal per 16-hr. day. The battery of furnaces will be installed and in operation about April 1.

The Erie Foundry Co., Erie, Pa., recently completed an order for 67 steam drop hammers ranging in size from 800-lb. to 5000-lb. for the Ford Motor Co., for installation at its Highland Park plant. There are now approximately 100 Erie hammers in the Ford Motor

LEATHER BELTING RESEARCH*

Manufacturers Have Conducted Investigation Into Various Phases of Its Use

The experienced belt-maker would probably say that the two most frequent sources of trouble are belts stretching and running crooked, the latter usually with very high speed drives where single belts are most likely to be used. It is evident that there are a number of things which may affect the stretch of a belt, such as the kind of hide used, tannage, method of currying—that is, the percentage and distribution of grease in the leather itself, and the thoroughness of stretching given to the leather before it is made into a belt. The hide of spongy fiber or consistency is likely to make leather that is more "stretchy." It is well-known that certain tannages, probably those which do not well fill the inter-fibular spaces, make leather which is more likely to stretch than that which is dead tanned.

Belts running crooked, when not due to abuse, are certainly sometimes caused by the springing of the piece of leather, after it is stripped to width, which is probably related somewhat to the factors influencing stretch just previously noted. With leather which is not very thoroughly tanned there seems to be a tendency for one edge of the strip to draw up more than the other after it has been stretched, and thereby pulling crooked. Aside from the annoyance to the user by having frequently to tighten the belt, the tendency to stretch causes a rapid reduction in the tension, and unless the coefficient of friction is unusually good, there results a rapid diminution in the effective tension and the work which the belt will do. While a moderate amount of stretch is perhaps not a serious matter, the importance of this being removed as soon as possible, so that an effective tension high enough to carry the load satisfactorily may be maintained is of great importance.

Increased Belt Tensions Not Unlikely

As far back as the days of Frederick Taylor considerable work was done in determining what was the proper tension to give a belt. He arrived at figures which were certainly conservative and practicable. I think there is not much doubt that if the belt users of the country had been willing to adopt his recommendations in this respect, they would have had greater economy with belting than has been the case. However, the tendency has been to load closer to the limit and to settle upon a tension which could be maintained fairly steadily, but which would give a maximum of power transmission. It would not be surprising to see higher tensions still adopted with improved methods of manufacture and better types of bearings.

Closely allied with the question of stretch is that of creep and its cause, and elasticity, which we have for a long time thought one of the most valuable properties of the leather belt, and one which differentiated it sharply from most of the substitutes available. Some of the work on this has been done by Mr. Jones and Professor Sawdon, which has thrown rather more light on earlier work and theories in connection with the subject.

Questions of Creep and Elasticity Studied

They have shown that the leather belt is not perfectly elastic in that it comes back immediately after the removal of tension, but that there is a time lag which may have some bearing upon the problem of transmission of power. Just what this is will probably vary a little with different leathers, but from the practical standpoint of power transmission it seems pretty clear that it will account for perhaps the first three quarters of one per cent or one per cent of what we read as slip in our power transmission curves, and it would seem reasonable that there is room for further improvement in reducing this a little more in a way

which will increase slightly the efficiency of the leather belt.

The wide variation in the observed coefficient of friction readings on a belt when it is just new and that obtained after it has been in use some time shows clearly the importance of a proper finish on the surface. One interesting feature which had not been carefully studied until perhaps of recent times is in the observation that the coefficient of friction changes quite noticeably at different speeds of slip on a given piece of leather, though the coefficient of friction does not apparently change in any considerable way at different tensions. It is obvious that in a running belt the effective tension, which is the difference between the tension on the tight side and the slack side, is limited very definitely by the coefficient of friction obtained at a given speed of operation and of slip. This problem seems to be one of the very fertile fields for further work.

So far I have not mentioned the often spoken of factor of tensile strength, though it is apt to be one of the main things alluded to in leather belting specifications. I have not mentioned it because the factor of safety in a good leather belt is high, often 5 to 1 to 10 to 1, and it is a very rare thing to hear of a belt tearing because of the load applied to it, unless some accident has occurred.

Belt Speeds

Another very important factor in the capacity of a given belt to transmit power is speed, and while considerable work has been done on this subject, there is still a good deal to learn. It has only been a few years since a prominent leather belting manufacturer stated that he considered it good practice to run leather belts for woodworking machinery at speeds in the neighborhood of 9000 ft. per min. Other makers disagree with him. Dr. E. D. Wilson, in presenting data on the subject published in 1919 (and on which the tables published by the Exchange are based) has shown that at this speed a double belt will transmit practically no power and a single very little indeed.

There is no available machinery for actually making such tests at these high speeds, and general experience in which little scientific data is available seem to indicate that the greatest efficiency is obtained at speeds of 4000 to 5000 ft. per min. So far as I am aware, none of the data submitted take into consideration the effect of grease, and of the varying coefficient of friction at the high speed of slip which would be obtained at any such speed as 9000 ft. per min. We do know, of course, that the centrifugal force increases very fast on higher speeds, tending to throw the belts away from the pulleys, and it is likely that in scientific work on this subject when it is done thoroughly will, as is so often the case, bear out practical shop experience, at least in large measure, and recommend the limitation of speed to a more reasonable figure.

Some years ago the subject of humidity and its effect upon leather belts was investigated, but whether or not due consideration was given to the variation in the modern methods of currying from the old hand stuffing, and whether the tests were made on a large number of belts, or only on a few of one make, I am not aware. It does seem, however, pretty clear that the presence of large amounts of humidity lowers the effectiveness of a leather belt, but it is also likely that proper treatment will do something to lessen this tendency.

Use of Belt Tightening Pulleys

During the past few years the use of compressors and machines with a wide variation in loads has rather increased, and motor driven compressors with a binder pulley or tightener have become very much more common. This type of drive has received comparatively little careful investigation, though it has known to work quite well with proper installation and sufficient belt capacity. It does, however, seem quite clear that it is necessary to have more belt for a load of this kind based upon the power required from the motor than for an ordinary steady pull; some say twice

*From a paper read by J. Edgar Rhoads before the National Association of Leather Belting Manufacturers.

as much is needed, but I believe this is still another subject requiring careful test under well controlled conditions.

Closely allied with this is the question of arc of contact, the effect of increasing or decreasing this in the load which a belt will carry, and also the most effective way to arrange drives where there is a small driver and a large driven or vice versa.

The subject of center distance was investigated somewhat during this past year at Purdue University, but time prevented final or the most thorough kind of test. The millwright has known for a long time that increasing the center distance was a great help, and that with a well designed drive, the position of the catenary formed by the slack side on top was a great help in steadying the belt, particularly on sloping

drives where belts were running at angles with the floor.

During the past few weeks a very careful comparison has been made to settle the much mooted question as to which side of a single belt should run next to the pulley, and Mr. Jones has prepared very complete figures which he has probably just about ready to publish, which represents an enormous amount of careful work and prove conclusively that the grain side of the leather belt is on the average decidedly superior to the flesh, though he has found that some belts, carrying very high amounts of grease, will do nearly as well when run with the flesh side to the pulley as the grain. These, however, are not representative of the great mass of standard leather belts upon the market.

POWDERED COAL INSTALLATIONS

Considerations of Capacity of Equipment and of Power Requirements for Pulverizing Coal

In a 131-page pamphlet, entitled "The Preparation, Transportation and Combustion of Powdered Coal," prepared by John Blizard, the Canadian Department of

for bituminous coal containing not more than 10 per cent of moisture. When greater moisture is contained, in some cases larger sizes would be required, or the moisture removal would be less than standard.

Table III. shows the amount of heat required, and the amount of undried coal which has to be burned, in order to dry coal containing from 4 to 14 per cent of moisture. The figures are worked out on a basis

Table I—Standard Sizes and Capacities of Aero Pulverizers

	Size and Weight (Lb.)	Normal Load Soft Coal (Lb. per Hr.)	Floor Space (Inches)	Height (Inches)	R.p.m.	(Horsepower—Normal Motor Consumption—Recommended)	Space Occupied (Cu. Ft.)	(Per Net Ton of Load—Weight—Hp. Consumption—Space)
A.....	2,250	600	27" x 61"	28"	2,050	10	28.5	7,500 33.3 95.0
B.....	4,000	1,000	29" x 77"	45"	1,760	14	58.5	8,000 28.0 117.0
D.....	5,400	2,000	29" x 85"	46"	1,550	30	67.3	5,400 30.0 67.3
E.....	6,900	3,000	32" x 89"	50"	1,450	40	85.0	3,933 26.7 56.6
G.....	12,000	5,000	40" x 116"	59"	1,450	65	158.4	4,800 26.0 53.4

Mines has put forth a compendium of information on the subject, based partly upon direct investigation in the shape of field studies, and partly upon a compilation from printed data otherwise available. So much of the information in this volume is of permanent value that a portion of it, in the shape of tables, is

Table II—Fuller-Lehigh Dryers for Bituminous Coal with Not Over 10 Per Cent Moisture

Tons Coal per Hour	Size of Dryer—Diam. Length Ft.	Volume per Ton Cu. Ft.	Horsepower to Rotate Shell	Horsepower per Ton Hourly Capacity
4	3 30	212	3	0.75
6	3 30	289	4	0.67
8	4 30	477	5	0.625
10	4 42	668	6	0.6
14	5 42	998	7	0.5
20	6 42	1,188	8	0.4
25	6 42	1,394	10	0.4

republished here. This has been somewhat rearranged from the tables as given and has been amplified in certain particulars.

Table I. shows standard sizes and capacities of Aero pulverizers, with normal loads ranging from 600 to 5000 lb. per hour of soft coal. This shows not only the size and weight of the pulverizer for the

of obtaining, as a final product, 100 lb. of coal with 2 per cent of moisture, and the coal consumption for drying is figured on a basis of 70 per cent, 60 per cent and 50 per cent efficiency in the combustion of the coal used for this purpose.

Table IV. shows the power required for pulverizing coal to certain degrees of fineness. In the first part of this table, which relates to Raymond pulverizers, capacities are covered from 1 to 25 tons of coal per

Table IV—Power Required for Pulverizing Coal A—In Raymond Pulverizers

Grinding Room Capacity, Tons per Hr.	Percentage Through		Horsepower Required	
	100 Mesh	200 Mesh	Total	Per Ton
1	99	95	45	45.0
2	95	82	45	22.5
3	99	95	60	30.0
4	95	82	60	20.0
5	95	82	85	28.3
6	99	95	75	18.8
10	95	82	85	17.0
10	99	95	170	28.7
25	95	82	170	17.0
25	99	95	255	25.5
25	95	82	425	17.0
25	99	95	680	27.2

B—In Fuller-Lehigh Pulverizers (95 per cent through 100 mesh)

Size of Mill	Output per Hour	Horsepower	per Ton Output
24-in.	1000 to 1200 lb.	10	18.0
33-in.	2 to 2½ tons	30 to 35	14.5
42-in.	4 to 6 tons	45 to 50	9.5
57-in.	8 to 10 tons	100	11.0

Table III—Heat Required, and Undried Coal Burned, to Dry Coal Containing 4 to 14 Per Cent of Moisture, to 100 Lb. of Coal with 2 Per Cent of Moisture

Moisture in raw coal, per cent	4	6	8	10	12	14
Moisture evaporated, lb.	2.1	4.3	6.5	8.9	11.4	13.9
B.t.u. to evaporate this moisture	2,300	4,700	7,200	9,900	12,600	15,500
B.t.u. given to 100 lb. of coal	4,100	4,100	4,100	4,100	4,100	4,100
Total heat used	6,400	8,800	11,300	14,000	16,700	19,600
Lb. coal burned at:						
70% efficiency	0.68	0.95	1.25	1.58	1.93	2.32
80% efficiency	0.79	1.11	1.46	1.84	2.26	2.71
90% efficiency	0.95	1.34	1.76	2.21	2.71	3.25

various capacities, but also the power consumption and the size of motor recommended.

Table II. shows the sizes of Fuller-Lehigh dryers and the power requirements for hourly capacities ranging from 4 to 25 tons of coal. These figures are given

hour. In the second part of the table, which relates to Fuller-Lehigh pulverizers, capacities range from ¼ ton to 10 tons per hour.

The Minnesota Steel Co., Duluth, Minn., has work in active progress on its new wire manufacturing plant on local site, and plans to commence the installation of machinery in about 60 days, having the entire plant ready for operation early in June.

The Alliance Structural Co., Alliance, Ohio, has increased its capital stock from \$200,000 to \$500,000.

BIDS OPENED ON TUNNEL JOB

Booth & Flinn, Ltd., Quotes Lowest Price \$19,331,723.50, and Will Get Contract

Booth & Flinn, Ltd., 17 Battery Place, New York, was low bidder on the contract for construction work on the Hudson River vehicular tunnel, bids on which were opened at the Hall of Records, New York, Feb. 15, its price on contracts Nos. 3 and 4 being \$19,331,723.50. Among the itemized bids a price of \$57.50 per ton was submitted on the 33,200 tons of cast iron segments in contract No. 3 and \$47.50 per ton on the 72,300 tons of cast iron segments in contract No. 4, totaling \$1,782,840 and \$3,434,250, respectively.

Booth & Flinn, Ltd., has handled numerous tunnel and subway construction contracts, among the most recent being the tunnel extending from Clark Street, Brooklyn, to Old Slip, New York, built for the Interborough Rapid Transit Co. and the Montague Street tunnel in Brooklyn, constructed for the Brooklyn Rapid Transit Co.; a tunnel from Fourteenth Street, New

York, to North Seventh Street, Brooklyn; tunnel construction in Newark, N. J., for the Passaic Valley Sewage Commission; Liberty tunnel through rock, for Pittsburgh, and several contracts on clay tunneling for sewers in Detroit. Award of the sub-contracts for materials involved will probably be made by Booth & Flinn within the next week or 10 days.

Quotations on some of the iron and steel items in the Booth & Flinn bid were as follows: On the 2000 ft. of wrought iron or steel pipe, 1-in. to 4-in., quotations ranged from 40c. to \$1.70 per ft. and totaled \$2,130; on 34,100 ft. of galvanized iron electric conduit the prices were from 15c. to 75c. per ft. and totaled \$10,468.50; on the cast steel tunnel lining totaling 9,050 tons, \$85 per ton was the price submitted in contract No. 4, and \$90 per ton on contract No. 3, totaling \$769,750; on cast steel pile segments the total was 370 tons and the prices \$85 and \$90 per ton; on 15,590 ft. of cast-iron service pipe, ranging from 6-in. to 12-in., \$1.40 to \$3.50 per ft. was quoted; on bolts and nuts the total was 1,615 tons at \$150 per ton, totaling on both contracts \$692,250.

JAPANESE MERCHANTS BUYING

**Purchases No Longer Confined to Government--
German Competition Slackens-- Low
Rail Prices**

NEW YORK, Feb. 20.—Practically all export inquiries of any importance are still appearing from Japanese sources with some slight activity on the part of China. Buying from Japan, which has heretofore been largely governmental, is beginning to include merchant buying. Last week one Japanese export house booked orders for about 1800 tons of merchant steel for Japan. This included 450 tons of merchant bars; 250 tons of structural steel; a tonnage of black and blue annealed sheets, and a fairly large order for 15-in. beams. Japanese buyers are beginning to evince a strong interest in steel bars and there have been several small orders booked by New York exporters. Sizes on these orders generally range from $\frac{3}{4}$ -in. to as large as $\frac{3}{4}$ and 1-in. One bar order for 600 tons is reported and another for 200 tons. Wire rods also continue active, one exporter having booked during the past two weeks about 2000 tons in small orders. A New York exporter is quoting on an inquiry for 200 tons of 42 to 80-lb. I beams of 15, 20, 22 and 24-in. and has sold about 5000 kegs of checker head, countersunk wire nails.

German competition in Far Eastern markets seems to be largely confined to material upon which labor is a large item. German bars, however, have quite recently been sold to Japanese buyers on a basis which figures back to 1.09c. per lb., Pittsburgh. British sellers are now quoting \$53 per ton on wire rods, c.i.f. Japanese port. If this is the lowest possible price by United Kingdom sellers, exporters in the United States are contemplating selling wire rods into England, provided they can buy low enough to deliver at about \$45 per ton, c.i.f. United Kingdom port.

The recent rail purchases by the Imperial Government Railways and the South Manchuria Railway Co. are said to have brought out low quotations. The Imperial Government Railway specification, which called for 10,000 tons of 60-lb. rails, is said to have been placed with a Japanese export house at \$43.96 per ton, c.i.f. Japan, while the South Manchurian rail contract involving about 6800 tons of 100-lb. rails is said to have gone at \$46.25 per ton, c.i.f. Dairen, Manchuria. On this latter the best bid possible by German mills was \$47, but German bids through the United States were not permitted. Inquiries for rails by Far Eastern interests will undoubtedly bring out good prices. One New York exporter states that he was quoted \$36.23 per ton, f.a.s., New York, on a tonnage of 35-lb. rails for the Far East and was given a still lower quotation by another mill.

Chinese activity is at present confined to purchases of small lots of black sheets, nails, second-hand struc-

tural steel and bar crop ends. The Japanese government inquiry for bridge material, which was to have closed the latter part of January, has been placed with one of the large Japanese export houses, which quoted on the price of a leading independent. It totals 4000 tons. Another tender on bridge material is still pending. Kobe municipality is in the market for another tonnage of T rails for its trolley line, bids on which will be opened the latter part of this month.

Steel Manufacturers Elect New Officers

At the annual meeting of the Association of American Steel Manufacturers, held at the William Penn Hotel, Pittsburgh, Feb. 17, Jesse J. Shuman, inspecting engineer Jones & Laughlin Steel Co., was elected president; E. F. Kennery, metallurgical engineer, Midvale Steel & Ordnance Co., vice-president, and J. O. Leech, manager bureau of inspection and tests, Carnegie Steel Co., secretary-treasurer. Robert H. Irons, Central Iron & Steel Co., retiring president, was presented with a silver after-dinner coffee service.

Shipping Board Will Sell Steel at Auction

WASHINGTON, Feb. 18.—After rejecting sealed bids which were opened last Wednesday, the Shipping Board has turned to the plan of disposing of the 105,000 tons of surplus steel at Hog Island by public auction and named to-day to sell the material in this manner. The board did not reveal either the number of bids received or prices offered nor its reason for rejecting them last week. It is said, however, that there were seven or eight bids received and that they were rejected because of the low figures named.

Hammond Iron Works, Warren, Pa., recently shipped on the Ward line steamer, Canto, from Baltimore, 95 carloads of fabricated plates, part of a contract for 13 82,000-barrel tanks for the Gulf Refining Co., Port Arthur, Texas. The tanks are 140-ft. in diameter and 30-ft. high.

The New England Iron League will hold its annual winter outing at Jackson, N. H. Members will leave Boston, Saturday afternoon, Feb. 18, and will return on the evening of Feb. 22. C. N. Pitts, New England Structural Co., Everett, Mass., has charge of arrangements.

The Anchor Concrete Machinery Co., Rock Rapids, Iowa, has moved to Adrian, Mich. The plant and site of the Adrian Steel Castings Co. have been purchased and machines for producing blocks, brick and cement will be made as soon as equipment can be installed.

Iron and Steel Markets

INCREASED ACTIVITY

February Exceeding January Production

Advances in Pig Iron But Weakness Still in Steel—Broad Demand Maintained

Increased pig iron and steel making is the outstanding factor of the week. It is the response to necessity buying and the railroad purchases of cars and track material of the past month.

The Steel Corporation is operating at better than 50 per cent, but business accumulated by the independents has shortened the gap between their scale of operations and that of the corporation. The Illinois Steel Co. is making 55 per cent of its capacity in ingots and the Inland Steel Co. is on a 60 per cent basis. Little of the railroad business went to the East, but the average of independent makers is over 40 per cent and the February production rate promises to exceed measurably the January output, which in steel was 46½ per cent of capacity.

An unexpected development was a well-defined effort to stabilize pig iron prices. Against doubts that advances can be held is the actual blowing in of at least five more blast furnaces, with two others scheduled to go on the active list before the end of the week.

It remains that rolling mills are yet unable to bring up order books to a point necessitating deferred shipments, and buyers, sure of deliveries, continue to cover merely for needs. Present activity represents orders taken at a sacrifice to establish backlogs and price weakness has not yet disappeared. A firmer attitude on new inquiries is, however, more general.

Railroad car business is still encouraging. The Great Northern, which closed on 500 cars, is still to buy 750; the St. Paul is expected shortly to cover for 2000 and the Pacific Fruit Express Co. for 3300. Five or six round lots of rail orders have been booked and the Gary mill has had releases on 20,000 tons on existing contracts.

The demand for bridge and building construction is indicated by fresh projects involving 22,000 tons and the awards aggregating 14,000 tons. January's business in fabricated structural steel, 72,100 tons, was at a rate of 40 per cent of the country's capacity and is barely 13 per cent under the January average for 10 years.

A few sales of various grades of pig iron have been made in the Chicago district on a basis of \$20, an advance of \$2 over recent quotations, but doubt is expressed that this advance can be maintained. The effect has been to cause firmer prices on irons which have been competing with the Chicago product. This is particularly noticeable in Cleveland, but concessions of 50c. have been made on iron from the Cleveland district when made in territory distant from Chicago. At Philadelphia there is more activity, but furnaces are absorbing freight when necessary.

Cast iron pipe awards, some of it seasonal, total 17,000 tons in a number of large size orders.

Three freight boats are now under negotiation for construction at Lake yards, each taking 4000 tons of steel.

The broadening market has brought increasing business from the automobile and the agricultural implement trade. The American Sheet & Tin Plate Co. has opened its books for the second quarter at to-day's prices.

In wire products there is no lack of inquiry from jobbers in preparation for spring demand. Manufacturers find it difficult to get concessions on small lots and hesitate to buy in a large way when meeting a refusal for a guarantee against price declines. Wire rods have been sold at \$35 a ton, with \$36 the usual quotation.

On shafting 2c. is still an asking price, but 1.90c. is the more common maximum, and even this is shaded.

Shading of \$3 and \$4 a ton is occasional on hot-rolled strips.

Rivets are lower, reductions in some centers amounting to \$3 a ton. Structural rivets are now obtainable at \$2.10 and boiler rivets at \$2.20. For a large pipe line in the East, structural rivets were bought at close to \$2.

A large order of tie plates was booked at less than \$30 per ton at mill. Light rails are \$1 and \$2 a ton lower, and now a minimum at 1.40c. a pound.

Better export trade is indicated by participation of private buyers as distinguished from the recent large part taken by Government agencies. For bridge work in Japan 4000 tons of structural material has been placed. American prices in the Far East have so well cut under those of Europe that added promise is given to the possibility of shipping steel to European markets.

Pittsburgh

PITTSBURGH, Feb. 21.

Aside from a well-defined effort to stabilize pig iron prices, general iron and steel market conditions have undergone very little change in a week. Most producers of foundry iron now regard the market as \$19, furnace, for the base grade, and similarly, \$18, furnace, has been set up as a minimum on basic. Some fair-sized tonnages of foundry iron have been placed in the past week at \$19, but there also was a good-sized transaction at \$18.75, this from a Valley furnace. A sale of 1000 tons of basic is noted to a Pittsburgh district sheet maker, but not very definite information as to the price is obtainable. There are reports that the business was placed at \$18, and also that the price paid was the same as on the last previous purchase by the same interest, which was \$17.75. It is clear that none of the producers went below \$18 on this inquiry, but all disclaim having taken the order, and the assumption is that it was placed at less than that figure.

General demand for steel still is for actual rather than future requirements and there has not been much change one way or another in the number of orders placed.

The possibility of a strike of union coal miners on April 1 has come only slightly into the foreground as a factor, but it is seen in the efforts of manufacturers to stock material against such an exigency rather than in any advance buying by either jobbers or con-

A Comparison of Prices

Advances Over the Previous Week in Heavy Type, Declines in Italics
At date, one week, one month, and one year previous

For Early Delivery

Pig Iron,

	Feb. 21, 1922	Feb. 14, 1922	Jan. 24, 1922	Feb. 22, 1921
Per Gross Ton:				
No. 2X, Philadelphia.....	\$21.31	\$21.31	\$21.34	\$30.04
No. 2, Valley furnace.....	18.75	18.75	19.00	27.00
No. 2, Southern, Cin'tit.....	20.00	20.00	20.50	32.00
No. 2, Birmingham, Ala.....	15.50	15.50	16.00	27.50
No. 2 foundry, Chicago*.....	20.00	18.00	19.00	28.00
Basic, del'd, eastern Pa.....	19.84	19.84	20.25	28.40
Basic, Valley furnace.....	17.75	17.75	18.00	25.00
Bessemer, Pittsburgh.....	21.46	21.46	21.46	28.96
Malleable, Chicago*.....	20.00	18.00	19.00	28.50
Malleable, Valley.....	19.00	19.00	19.50	27.00
Gray forge, Pittsburgh.....	20.71	20.71	20.56	27.96
L. S. charcoal, Chicago.....	30.50	30.50	30.50	38.50
Ferromanganese, del'd.....	62.50	62.50	60.00	90.00

Rails, Billets, etc.,

Per Gross Ton:				
O.-h. rails, heavy, at mill.....	\$40.00	\$40.00	\$40.00	\$47.00
Bess. billets, Pittsburgh.....	28.00	28.00	28.00	38.50
O.-h. billets, Pittsburgh.....	28.00	28.00	28.00	38.50
O.-h. sheet bars, P'gh.....	29.00	29.00	29.00	42.00
Forging billets, base, P'gh.....	32.00	32.00	32.00	43.50
O.-h. billets, Philadelphia.....	33.74	33.74	33.74	49.24
Wire rods, Pittsburgh.....	35.00	36.00	36.00	52.00
Sk. gr. steel, P'gh, lb.....	1.50	1.50	1.50	2.45
Ligh. rails at mill.....	1.40	1.50	1.50	2.75

Finished Iron and Steel,

Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Iron bars, Philadelphia.....	1.76	1.76	1.81	2.70
Iron bars, Chicago.....	1.55	1.60	1.60	2.63
Steel bars, Pittsburgh.....	1.40	1.40	1.50	2.00
Steel bars, Chicago.....	1.50	1.55	1.60	2.38
Steel bars, New York.....	1.78	1.78	1.83	2.38
Tank plates, Pittsburgh.....	1.40	1.40	1.50	2.15
Tank plates, Chicago.....	1.50	1.55	1.60	2.53
Tank plates, New York.....	1.78	1.78	1.83	2.53
Beams, Pittsburgh.....	1.40	1.40	1.50	2.15
Beams, Chicago.....	1.50	1.55	1.60	2.53
Beams, New York.....	1.78	1.78	1.83	2.53
Steel hoops, Pittsburgh.....	1.90	1.90	1.90	2.80

*The average switching charge for delivery to foundries in the Chicago district is 70c per ton.
†Silicon, 1.75 to 2.25 †Silicon, 2.25 to 2.75.

The prices in the above table are for domestic delivery and do not necessarily apply to export business.

Sheets, Nails and Wire,

	Feb. 21, 1922	Feb. 14, 1922	Jan. 24, 1922	Feb. 22, 1921
Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Sheets, black, No. 28, P'gh.....	3.00	3.00	3.00	4.10
Sheets, galv., No. 28, P'gh.....	4.00	4.00	4.00	5.35
Sheets, blue cold, No. 28, P'gh.....	2.25	2.25	2.25	3.20
Wire nails, Pittsburgh.....	2.40	2.40	2.40	3.10
Plain wire, Pittsburgh.....	2.45	2.45	2.45	3.00
Barbed wire, galv., P'gh.....	3.95	3.05	3.15	3.85
Tin plate, 100 lb. box, P'gh.....	\$4.75	\$4.75	\$4.75	\$7.00

Old Material,

Per Gross Ton:				
Carwheels, Chicago.....	\$15.00	\$15.00	\$15.00	\$19.00
Carwheels, Philadelphia.....	16.50	16.50	16.50	23.00
Heavy steel scrap, P'gh.....	11.00	13.50	14.00	16.00
Heavy steel scrap, Phila.....	12.00	12.00	11.50	11.50
Heavy steel scrap, Chgo.....	11.50	11.25	11.50	14.50
No. 1 cast, Pittsburgh.....	16.00	16.00	16.50	22.00
No. 1 cast, Philadelphia.....	16.50	16.50	16.50	23.00
No. 1 cast, Chgo (not ton).....	13.50	13.00	13.00	17.50
No. 1 RR wrot, Phila.....	14.50	14.50	14.50	19.00
No. 1 RR wrot, Chgo (not ton).....	10.50	10.50	10.50	13.00

Coke, Connellsville,

Per Net Ton at Oven:				
Furnace coke, prompt.....	\$3.25	4.20	\$2.75	\$4.50
Foundry coke, prompt.....	1.00	1.00	1.00	2.50

Metals,

Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Lake copper, New York.....	13.00	13.25	12.75	13.25
Electrolytic copper, refinery.....	12.75	13.00	13.50	12.75
Zinc, St. Louis.....	4.50	4.50	4.65	4.95
Zinc, New York.....	4.85	4.85	4.00	5.35
Lead, St. Louis.....	4.40	4.40	4.40	4.20
Lead, New York.....	4.70	4.70	4.70	4.40
Tin (Strait), New York.....	36.75	36.75	31.25	32.50
Antimony (Asia), N. Y.....	4.40	4.40	4.45	5.20

Composite Price, Feb. 21, 1922, Finished Steel, 2.005c. Per Lb.

Based on prices of steel bars, beams, tank plates, plain wire, open-hearth rails, black pipe and black sheets.....	Feb. 14, 1922, 2.005c Jan. 24, 1922, 2.062c Feb. 22, 1921, 2.821c (10-year pre-war average, 1.689c)
These products constitute 88 per cent of the United States output of finished steel	

Composite Price, Feb. 21, 1922, Pig Iron, \$18.35 Per Gross Ton

Based on average of basic and foundry irons, the basic being Valley quotation, the foundry an average of Chicago, Philadelphia and Birmingham.....	Feb. 14, 1922, \$18.02 Jan. 24, 1922, 18.39 Feb. 22, 1921, 26.76 (10-year pre-war average, 15.72)
--	--

sumers. Having access to so much non-union coal, steel makers in the Pittsburgh district are not seriously perturbed over the strike possibility and while indications point rather strongly to a strike or a suspension of union mines over the wage question, there is a belief that Government intervention may come before the crisis is reached. The prospect of trouble is looked upon pretty calmly here, not only because there has been a good deal of quiet stocking of coal, both by the railroads and industrial consumers during the past few weeks, but because business is not so heavy or urgent that a suspension would be looked upon as serious.

Steel prices do not change much, but as a general proposition they lean in favor of buyers. The American Sheet & Tin Plate Co. yesterday opened its books for second quarter business, naming the same prices as for first quarter orders. This interest also has reaffirmed the base of \$4.75 for tin plate on second quarter contracts from jobbers. The market is at least steady on these products, although intimations of con-

cessions still are common, and on merchant steel bars there appear to be no important deviations from 1.40c. base. The market is not very firm at 1.40c. for beams and plates nor for other finished steel products not specifically referred to.

A flurry in the coke market last week strengthened coal prices, but prices of both products this week show a reactionary tendency. The scrap market has strengthened slightly as a result of purchases of some of the mills outside of Pittsburgh, which serve to bring to the surface the meagerness of available supplies.

Pig Iron.—There is a distinctly firmer tone to the market, due partly to a somewhat larger demand, which shows more strongly in foundry than in the other grades, and partly to an increasing unwillingness on the part of producers to meet prices recently done. A sanitary ware manufacturer with plants in this district and in the South has bought about 1500 tons for each plant, or a total of 4500 tons of foundry iron for March delivery. On Northern iron, this interest was

able to buy a No. 2 Valley iron at \$18.75, but paid \$19 at furnaces outside the Valley district, which, however, have slightly lower freight rates to point of consumption than the Valley furnaces. This interest also was able to buy some No. 2 foundry iron from Valley furnaces at \$19. On its Southern iron, some of the tonnage was secured at \$15, Birmingham. The National Radiator Co. is in the market for 2000 to 2500 tons of No. 2 and No. 2X foundry, for March, April and May delivery in equal amounts to its New Castle and Johnstown, Pa., plants. Producers now are generally quoting \$19, and it is claimed that some fair sized lots have been placed at this price in the past few days. Western Pennsylvania furnaces probably will be able to do more business in Johnstown from now on, as it is reported that the stock of the Cambria Steel Co., which had been on foundry grade, lately was shifted over to steel making iron. In addition to a purchase of 1000 tons of basic, a Pittsburgh district sheet maker also has taken 300 tons of Bessemer which it is understood will come from Johnstown, Pa. The rate from that point to destination is the same as from the Valley, or \$1.96, and the sales price is understood to have been around \$19. Valley furnaces having any of this grade for sale are holding to \$19.50, but middlemen have lately been taking small lots about 25c. below that price.

We quote Valley furnace, the freight rate for delivery to the Cleveland or Pittsburgh district being \$1.96 per gross ton:

Basic	\$17.75 to \$18.00
Bessemer	19.50
Gray forge	18.75 to 19.00
No. 2 foundry	18.75 to 19.00
No. 3 foundry	18.75 to 19.00
Malleable	19.00

Ferroalloys.—A Valley steel maker who recently inquired for 100 tons of 16 to 19 per cent spiegeleisen is reported to have covered this requirement at \$30 delivered and the price of \$30, furnace, recently named by an Eastern maker, remains merely a quotation as far as sales in this and nearby districts are concerned. Interest in ferroalloys generally is pretty low in this district and prices largely are nominal. Despite the recent cut of \$2 per ton in Jackson, Ohio, prices of Bessemer ferrosilicon, the advantage in price still is with producers making this material in the electric furnace, and the former moves slowly. On 50 per cent ferro-silicon a price of \$55, furnace, freight allowed, still is being made, though the more common range is from \$57 to \$60. The recently established prices for ferromanganese have not yet found basis in sales.

We quote 78 to 82 per cent ferromanganese, \$62.50 c.i.f. Atlantic seaboard for domestic and English and \$58.35 for German. Average 20 per cent spiegeleisen, nominal; 16 to 18 per cent, \$30 to \$35, delivered Pittsburgh or Valleys; 50 per cent ferrosilicon, domestic, \$55 to \$60 furnace, freight allowed. Bessemer ferrosilicon is quoted f.o.b. Jackson and New Straitsville, Ohio, furnaces as follows: 10 per cent, \$36.50; 11 per cent, \$39.80; 12 per cent, \$43.10; 13 per cent, \$47.10; 14 per cent, \$52.10; silvery iron, 6 per cent, \$25; 7 per cent, \$26; 8 per cent, \$27.50; 9 per cent, \$29.50; 10 per cent, \$31.50; 11 per cent, \$34; 12 per cent, \$36.50. The present freight rate from Jackson and New Straitsville, Ohio, into the Pittsburgh district is \$4.06 per gross ton.

Billets, Sheet Bars and Slabs.—The market is beginning to reflect the recently enlarged movement of finished products, but this is seen more in freer specification against contracts than in new business, although sales are slightly more numerous than they were recently. A middle interest is seeking 200 tons of slabs and inquiries for forging billets are coming to makers with a little more frequency than recently was the case. Prices do not change much, but since there is considerable competition between Pittsburgh and Valley mills, equalization of freights is common practice.

We quote 4 x 4-in. soft Bessemer and open-hearth billets at \$28 to \$29; 2 x 2-in. billets, \$29 to \$30; Bessemer and open-hearth sheet bars, \$29 to \$30; slabs, \$29 to \$30; forging billets, ordinary carbons, \$32 to \$33, all f.o.b. Youngstown or Pittsburgh mills.

Wire Rods.—Demand is moderate and with business in finished products possible only at concessions from regular prices, considerable difficulty is experienced in selling rods at recent levels. We note a fair-sized sale of new stock rods at \$40, mill, and on soft rods, \$36 lately

has been maximum, while sales have been done as low as \$35. Buyers seem willing to pay the latter price and usually find accommodation. Prices are given on page 559.

Steel Skelp.—Open market inquiries are so few and small that prices are indeterminate. Makers still quote 1.50c. for pipe skelp, but this may be regarded merely as a negotiation quotation, which would be shaded, probably to the plate base, on the appearance of sizable inquiries.

Wire Products.—There is no lack of inquiry from the jobbers, most of whom are going along with light stocks and who appear to want to prepare for the spring demand, but actual business is kept down by the uncertainty over prices. Practically all manufacturers are taking business from the larger distributors at \$2 per ton below the Dec. 15, 1921, prices and the smaller factors seem to believe they should be able to buy at the same prices. It is because manufacturers are unwilling at the moment to meet this demand or to give guarantees against a decline in prices that larger orders are not being booked.

We quote wire nails at \$2.40 to \$2.50 base per keg, Pittsburgh, and bright basic and Bessemer wire at \$2.15 to \$2.25 base per 100 lb., Pittsburgh.

Steel Rails.—The market is definitely weaker on light rails with prices off \$1 to \$2 per ton from recent levels. In the immediate Pittsburgh district, makers of these sections, rolling them from new steel, are able to obtain 1.45c., base, but to the East as low as 1.40c. has been done and some business has been lost at that price to mills rerolling old standard sections.

We quote 25 to 45-lb. sections, rolled from new steel, 1.40c. to 1.45c. base; rolled from old rails, 1.35c. to 1.40c. base; standard rails, \$10 per gross ton mill for Bessemer and open-hearth sections.

Iron and Steel Bars.—Suggestions that business in merchant steel bars has been taken as low as 1.35c., Pittsburgh, are denied by makers here, at least as far as Pittsburgh and nearby points are concerned. Demands are not large, but they are fairly numerous and it is insisted that 1.40c. is minimum. However, there is not much support for a higher price, even on small lot orders. Makers of refined iron bars still are holding to 2c., minimum, for carload lots.

We quote steel bars rolled from billets at 1.40c.; reinforcing bars, rolled from billets, 1.40c. to 1.50c. base; reinforcing bars, rolled from old rails, 1.35c. to 1.40c.; refined iron bars, 2c. to 2.10c. in carloads, f.o.b. mill, Pittsburgh.

Structural Material.—Fabricating companies in this tract are busy in their estimating departments, but not in their shops. Only small lot jobs are coming out in this district. Plain material is slow of sale and the accepted base now is 1.40c., even on comparatively small tonnages. Prices are given on page 559.

Sheets.—The American Sheet & Tin Plate Co., as of Feb. 20, opened its books for second quarter business, naming the same prices as it quoted for the present quarter, or 3c. base for black, 4c. base for galvanized and 2.25c. base for blue annealed. It is stated in explanation for the comparatively early announcement of second quarter prices that there were a number of inquiries for that delivery. Affirmation of present prices by this interest should serve to dispel suggestions of higher prices which have been heard lately in some quarters. There is a pretty general observance of present prices on black and galvanized sheets where new rollings are involved, but stock material can be bought at concessions and it is a fact that some contracts placed \$5 per ton below current quotations have more elasticity than they were intended to have. Demand is steady rather than active, with not much anticipation of needs. The Steel Corporation sheet making subsidiary this week is operating more than 70 per cent of its mills, with the independents running about 50 per cent. Prices are given on page 559.

Tin Plate.—Current demands are light, but the mills keep well engaged on contract specifications. February is never a very active month, but by comparison with other years, it is showing relatively well this year. The

American Sheet & Tin Plate Co. has announced a price of \$4.75 per base box, Pittsburgh, on second quarter contracts from jobbers.

We quote standard production coke tin plate \$4.75 per base box f.o.b. Pittsburgh for carload lots.

Plates.—There is some business pending in connection with tank and large size pipe inquiries, but in a broad sense the market is quiet and buyers are confining their purchases closely to actual needs. The going market is 1.40c., but since this prevails on small tonnages, there is a common impression that sizable orders could be placed at 1.35c.

We quote sheared plates, $\frac{3}{4}$ in. and heavier, tank quality, at 1.40c. f.o.b. Pittsburgh.

Hoops and Bands.—The market does not appear to be quotable at above 1.90c. on either product, although the official quotation on hoops still is 2c. A range of 1.75c. to 1.90c. is quoted on bands, while some business in hoops has been placed at 1.80c.

Hot-Rolled and Cold-Rolled Strips.—Buyers continue to take supplies only as they are needed, and while a fair number of orders is being placed, the aggregate leaves much to be desired. On cold-rolled strips there is not much deviation from the 3.50c. base, but on comparatively attractive orders for hot-rolled strips the regular quotation of 2c. is being shaded as much as \$3 and \$4 per ton.

Iron and Steel Pipe.—Makers of both steel and wrought iron pipe are enjoying a reasonably good business with orders and specifications showing almost as great a gain so far this month over January as that month showed over December. In steel pipe, orders for oil country goods lately have been gaining and with some makers they are as large as those for merchant pipe. Line pipe inquiries are fairly numerous and it is believed one for 98 miles of 12-in. for a gas line from Monroe to Alexandria, La., inquired for by the Hope Engineering & Supply Co., Mount Vernon, Ohio, will be closed soon. Observance of the Dec. 16 price card is not particularly rigid, with rather low prices being named on line pipe. Plant operations are higher than are warranted by current orders, but there is some stocking in anticipation of plant suspension in the event of a strike of the union coal miners. Card discounts are given on page 559.

Boiler Tubes.—Business is picking up in steel tubes, but there are not enough orders to give all makers a share and price cutting still is pretty common. There are no established quotations on seamless tubes and the quoted discounts on lapwelded goods frequently are supplemented by an additional 5 per cent. Iron tubes are relatively firm. Discounts are given on page 559.

Nuts and Bolts.—Business is no more than it has been, but it does not show much increase either, and as far as makers in this district are concerned, it is pretty much localized, due to the fact that on most sizes and styles, buyers can save money by placing business with mills having a lower freight rate than those observing the Pittsburgh base. Demand is purely hand-to-mouth. Discounts are given on page 559.

Cold-Finished Steel Bars and Shafting.—There is just a fair demand for screw stock and shafting, purchases of which for the most part merely are for the rounding out of stocks. Jobbers in some parts of the country still have unliquidated stocks and the agricultural implement industry has had little opportunity to work off big purchases of 1920. Stocks in distributing and consuming hands as a whole are small by comparison with what they have been in recent years, but this is not necessarily a favorable augury. It is recognized that even when general business returns to its normal stride, there will hardly be a repetition of the urgent demands of early 1920 and consequently not the necessity for consumers and jobbers to carry big stocks. For some time it is probable that supply will be sufficient for all demands, and so long as delivery can be made in two or three weeks, buyers will feel safe with about half the stocks they formerly carried. The "official" quotation on cold-rolled or cold-drawn steel bars still is 2c., but 1.90c. is the more common maximum and even that price is being shaded against occasional orders of attractive features. Ground shafting is unchanged at 2.25c., base, mill, for carloads.

Rivets.—The market is very largely a buyer's affair, and while an effort is being made to maintain \$2.25 to \$2.35, base, per 100 lb. on heavy rivets, it is frankly admitted that these prices are being obtained only on retail lots and that attractive orders can be placed \$2 to \$3 per ton less. Prices and discounts are given on page 559.

Spikes.—No information yet has been received here as to the disposition of the 30,000 to 40,000 kegs of spikes for the New York Central Lines. It is rumored that the order has been divided between the Lackawanna Steel Co. and Jones & Laughlin Steel Co., but the latter company has no official advice with regard to the order. Prices on standard spikes still are inclined lower and the common belief is that the New York Central business will be placed at less than \$2.15, base, per 100 lb., the minimum public quotation of makers. Prices are given on page 559.

Coal and Coke.—Two or three good-sized orders for furnace coke last week resulted in such a complete cleaning up of available tonnages that the advance of the previous week was further extended, some sales being made as high as \$3.50 per net ton ovens. Demands having been satisfied, however, the market this week has grown weaker and \$3.25 now appears to be as high as any business can be done. Higher prices for coke have naturally enhanced the appraisal value of coal, but there has not been sufficient demand to sustain the advance and the market is weaker this week. Some business in by-products coal was done as high as \$2 at mines, for run-of-mine, but in the past few days the market has settled back to \$1.85 as a maximum, with some tonnages available at less. The current price on steam coal for spot tonnages is right around \$1.50 for mine-run grade, while non-union gas coal can be bought at \$1.90 for spot or prompt shipment. Foundry coke for spot shipment ranges from \$4 to \$4.50.

Old Materials.—The market has grown distinctly firmer on the steel works grades since a week ago, due to purchases by mills outside the Pittsburgh district proper. Some of these melters who ordinarily charge light scrap, unable to obtain tonnages except at relatively stiff prices, have turned to the heavier grades and this demand has stiffened prices. Neither dealers nor consumers lately have been able to obtain even carload lots at less than \$14. A price equivalent to about \$14.50 at Pittsburgh has been paid by Youngstown mills. The market has been helped not only by the slightly heavier demand, but also by light offerings. Dealers are not pressing yard stocks for sale and current production is restricted by the light operations of producing industries. Only small lots of compressed or bundled sheet scrap are coming out because of that condition. There is not much demand for the foundry grades.

We quote for delivery to consumers' mills in the Pittsburgh and other districts taking the Pittsburgh freight rate, as follows:

Heavy melting steel	Steubenville, Follansbee, Brackenridge, Monessen	
Midland and Pittsburgh		\$14.00 to \$14.50
No. 1 case, cupola size		16.00 to 16.50
Re-rolling mills, Newark and Cambridge, Ohio	Cumberland, Md.; Huntington, W. Va., and Franklin, Pa.	15.00 to 15.50
Compressed sheet steel		12.00 to 12.50
Bundled sheets, sides and ends		10.75 to 11.25
Railroad knuckles and couplers		14.50 to 15.00
Railroad coil and leaf springs		14.50 to 15.00
Low phosphorus standard bloom and bullet ends		17.00 to 17.50
Low phosphorus plates and other grades		16.50 to 17.00
Railroad malleable		12.50 to 13.00
Iron car axles		23.00 to 24.00
Locomotive axles, steel		21.00 to 22.00
Steel car axles		14.50 to 15.00
Cast iron wheels		15.00 to 15.50
Roller steel wheels		14.50 to 15.00
Machine shop turnings		9.50 to 10.00
Sheet bar crop ends		14.00 to 14.50
Heavy steel axle turnings		11.50 to 12.00
Short shoveling turnings		11.00 to 11.50
Heavy breakable cast		14.50 to 15.00
Stove plate		12.50 to 13.00
Cast iron borings		11.00 to 11.50
No. 1 railroad wrought		11.50 to 12.00

The Bureau of Supplies and Accounts, Navy Department, Washington, is taking bids until Feb. 28 for 65,000 lb. of slab zinc for use at the Norfolk, Va., navy yard.

New York

NEW YORK, Feb. 21.

Pig Iron.—Interest is centered in the bids for the segments for the New York-New Jersey vehicular tunnel, and while nothing definite is known except the names of the firms that have been figuring with the successful bidders, Booth & Flinn, it is generally expected that contracts for the segments are likely to go to the Federal Shipbuilding Co., the Bethlehem Steel Co. and Davies & Thomas. The tonnage may be divided among these three, or some of it may go to others, but the three concerns named are considered as best equipped to do the work. Davies & Thomas have done a large part of the work on previous tunnels at their plant at Catasauqua, Pa., and the Bethlehem Steel Co. is considered especially well equipped. Outside of the tunnel business no large tonnages are being figured on, but the Essex Foundry Co., Newark, N. J., is in the market for from 500 to 1000 tons of No. 2X for delivery after March 1, and it is understood that the contract will not be made until next week. Numerous smaller inquiries are pending and the most encouraging feature of the situation is that a large number of foundries report increasing melt.

We quote delivered in the New York district as follows, having added to furnace prices \$4.52 freight from eastern Pennsylvania, \$5.16 from Buffalo and \$6.16 from Virginia:

East. Pa. No. 1 fvy., sd. 1.75 to 3.25	\$23.52
East. Pa. No. 2X fvy., sd. 2.25 to 2.75	23.02
East. Pa. No. 2 fvy., sd. 1.75 to 2.25	22.52
Buffalo, sd. 1.75 to 2.25	\$23.16 to 23.71
No. 2 Virginia, sd. 1.75 to 2.25	23.16

Ferromanganese.—Demand for ferromanganese is not heavy, sales being confined to carload lots and inquiries totaling about 500 tons. Quotations are unchanged at the higher levels recently put into effect. The spiegel-eisen market continues fairly active in the absence of stocks of the 20 per cent grade, and in the belief that the quantity of the 16 to 19 per cent grade available is small. Inquiries before the market amount to about 1000 tons, but there has been no change in the asking price from that announced a week ago. There have been no developments in the manganese ore market, but from offerings that have appeared from sellers it is likely that high-grade foreign ore could not be purchased at less than 25c. to 26c. per unit, seaboard. The 50 per cent ferrosilicon market is quiet and firm at unchanged levels, sales being confined to carload lots, several having been sold in the past week, among which is noted one carload at \$59, Chicago. The recent reduction in quotations for Bessemer ferrosilicon of \$2 per ton is understood to have been caused by the competition of electric ferrosilicon of approximately the same percentage content of silicon, as well as the fact that the 50 per cent grade can be used to advantage and bought as cheaply as Bessemer in proportion to the silicon content. Quotations are as follows:

Ferromanganese, domestic, seaboard, per ton	\$62.50
Ferromanganese, British, seaboard, per ton	\$62.50
Spiegeleisen, 16 to 19 per cent, furnace, per ton	\$30.00
Ferrosilicon, 50 per cent, delivered, per ton	\$55.00 to \$60.00
Ferrotungsten, per lb. of contained metal 40c. to 50c.	
Ferrocromium, 6 to 8 per cent carbon, 60 to 70 per cent Cr., per lb. Cr., delivered	12c. to 14c.
Ferrovandium, per lb. of contained vanadium	\$4.00

Ores

Manganese ore, foreign, per unit, seaboard	25c. to 26c.
Tungsten ore, per unit, in 60 per cent concentrates	\$2.00 up
Chrome ore, 40 to 45 per cent Cr ₂ O ₃ , crude, per net ton Atlantic seaboard	\$20.00 to \$25.00
Chrome ore, 45 to 50 per cent Cr ₂ O ₃ , crude, per net ton, Atlantic seaboard	\$25.00 to \$27.00
Molybdenum ore, 85 per cent concentrates, per lb. of MoS ₃ , New York	50c. to 60c.

Finished Iron and Steel.—Betterment is difficult to measure except through increasing mill operations. There is evidence that the small replenishment orders are making a gradually increasing aggregate, although in an individual selling office the daily volume fluctuates so that it is difficult to define the trend. Fabricated steel work still remains active, though there is at the moment a drop in the total of fresh projects. The East is not as yet getting any sizable railroad equip-

ment business. Uncertainty exists with regard to the stability of wire and wire products prices and there are intimations that better than 1.40c. Pittsburgh can still be done on large orders for plates, shapes and bars. About the only structural project which has come to light covers 100 tons for the American Car & Foundry Co., Huntington, W. Va. For the shields for the vehicular tunnel under the Hudson river 9000 to 11,000 tons of steel work will be required. Awards were in part as follows: New York Cotton Exchange, 4000 tons, to Post & McCord; West Penn power house, Wellsburg, 2900 tons, to Fort Pitt Bridge Works; apartment house, Kingsbridge Road and Grand Concourse, New York, 850 tons, to Levering & Garrigues Co.; Orient Life Insurance Co., Hartford, 500 tons, to Levering & Garrigues Co.; apartment house, 108th Street and Riverside Drive, 1000 tons, to A. E. Norton Co.; shelters for the Pennsylvania Railroad at Jersey City, 300 tons, for which the Triest Contracting Corporation is the general contractor; plate girders for the New York Central at Tonawanda, N. Y., 300 tons, to Lackawanna Bridge Works Corporation; United States Gypsum Co., Oakfield, N. Y., 106 tons, to the Lackawanna Bridge Works Corporation; tanks for Mexican Petroleum Co., 2 at Providence, 2 at Portland, Me., 700 tons, to the American Bridge Co. Outside of car repair contracts for the Boston & Maine and the Norfolk & Western, about the only Eastern railroad work covers 50 suburban cars awarded to the Harlan & Hollingsworth plant of the Bethlehem Steel Co. The Great Northern placed an order for 500 refrigerator cars with the General American Car Co. and is in the market for 250 gondolas and 500 stock cars. The Pacific Fruit Express Co. will probably buy 3300 cars and the St. Paul may buy 2000 cars. Car builders are inclined to believe that there will be plenty of business to satisfy the plants of the country by the latter half of the year.

We quote for mill shipments, New York, as follows: Soft steel bars, 1.78c. to 1.88c.; plates, 1.78c. to 1.88c.; structural shapes, 1.78c. to 1.88c.; bar iron, 1.78c. to 1.88c. On export shipments the freight rate is now 28.5c. per 100 lb., instead of 38c., the domestic rate.

High Speed Steel.—The market continues dull with sales of extremely small quantities only reported. There is some shading of prices and a fair estimate of the market on 18 per cent tungsten high speed steel is probably 80c. to 90c. per lb. with special brands of some companies selling up to \$1.05 per lb.

Cast-Iron Pipe.—Optimism still prevails in this market and purchases by private consumers are slightly larger than usual. At present no municipal lettings are in sight in this district excepting the pipe involved in the Hudson River vehicular tunnel, which will be purchased by Booth & Flinn, Ltd., New York. The Metropolitan Water Supply Co., Boston, has closed on 3000 tons of 12-in. to 24-in. cast iron pipe with the Warren Foundry & Machine Co. The 600 tons of pipe, to be purchased by contractors with municipal contracts in New York, has not yet been bought. We quote per net ton, f.o.b. New York, carload lots, as follows: 6-in. and larger, \$47.30; 4-in. and 5-in., \$52.30; 3-in., \$62.30, with \$4 additional for Class A and gas pipe.

Warehouse Business.—The market is fairly active, the increase in business during the past few weeks being well maintained. Warehouses carrying structural material continue to report more than usual activity, but it is believed that there has been some shading of quoted prices along this line. A domestic and export seller in this district is offering a fairly large tonnage of structural material, bars, angles, beams, channels and plates, at a price of \$28 per ton, f.o.b. point of shipment. This is, however, probably canceled material. Sheets are slightly stiffer on small lots, but a satisfactory tonnage of galvanized or black sheets would bring out a good concession. In general, prices in this line are uneven. Offerings of one company of new galvanized and black sheets at considerably under the prevailing prices are said to be seconds. The railroads are buying small lots of special steels. German tool steel is being offered by a Philadelphia importer at 7.75c. per lb., f.o.b. Hamburg, which is about 9c. per lb. New York. The wrought iron and steel pipe mar-

ket is quiet. Brass rods have dropped $\frac{1}{2}$ c. per lb. from 14 $\frac{1}{2}$ c. to 14 $\frac{1}{4}$ c. per lb. We quote prices on page 576.

Coke.—The Eastern By-Product Coke Co. has quoted \$4.50 on 700 tons per month for the coke which will be required by foundries making segments for the new vehicular tunnel, and it is understood that another company named even a lower figure, but it was not accepted. Owing to the fact that coal has been sold readily and that there is an active demand for coke due to fear of a strike in the bituminous regions April 1, a number of Connellsville coke operators have found themselves unable to make deliveries at an early date and have withdrawn from the market. It is expected that some of these operators will be back in the market in a few days, but others may be out for a month or more. The price has been advanced 25c., and \$4.25 seems to be the lowest obtainable price on high grade foundry coke. By-product coke continues to be quoted at \$8.59, delivered New Jersey points, this being on the basis of \$4.25 for Connellsville coke at ovens and \$4.34 for freight. An advance in the price of by-product coke does not seem to be probable.

Old Material.—The market has been rather inactive during the past week and most dealers are offering slightly lower prices, except for heavy melting steel, which is still fairly firm at \$7.50 to \$8.00 per ton. Small contracts continue to be made on No. 1 heavy melting steel from time to time. The Lukens Steel Co. is reported to have ordered resumption of shipments on old contracts. The Midvale Steel & Ordnance Co. is paying \$12.50 per ton for No. 1 heavy melting steel, delivered Coatesville, and the American Bridge Co. \$11.50, Pencoyd. One broker in this district has reduced his buying prices on several items by 50c. per ton. No. 1 railroad wrought iron car axles and wrought iron track all show a slight reduction from the previous week's quotations.

Buying prices per gross ton, New York, follow:

Heavy melting steel, yard	\$7.50 to \$8.00
Steel rails, short lengths, or equivalent	8.00 to 8.25
Rerolling rails	9.25 to 9.75
Relaying rails, nominal	27.00 to 28.00
Steel car axles	10.00 to 10.50
Iron car axles	17.50 to 18.50
No. 1 railroad wrought	9.50 to 10.00
Wrought iron track	8.00 to 8.50
Forge fire	5.00 to 5.50
No. 1 yard wrought, long	9.00 to 9.50
Cast borings (clean)	7.00 to 7.50
Machine-shop turnings	4.50 to 5.00
Mixed borings and turnings	4.50 to 5.00
Iron and steel pipe (1 in. diam., not under 2 ft. long)	7.25 to 7.75
Stove plate	10.00 to 10.50
Locomotive grate bars	9.00 to 9.50
Malleable cast (railroad)	8.00 to 8.50
Cast-iron car wheels	10.50 to 11.00

Prices which dealers in New York and Brooklyn are quoting to local foundries, per gross ton, follow:

No. 1 machinery cast	\$16.50 to \$17.00
No. 1 heavy cast (columns, building materials, etc.), cupola size	15.50 to 16.00
No. 1 heavy cast, not cupola size	11.00 to 11.50
No. 2 cast (radiators, cast boilers, etc.)	10.00 to 10.50

Birmingham

BIRMINGHAM, ALA., Feb. 21.

Pig Iron.—More orders were booked by Birmingham iron makers the past week than in many months. The iron goes over a more scattered territory than has been the case since the industrial slump began. Alabama iron is going to more foundries in competitive territories than it has done in practically a year. One maker booked 15 carloads in one day, the total representing 11 different customers from St. Louis, Michigan, Illinois and Indiana to Florida, the Carolinas, Texas and Pacific Coast. The last-named business is on a continuous base and bids fair to remain so pending the excellent ocean rates prevailing. The Sloss-Sheffield Steel & Iron Co.'s initial shipment from its Sheffield stack in extreme northern Alabama to Metropolis for St. Louis, Chicago and Northwestern distribution is scheduled to take place this week and to consist of 1600 tons in 400-ton barges with delivery in 40 hours. This delivery was the experience of the company with the same transportation agency, the Arrow Transportation

Co., before the war. This river shipping does not appear to have cut into business in the same territory done by Birmingham makers. St. Louis took several lots last week at \$15.50. That was also the base on sales into Michigan and other north of Ohio River points. Pacific Coast business is the choicest, being done on a base of \$16. Two operators say they will ship their make and reduce yard stocks this month. One maker booked over 3000 tons in small lots during the week. Most of the business comes without solicitation, the market base of \$15.50 appearing to be very generally accepted with \$16 charged under certain circumstances. Indications point to greater furnace capacity incident to evidently large melt to be made by the high pressure pipe shops. The feeling in industrial circles is more buoyant than it has been at any time in many months.

We quote per gross ton for Birmingham district foundries as follows:

Foundry, schen 17 to 22	\$15.50 to \$16.00
Basic	14.50 to 15.00
Charcoal, with black	32.00

Cast Iron Pipe. High pressure pipe plants of the National Cast Iron Pipe Co. and the American Cast Iron Pipe Co. are not far from capacity. United States Cast Iron Pipe & Foundry Co. will make the 2000 tons for Portland, Ore., here and ship by Mobile. The Seattle order is also expected here. National Cast Iron Pipe Co. is finishing an order for 1000 tons for Port Arthur, Texas and has, among other orders, one for 1200 tons for St. Paul. American Cast Iron Pipe Co. booked Wisconsin orders for 1000 tons. A vessel is putting in at Mobile to load with 3000 tons of pipe for the Pacific Coast.

Finishing Mills.—The Tennessee company is shortly to blow in No. 4 blast furnace at Ensley, making five on basic iron there. Open hearth demand continues operation of seven of the nine furnaces.

Coal and Coke.—Demand for coke is stronger and shipments are larger. The price remains at about \$5 for standard foundry.

Old Material.—Scrap dealers begin to look for improvement incident to what seems to be a prospect of a real expansion of steel and iron foundry business. Very little business is being done now.

We quote per gross ton for Birmingham district yards as follows:

Steel rail	\$11.00 to \$12.00
No. 1 steel	10.00 to 11.00
No. 1 cast	11.00 to 12.00
Car wheels	12.00 to 13.00
Tramway wheels	12.00 to 13.00
No. 1 wrought	11.00 to 12.00
Stove plate	11.00 to 12.00
Cast iron beams	6.00 to 7.00
Machine shop turnings	6.00 to 7.00

Buffalo

BUFFALO, Feb. 21.

Pig Iron.—The majority of sales are made at \$18.50 base, but in general the volume is small. An inquiry for 5000 tons from outside the district has reached several furnaces and two have responded with the \$18.50 price. The average run of orders ranges from carload lots to 200 tons. Generally, inquiry is light and without particular feature. Furnace operation is maintained on the same basis which existed at the beginning of the year and the whole selling object is summed up as that of liquidation rather than doing business on a profitable basis.

We quote for Buffalo as follows:

No. 1 foundry, 2 1/2 to 3 1/2 sil	\$19.50 to \$20.00
No. 2X foundry, 2 1/2 to 3 1/2 sil	19.00 to 19.50
No. 2 plain, 1 1/2 to 2 1/2 sil	18.50 to 19.00
Basic	18.00 to 18.50
Malleable	19.50
Lake Superior charcoal	31.75

Warehouse Business.—An increase in the number of orders and in the volume of inquiry within the last 10 days is an encouraging sign. Much of this business is for maintenance work and is indicative of easier conditions in factories and shops. There are many evidences of anxiety to get equipment in good order.

Finished Iron and Steel.—The anticipated adjustment of prices on wire products which buyers believed

would be announced last week but did not develop, had a quieting effect on demand for those products. Sheet inquiry has been brisk, but much of this activity is taken to mean that buyers are circulating requests for prices with a view to finding a break in the uniformity of prices. With all mills quoting \$3 on black sheets, there is little advantage in "shopping" and the inquirers who thought they could find a weakness have been disappointed. Bar prices, however, are not as firm. Quotations range from 1.40c. to 1.50c. Some inquiry on irregular sizes has developed, but one agency has declined to bid because mills are not rolling the material sought, and the tonnage is not sufficient to change the roll. Some rod inquiries have been made by nail manufacturers and some requests for prices on reinforcing bars are also out. Structural affairs are quiet; plans for the Buffalo Athletic Club are ready, but structural requirements have not been announced.

We quote warehouse prices f.o.b. Buffalo as follows: Structural shapes, 2.60c.; plates, 2.60c.; plates, No. 8 gage, 2.55c.; soft steel bars and shapes, 2.50c.; hoops and bands, 2.15c.; blue annealed sheets, No. 10, 3.40c.; galvanized steel sheets, No. 28, 5.25c.; black sheets, No. 28, 4.25c.; cold-rolled strip steel, 5.00c.; cold-rolled round shafting, 3.40c.

Coke. Inquiry is lively and is attributed to the strike possibility. Best grades are quoted at \$4 to \$4.25 ovens.

Old Material.—Because of the light production and the disposition of dealers to retain their stocks for better prices, the market is slow and demand for most materials fairly brisk. The price situation on heavy melting steel is unchanged and dealers willing to sell at \$13.50 could find plenty of business. Turnings and borings are also much in demand.

We quote dealers' asking prices per gross ton f.o.b. Buffalo as follows:

Heavy melting steel	\$13.00 to \$14.00
Low phos., 0.01 and under	17.00 to 18.00
No. 1 railroad wrought	15.00 to 16.00
Car wheels	16.50 to 17.50
Machine shop turnings	7.50 to 8.00
Cast iron borings	7.00 to 8.00
Heavy axle turnings	10.50 to 11.50
Grate bars	12.00 to 13.00
No. 1 busheling	10.00 to 11.00
Stove plate	15.00 to 16.00
Bundled sheet stampings	8.00 to 9.00
No. 1 machinery cast	17.00 to 18.00
Hydraulic compressed	10.50 to 11.50
Railroad malleable	13.00 to 14.00

St. Louis

St. Louis, Feb. 21.

Pig Iron.—The new market price of \$20, Chicago, for Northern iron, made rather suddenly in Chicago last week, seems firmly established in this territory. The advance is being followed by producers in Granite City. Sales for the last week, although still largely confined to carloads for immediate shipment, showed an improvement, and there was a better tone to the market, a condition helped by the advance. The \$20 price for Northern iron gives Southern iron at \$15.50, Birmingham, an advantage of \$1.56 a ton, St. Louis, on all-rail shipment, and an even greater advantage on the Sheffield water and rail movement, which affords a saving of 80c., as a differential and \$1.50. For the first movement by barge from Sheffield to Metropolis, Ill., and thence by rail, there were two barge loads sold here; one each for Bridge & Beach Mfg. Co., and the Enterprise foundries in Belleville. The largest inquiry pending is for 2000 tons for March and April shipment for an Illinois melter. The Mt. Vernon Car Mfg. Co. has an inquiry out for 1000 to 2000 tons, of which 200 tons is to be delivered during February and the remainder at the rate of 100 tons a week. Another Illinois melter wants 500 tons of foundry iron for March and April shipment.

We quote delivered consumers' yards, St. Louis, as follows, having added to furnace prices \$2.50 freight from Chicago and \$5.74 from Birmingham:

Northern foundry, sil. 1.75 to 2.25	\$22.80
Northern malleable, sil. 1.75 to 2.25	22.80
Basic	22.80
Southern foundry, all rail, sil. 1.75 to 2.25	21.24
Southern foundry, sil. 1.75 to 2.25, rail and water	19.44

Finished Iron and Steel.—The most important development of the week was the announcement of J. M.

Kurn, president of the St. Louis & San Francisco Railroad, of plans to expend \$7,766,000 on improvements, of which \$5,500,000 is to be for track and grade improvements, and more than \$2,000,000 for new or strengthened equipment. It is planned to spend \$1,385,000 for laying of double track, and the laying of 185 miles of new 90-lb. rails at different points and 100 miles of relay rails. Eight 70-ft. all-steel passenger coaches and six 70-ft. all-steel chair cars will be bought at an estimated cost of \$435,000. No inquiries covering this material have been issued by the purchasing department of the road. The Union Pacific Railroad bought a carload of wheels, and 100 tons of wire rods also were purchased by a Missouri River concern. The Missouri Pacific Railroad is planning to buy more than 5000 tons of 90-lb. rails. The demand for structural steel here is still light because of the wage situation. Figures submitted for the proposed new Jewish Hospital at Memphis, involving 300 tons of reinforcing bars, are greater than the promoters had expected, and it is likely that new bids will be asked for.

For stock out of warehouse we quote: Soft steel bars, 2.62½c. per lb.; iron bars, 2.62½c.; structural shapes, 2.72½c.; tank plates, 2.72½c.; No. 10 blue annealed sheets, 3.47½c.; No. 28 black sheets, cold rolled, one pass, 4.15c.; cold drawn rounds, shafting and screw stock, 3.65c.; structural rivets, \$3.52½ per 100 lb.; boiler rivets, \$3.62½; tank rivets 7/16-in. and smaller, 65 and 5 per cent off list; machine bolts, large, 60-10 per cent; small, 60, 10 and 10 per cent; carriage bolts, large, 55-5 per cent; small, 60 and 10 per cent; lag screws, 65-15 per cent; hot pressed nuts, square or hexagon blank, \$4, and tapped, \$3.75 off list.

Coke.—The business in coke is increasing, although most of the orders being placed are for carloads and for immediate shipment. The most encouraging feature is the steady increase in shipping instructions against contracts, more especially from the producers of lead in the Oklahoma-Kansas-Missouri districts. Granite City by-product producers have renewed contracts for 30,000 tons for shipment over 12 months. Domestic coke is only in fair demand, because of warmer weather.

Old Material.—The situation is unchanged, the market remaining dull and sluggish. The large consumers are still out of the market, and will not make any further purchases this month. Although economy of operation could be effected by unloading old material direct from railroad cars to charging boxes, consumers prefer not to make such cash outlays and are still using their reserve stocks at higher prices. The only railroad list before the market this week was issued by the Texas & Pacific Railway aggregating 1750 tons.

We quote dealers' prices f.o.b. consumers' works, St. Louis industrial district and dealers' yards, as follows:

Per Gross Ton	
Old iron rails	\$14.00 to \$14.50
Steel rails, rerolling	10.50 to 11.00
Steel rails, less than 3 ft.	12.50 to 13.00
Relaying rails, standard section	23.00 to 28.00
Cast iron car wheels	13.50 to 14.00
No. 1 heavy railroad melting steel	10.00 to 10.50
No. 1 heavy shoveling steel	9.75 to 10.00
Ordinary shoveling steel	9.50 to 10.00
Frogs, switches and guards, cut apart	10.00 to 10.50
Ordinary bundle sheet	4.00 to 4.50
Cast steel bolsters	9.50 to 10.00

Per Net Ton	
Heavy axles and tire turnings	6.00 to 6.50
Iron angle bars	13.00 to 13.50
Steel angle bars	9.00 to 9.50
Iron car axles	18.00 to 18.50
Steel car axles	12.50 to 13.00
Wrought iron arch bars and transoms	15.00 to 15.50
No. 1 railroad wrought	9.50 to 10.00
No. 2 railroad wrought	8.50 to 9.00
Railroad springs	10.00 to 10.50
Steel couplers and knuckles	10.00 to 10.50
Locomotive tires, 42 in. and over, smooth inside	8.00 to 8.50
No. 1 dealer's forge	8.00 to 8.50
Cast iron borings	5.50 to 6.00
No. 1 busheling	8.50 to 9.00
No. 1 boilers cut in sheets and rings	6.00 to 6.50
No. 1 railroad cast	12.00 to 12.50
Stove plate and light cast	11.00 to 11.50
Railroad malleable	8.50 to 9.00
Agricultural malleable	9.00 to 9.50
Pipes and flues	7.50 to 8.00
Heavy railroad sheet and tank	5.50 to 6.00
Light railroad sheet	3.50 to 4.00
Railroad grate bars	9.50 to 10.00
Machine shop turnings	3.00 to 3.50
Country mixed iron	6.00 to 6.50
Uncut railroad mixed	7.00 to 7.50
Horseshoes	9.50 to 10.00
Railroad brake shoes	9.50 to 10.00

Cleveland

CLEVELAND, Feb. 21.

Iron Ore.—The first ore sale reported for this season was made during the week, this being 1500 tons of manganiferous ore which was bought by a St. Louis consumer. The purchaser will pay whatever market price is established later in the season. Recently a sale of 10,000 tons of manganiferous ore was made for use in manufacturing spiegel, but this was a resale lot to be shipped from Lake Erie docks. Mining companies are making estimates of probable mining costs for the season with a view of arriving at conclusions as to what ore prices should be. Some of the independent mining companies that are paying wage scales below those of the Steel Corporation regard their present wage scales as a temporary expedient in order to keep the men at work and say they will probably use the Steel Corporation's wage schedule as a basis for figuring mining costs.

We quote delivered lower lake ports: Old range Bessemer 55 per cent iron, \$6.45; Old range non-Bessemer 51½ per cent iron, \$5.70; Mesabi Bessemer 55 per cent iron, \$6.20; Mesabi non-Bessemer, 51½ per cent iron, \$5.55.

Pig Iron.—Sales increased during the week and included some good-sized orders. The action of Chicago producers in marking up prices has resulted in a stiffening by one lake furnace, but this appears to be mostly on iron for shipment to points at which Chicago furnaces can enter competition, as this producer is still quoting foundry iron at \$18.50 in some cases. With this market firmness in one direction, lake furnaces apparently will meet keener competition with southern iron in central and southern Ohio, as further concession of 50c. a ton has been made in Alabama iron on the inquiry from the Standard Sanitary Mfg. Co. for its Louisville plant, which brought out a \$15 base price. On foundry iron \$19 appears to be the more general quotation by lake furnaces except for delivery to points where competition is sharpest. The Standard Sanitary Mfg. Co. has purchased 1000 tons and the United States Sanitary Co. 300 tons of foundry iron from a Valley furnace, both at \$19 and we also note the sale of 1000 tons of foundry iron to a Michigan automobile foundry and 1000 tons of malleable iron to an Ohio foundry at the same price. A lake furnace that booked the two last mentioned orders also sold about 4000 tons additional during the week in small lots. Locally the demand has increased, a number of small foundries buying small lots at \$19.50 to \$20 at furnace. Sales of three lots of Ohio silvery iron aggregating 500 tons were made to Cleveland foundries at the new price. Shipments continue to improve and one producer expects that its February shipments will be 50 per cent greater than in January. The Hanna Furnace Co. blew in its Dover furnace Feb. 18 and Pickands, Mather & Co. will put their Perry furnace at Erie, Pa., in blast this week.

Quotations below are f.o.b. local furnace for Northern foundry iron, not including a 56c. switching charge. Other quotations are delivered Cleveland, being based on a \$1.96 freight rate from Valley points, a \$2.36 rate from Jackson and a \$6.67 rate from Birmingham:

Basic	\$19.71
Northern No. 2 fdy., sil 1 75 to 2 25	\$19.00 to 20.00
Southern fdy., sil 1 75 to 2 25	21.67 to 22.17
Ohio silvery, sil 8 per cent	20.86
Standard low phos., Valley furnace	32.00

Finished Materials.—The demand for finished materials shows a further improvement and has broadened, orders being well scattered from various manufacturing industries. Fabricating shops which have been buying plates and shapes only for specified work are now adding some additional material for stock. The price situation shows little change. On steel bars, plates and structural material 1.40c. is the minimum price and that is being quoted only on the more desirable orders, the greater percentage of the business being booked at 1.45c. to 1.50c. The structural outlook continues to improve. The Fort Pitt Bridge Works has taken 350 tons for the auditorium for the National Cash Register Co., Dayton, and bids have been taken for 300 tons for a building for the Commercial Savings Bank & Trust Co., Toledo. An inquiry has come out for 600 tons for the Kresge Store Building, Cleveland. Lake shipyards have received another inquiry for a

freight boat, this making three inquiries now pending for lake boats, each involving 4000 tons of steel. Some business is coming from the automotive industry and among the week's orders was one for 420 tons of spring steel.

Jobbers quote steel bars, 2.36c.; plates and structural shapes, 2.46c.; No. 9 galvanized wire, 3c.; No. 9, annealed wire, 2.50c.; No. 28 black sheets, 3.75c.; No. 28 galvanized sheets, 1.75c.; No. 10 blue annealed sheets, 3.10c.; hoops and bands, 2.96c.; cold-rolled rounds, 3.25c.; flats, squares and hexagons, 3.75c.

Sheets.—The improvement noted in other lines has not extended to the sheet market, which is quiet. While regular prices are holding well there is an occasional report of a concession to 3.75c. on galvanized sheets.

Warehouse Business.—Local warehouses have reduced prices on wire and nails. Warehouse orders show an improvement.

Bolts, Nuts and Rivets.—The demand for bolts and nuts has improved materially, but buying is mostly in small lots. A broadening is noted in the demand. Some orders are now coming from the implement manufacturers. Prices still lack firmness. The leading local rivet manufacturer reduced prices Feb. 18 \$3 a ton, making structural rivets 2.10c. and boiler rivets 2.20c. Some makers had recently shaded prices to this extent. Small rivets are weak, quotations of 75 and 10 per cent off list appearing.

Coke.—Prices have stiffened slightly, but the demand has quieted. We quote standard Conaellsville foundry coke at \$4 to \$4.50.

Old Materials.—The improvement in steel plant operations has not resulted in any better demand for scrap and the market was unusually dull during the week. Prices are still inclined to weakness, this being particularly true of blast-furnace scrap. Prices on borings and turnings have declined about 25c. a ton. There is a limited demand from Cleveland dealers for turnings to fill old orders with a local mill and they are offering \$9 for this grade. Some inquiry has come from Pittsburgh foundries for prices on couplers, knuckles and coil springs. These prices are to be used as a basis for quoting prices on railroad castings.

We quote per gross ton f.o.b. Cleveland, as follows:

Heavy melting steel	\$12.00 to \$12.50
Steel rails, under 3 ft	12.50 to 13.00
Steel rails, re-rolling	11.00 to 11.50
Iron rails	12.00 to 12.50
Iron car axles	18.00 to 19.00
Low phosphorus melting	13.00 to 13.50
Cast borings	9.00 to 9.25
Machine shop turnings	8.50 to 8.75
Mixed borings and short turnings	8.50 to 8.75
Compressed steel	9.00 to 9.50
Railroad wrought	12.00 to 12.50
Railroad malleable	12.50 to 13.00
Light handeled sheet stamping	6.00 to 7.00
Steel axle turnings	9.50 to 10.00
No. 1 cast	15.00 to 16.00
No. 1 bushing	8.75 to 9.00
Drop forge flashings, over 10 in	7.75 to 8.00
Drop forge flashings, under 10 in	4.00 to 5.25
Railroad grate bars	12.75 to 13.00
Stove plate	13.00 to 13.25
Pipes and flues	8.50 to 9.00

J. C. Reed has organized the Reed Railway Supply Co., of which he is president, with offices in the Railway Exchange Building and warehouse at Main and Chestnut streets, St. Louis. Mr. Reed was the president of the Southern Hardware & Supply Co., which was purchased recently by Geller, Ward & Hasner Hardware Co. T. W. Melan is vice-president, and T. B. Fitzwilliam, secretary of the company, which will have a capital stock of \$50,000.

Effects of modern sales and advertising methods upon stabilization is the subject of a meeting to be held at the Auditorium Hotel, Chicago, on March 14, by the Society of Industrial Engineers, George C. Dent, 327 South La Salle Street, Chicago, manager.

The Lebanon Drop Forge Co., Lebanon, Pa., has taken over the Rivetless Chain & Engineering Co., with local plant, and will merge the organization under its present name. The consolidated company will operate with a capital of \$165,000.

Philadelphia

PHILADELPHIA, Feb. 21.

More replenishment buying of steel products has marked the past week's business in this market and has created a somewhat more hopeful feeling among steel companies. Steel bars, spring steel and galvanized wire have been the principal beneficiaries of improved buying and the demand has come both from jobbers and from manufacturing consumers. Detroit automobile manufacturers have furnished a goodly share of the business. In a minor degree, there has also been better buying of plates and structural shapes. Some plate consumers who have not been buyers in many months have placed orders within the past week. A better demand for light rails is also a feature.

Pig iron buying is not large, but there is a better volume of inquiry. Most of the wants are immediate, there being little or no indication at the moment of interest in speculative buying by foundries. In steel-making iron, there is practically no interest.

Prices continue weak with the trend downward whenever changes occur. Eastern blast furnaces are conceding something from their f.o.b. furnace prices when necessary to meet competitive delivered prices, or in other words they are absorbing a part of the freight rate. In steel products the principal change is in wire products, which are now quoted quite generally at \$2 below the recent levels, wire nails selling at \$2.40 per 100 lb. keg, Pittsburgh, plain wire at \$2.15 and galvanized wire at \$3.05. Bars, plates and shapes continue at 1.40c., Pittsburgh, but shading of this price on plates is reported. Sheets remain firm despite weakness of other steel products. Light rails are selling at 1.40c. per lb., Pittsburgh. A recent large sale of structural rivets was made at about 2c., Pittsburgh, which is \$5 a ton below recent so-called regular quotations.

Pig Iron. There is comparatively little buying of iron, but prospects are somewhat brighter due to a greater number of inquiries received in the past few days. Most of these inquiries are for replenishment only, there being little or no interest among users of foundry iron in speculative buying. The quantities inquired for are small, ranging from a carload to 200 or 300 tons. The only important sales of the week were of gray forge iron, which totaled 3500 or 4000 tons, the buyers being two cast iron pipe companies and a maker of iron plates. Sales were made at prices ranging from \$19 to \$19.50, furnace, but the delivered prices were almost identical at \$20.50. Foundry iron delivered prices are unchanged, but furnaces show a disposition to meet competition by absorbing, when necessary, a part of the freight rate. A New Jersey foundry received several identical bids of \$21.76, delivered, on No. 2X iron, but the f.o.b. furnace prices in one or two instances were close to \$19.50. There is no interest in steelmaking iron.

The following quotations are, with the exception of those on low phosphorus iron, for delivery at Philadelphia, and include freight rates varying from 81 cents to \$1.54 per gross ton.

East Pa. No. 2 plain, 1 7/8 to 2 3/8 sq.	\$20.84 to \$21.26
East Pa. No. 2X, 2 3/8 to 2 7/8 sq.	21.34 to 21.76
Virginia No. 2 plain, 1 7/8 to 2 3/8 sq.	21.24 to 21.74
Virginia No. 2X, 2 3/8 to 2 7/8 sq.	21.74 to 28.24
Base delivery Eastern Pa.	19.84
Gray forge iron	20.50 to 21.50
Malleable	22.50 to 24.00
Standard low phos. (f.o.b. furnace)	30.00
Copper bearing low phos. (f.o.b. furnace)	28.60

Ferroalloys.—The advance to \$62.50, Atlantic seaboard, on both British and domestic ferromanganese has checked buying. Practically no business has been closed since the price was advanced, several buyers having covered at the former price just previous to the rise. There is very little demand for spiegeleisen, which is nominally quoted at \$30 for the lower grade, 16 to 19 per cent. The higher grade, 20 to 22 per cent, is scarce.

Billets.—On the small tonnages of rerolling billets which make up the bulk of current business, the usual price is \$28, Pittsburgh, but this could be shaded on larger tonnages. Forging billets have been sold within the week at \$32, Pittsburgh. There are reports of recent substantial sales of rerolling billets for shipment to England.

Plates.—An Eastern plate mill reports that its bookings of orders in the past week constitute the largest week's business in many months. Some consumers who have not been in the market in a long time placed fairly good orders, mostly for boiler steel. On the whole, however, the demand for plates leaves much to be desired. Prices are weak, and there are reports that 1.40c., Pittsburgh, has been shaded on desirable tonnages. Most any order from a carload upward can easily be placed at 1.40c., and only the less-than-carload lots fetch as high as 1.50c. An Eastern fabricator bidding on the proposed Castleton bridge of the New York Central Railroad is inquiring for 10,000 to 12,000 tons of plates, half sheared and half universal. Deliveries are wanted over a three months' period. This is the largest inquiry before the trade, most of the inquiry and buying involving lots of 500 tons and less. The Philadelphia & Reading Railroad last week distributed orders for 800 tons of tank steel for car repairs among three or four mills.

Structural Material.—A better run of small orders is reported by some of the Eastern mills. Building activity in Philadelphia is not extensive, though many rather indefinite projects are talked of. Fabricators have no difficulty in getting protection at 1.40c., Pittsburgh.

Bars.—In steel bars there has been a marked betterment. Orders have come in freely within the past week or 10 days from jobbers and manufacturers. The Detroit district has furnished considerable business. Spring steel as well as soft steel bars has been ordered. The bar mills of the Cambria plant at Johnstown, Pa., are running close to 90 per cent of capacity, although the plant as a whole is not exceeding a 45 per cent operation. Steel bars are being sold freely at 1.40c., Pittsburgh. In bar iron the same price obtains, with the possible exception that it might be difficult to buy large flats and rounds at less than 1.45c.

Sheets.—Prices on sheets continue firm, being the exception among steel products. There is, however, little inquiry in this district to test the market. Blue annealed is quoted at 2.25c., black at 8c. and galvanized at 4c., Pittsburgh.

Wire Products.—Practically all makers of wire products have now reduced prices \$2 a ton as a result of the cutting which has been going on for some weeks. Wire nails are quoted at \$2.40, plain wire at \$2.15 and galvanized wire at \$3.05, all per 100 lb., Pittsburgh. A fairly good demand is reported, particularly for galvanized wire.

Light Rails.—The demand for light rails has improved, but prices are weak. Sales have been made as low as 1.40c. per lb., Pittsburgh, though some mills are asking 1.45c. and 1.50c.

Rivets.—A recent large purchase of structural rivets, approximately 500 tons, was consummated at a price about 2c. per lb., Pittsburgh, which is \$5 a ton below so-called regular quotations.

Old Material.—There was a little better buying of scrap in the past week, but tonnages wanted were small. Prices are unchanged. For delivery at consumers' works in this district we quote:

No. 1 heavy m-ting steel	\$12.00 to \$12.50
Scrap rail	12.00 to 12.50
Steel rails, rerolling	15.00 to 15.50
No. 1 low phos. heavy 0.04 and under	18.00 to 19.00
Cast iron car wheels	15.00 to 15.50
No. 1 railroad wrought	14.50 to 15.00
No. 1 yard wrought	12.00 to 12.50
No. 1 forge fire	10.00 to 10.50
Bundled sheets (for steel works)	9.50 to 10.00
No. 1 busheling	11.00 to 12.00
No. 2 busheling	9.00 to 10.00
Turnings (short shoveling grade for blast furnace use)	9.50 to 10.00
Mixed borings and turnings (for blast furnace use)	9.50 to 10.00
Machine-shop turnings (for rolling mill and steel works use)	9.50 to 10.00
Heavy axle turnings (or equivalent)	9.50 to 10.00
Cast borings (for steel works and rolling mills)	12.00 to 12.50
Cast borings (for chemical plants)	13.50 to 14.00
No. 1 cast	16.50 to 17.00
Railroad grate bars	14.00 to 14.50
Stove plates (for steel plant use)	14.00 to 14.50
Railroad malleable	12.50 to 13.50
Wrought iron and soft steel pipes and tubes (new specifications)	12.00 to 12.50
Iron car axles	No market
Steel car axles	17.00 to 18.50

Warehouse Business.—Moderate improvement in buying of steel out of stock continues. Prices locally on plates and shapes are lower. We quote for Philadelphia delivery as follows:

Soft steel bars and small shapes, 2.50c.; iron bars (except bands), 2.50c.; round edge iron, 2.80c.; round edge steel, iron finish, 1½ x ½ in., 2.95c.; round edge steel planished, 3.70c.; tank steel plates, ¼-in. and heavier, 2.50c.; tank steel plates, 3/16-in., 2.55c.; blue annealed steel sheets, No. 10 gage, 3.50c.; light black sheets, No. 28 gage, 4c.; galvanized sheets, No. 28 gage, 5c.; square twisted and deformed steel bars, 2.65c.; structural shapes, 2.50c.; diamond pattern plates, ¼-in., 4.60c.; 3/16-in., 4.75c.; ½-in., 4.90c.; spring steel, 4.10c.; round cold-rolled steel, 3.25c.; squares and hexagons, cold-rolled steel, 3.75c.; steel hoops, No. 13 gage and lighter, 3.25c.; steel bands, No. 12 gage to 3/16-in., inclusive, 3.10c.; iron bands, 3.90c.; rails, 2.75c.; tool steel, 8c.; Norway iron, 5c.; toe steel, 4.50c.

Boston

BOSTON, Feb. 21.

Pig Iron.—Business in pig iron suffered a relapse this week, orders booked consisting of a carlot here and there, the aggregate tonnage involved being unimportant. The Gurney Heater Co., Framingham, Mass., inquiring on 2000 tons of No. 2 X, has withdrawn, temporarily, from the market. The largest prospective inquiry is for 500 tons, silicon 2.75 to 3.25, to be put out within the immediate future by a maker of textile machinery. In the absence of business, Buffalo irons appear firmer. One furnace heretofore offering silicon up to and including 3.25 at \$18, furnace, this week is quoting \$19 on small tonnages and \$18.50 on large. Other furnaces quote \$18.50, which suggests a recovery of at least 50c. Eastern Pennsylvania furnace interests are meeting \$19, Buffalo delivered, iron. The market on such irons therefore cannot be considered firmer. Some Virginia and Alabama iron is coming into this territory, but hardly enough to constitute a real market.

We quote delivered at common New England points as follows, having added to furnace prices \$1.06 freight from eastern Pennsylvania, \$5.16 from Buffalo, \$6.58 from Virginia and \$10.66 from Alabama:

East Penn., sil. 2.25 to 2.75	.....	\$23.06 to \$24.56
East Penn., sil. 1.75 to 2.25	.....	23.06 to 24.06
Buffalo, sil. 2.25 to 2.75	.....	23.96 to 24.46
Buffalo, sil. 1.75 to 2.25	.....	23.96 to 24.46
Virginia, sil. 2.25 to 2.75	.....	29.08 to 30.08
Virginia, sil. 1.75 to 2.25	.....	28.58 to 29.58
Alabama, sil. 2.25 to 2.75	.....	27.16 to 28.16
Alabama, sil. 1.75 to 2.25	.....	26.66 to 27.66

Cast Iron Pipe.—The Metropolitan District Commission, Boston, this week placed the largest single order for cast iron pipe noted in this territory for several months. From the Warren Foundry & Machine Co. it purchased 3150 tons of 20-in., 24-in. and 30-in. pipe, and from the United States Cast Iron Pipe & Foundry Co. 50 tons of fittings for 20-in. and 30-in. pipe, deliveries to begin at once and to terminate on or before May 1. The city of Portland, Me., has placed an order for approximately 1800 tons of 6-in. to 12-in. pipe and 35 tons of fittings with the Warren Foundry & Machine Co., for delivery up to May 1. A large tonnage of additional business is in the making, but prospective buyers are slow in making up lists. Representatives of pipe makers report books well filled with orders. Prices are firm and unchanged, as follows: per net ton, f.o.b. Boston and district, in carload lots, 3-in., \$66.70; 4-in., \$56.70; 6-in., \$50.70; 10-in. and larger, \$49.70, with \$4 differentials on Class A and gas pipe. Bids will be opened March 1, by the city of Boston, on 2150 tons 6 in. to 36 in. pipe, Boston specifications. R. D. Wood & Co. have secured approximately 800 tons of gas pipe from Stone & Webster, Boston.

Warehouse Business.—Further increases in the movement of iron and steel out of warehouses is noted, with the greatest activity in sheets and structural steel. The average order for bars involves small weights, and the increase in the movement out of stock is due entirely to an increase in the number of orders received daily. An improvement in the demand for bolts and nuts also is noted, but business is spotty. Local quotations on wire nails have been reduced 15c. to \$3.25 per keg base.

Finished Material.—The New England Structural Co. has been awarded 600 tons of structural steel for the Beacon Press Co., Boston, building, and 200 tons

for an Allston theater, and the American Bridge Co. the steel for a \$100,000 Holyoke, Mass., silk mill. Bids are being taken on 3000 tons for a Park Square, Boston, building, 240 tons for a Manchester, N. H., theater and 138 tons for a Winter Street, Boston, building, as well as on approximately 5000 tons for other projects, negotiations for which are private, all to be awarded presumably within the next fortnight. Mill representatives report business running well ahead of last month on bars, bands, plates, sheets and structural steel for stocking purposes. The Bangor & Aroostook Railroad has bought 2000 tons 80-lb. rails from the Bethlehem Steel Co., and 7400 standard angle joints. The Maine Central Railroad 3000-ton rail inquiry remains open.

Jobbers now quote: Soft steel bars, \$2.55½ per 100 lb. base; flats, \$2.65½; concrete bars, stock lengths, \$2.55½; structural angles and beams, 7.65½; plates, \$2.65½ to \$2.83; tire steel, \$3.85 to \$4.25; open hearth spring steel, \$4.50; crucible spring steel, \$11.50; bands, \$3.15½ to \$3.53; hoop steel, \$3.15½; cold-rolled steel, \$3.10 to \$3.30; toe rail steel, \$8; refined iron, \$2.55½ per 100 lb. base; best refined iron, \$4.25; Wayne iron, \$5.50; Norway iron, \$5.50; No. 10 blue annealed sheets, \$3.48 per 100 lb. base; No. 28 black sheets, \$1.50; No. 28 galvanized sheets, \$5.50.

Coke.—Daily shipments of by-product foundry coke by the New England Coal & Coke Co. and the Providence Gas Co. continue to run well ahead of those for the corresponding period last month. While business is better than it was, the above mentioned companies have not found it necessary to increase oven production. The buying is in anticipation of labor troubles at the coal mines April 1, rather than because of any marked increase of foundry operations. Only an occasional car of Connellsville foundry coke is finding its way into this territory. Prices are reported as firm by both New England producers on a basis of \$10.15, delivered, where the local freight does not exceed \$3.40.

Old Material.—Little of interest developed in the old material market the past week. New England users, as well as Pennsylvania mills, showed the same indifference they did during the previous week. In the absence of business, prices are largely nominal and therefore not subject to change. The demand for borings, the outstanding feature of the market during the latter part of January, appears to have dried up, yet dealers are quoting on the former basis. The low cost of pig iron and the low operating ratio of the average foundry in this territory account in a large measure for the inactivity of machinery cast.

The following prices are for gross ton lots delivered consuming points:

No. 1 machinery cast	.....	\$18.00 to \$18.50
No. 2 machinery cast	.....	16.00 to 16.50
Stove plate	.....	15.00
Railroad malleable	.....	12.00 to 13.50

The following prices are offered per gross ton lots f.o.b. Boston late shipping points:

No. 1 heavy melting steel	.....	\$8.00 to \$9.00
No. 1 railroad wrought	.....	10.50 to 11.00
No. 1 yard wrought	.....	9.50 to 10.00
Wrought pipe (1 in. in diam. over 2 ft. long)	.....	7.00 to 7.25
Machine shop turnings	.....	4.00 to 4.50
Cast iron borings, rolling mill	.....	7.50 to 8.00
Cast iron borings, machine	.....	7.50 to 9.00
Blas furnace borings and turnings	.....	3.50 to 4.50
Forged scrap and banded skeleton	.....	4.50 to 5.00
Street car axles and shafting	.....	10.50 to 11.00
Car wheels	.....	11.50 to 12.00
Retrolling rails	.....	10.00 to 10.50

Bids on the Navy's Copper and Brass Scrap

WASHINGTON, Feb. 20. — Submitting figures ranging from 7.0199c. to 9.3899c. per lb., Herman Jaffe, 220 Broadway, New York, was the highest bidder for 9 out of 11 lots of copper and brass scrap offered for sale by the Navy Department, tenders being opened this morning. The total quantity involved was 1,000,000 lb. The biggest lot included in Mr. Jaffe's bids was 500,000 lb. of reclaimed copper composition scrap ingots at Norfolk, Va., this material containing 81.5 per cent copper, 7.46 per cent tin and 9.51 per cent zinc with minor contents of other non-ferrous material. The price offered for this lot was 8.5699c. per lb. The highest individual bid was 9.76c. per lb., made by the U. T. Hungerford Brass & Copper Co., New York, for 25,000 lb. of brass primer rods at Newport, R. I. Besides the Norfolk and Newport navy yards the material offered for sale is located at the Hingham, Mass., and Portsmouth, N. H., yards. There were nine bidders in all.

Chicago

CHICAGO, Feb. 21.

Railroad purchases of cars and track material during the past month together with recent releases against rail contracts, have had their effect on local mill operations, which now average well over 50 per cent. The Illinois Steel Co. has put in another blast furnace at Joliet, giving it 11 active stacks in all, and is producing steel at the rate of 55 per cent of ingot capacity. The Inland Steel Co. is on a 60 per cent basis, having its entire No. 1 plant in operation and having started three open hearths and its 40-in. blooming mill and 32-in. roughing mill on the No. 2 side.

Much of the business which made these gains in production possible was taken at a sacrifice. This was particularly true of orders taken from car builders and railroads which involved large tonnages. Because of the mills' anxiety to build up a backlog, the advantage was clearly with the buyers and in some instances exceptionally low prices resulted. Recent orders for car steel have gone at 1.40c., Chicago, and even lower, one sale having been made at that price with a freight of 17c. allowed to the point of delivery. Likewise a large railroad order for tie plates was placed at less than \$30, mill. Mills profess to be sick of low-priced business, however, and are showing a firmer attitude on new inquiries. Even at 1.50c., Chicago, it is asserted no profit can be made on plates, shapes and bars. As producers are now fortified with substantial backlogs, it seems probable that the necessity for cutting so far below costs has passed.

Pig Iron.—Buying has been light since the advance in local irons, but such purchases as have been made, ranging from carload lots to 200 tons, have been at \$20 base. Here and there some Southern iron has been sold in this district, but as yet the tonnage has not been large. Although orders have fallen off sharply, some good-sized inquiries are current. The Mt. Vernon Car Mfg. Co. wants 1000 to 2000 tons of malleable for February and March shipment, while a Milwaukee melter is in the market for 2000 tons of Northern and 400 tons of Southern foundry for delivery in the next 60 days. The American Brake Shoe & Foundry Co. is inquiring for 300 tons of foundry for April shipment at the Southern Wheel Co. plant, St. Louis. The Western Electric Co. is negotiating for an additional 300 tons of 3 per cent foundry for March and April shipment. A current local inquiry for 250 tons of low phosphorous is expected to bring out keen competition. Copper free material appears to have firmed up to \$30, Valley furnace, but copper bearing is available at \$2 less. We note several sales of carload lots of charcoal at \$27 base, furnace, and one carload sale at \$28 base. While most producers are now insisting on a minimum of \$28, at least one maker is still offering material at the lower price.

Quotations on Northern foundry, high phosphorous malleable and basic irons are f.o.b. local furnace and do not include a switching charge averaging 70c. per ton. Other prices are for iron delivered at consumers' yards, or when so indicated, f.o.b. furnace other than local.

Lake Superior charcoal, averaging	
sil 1.50, delivered at Chicago	\$30.50 to \$31.50
Northern coke, No. 1, sil 2.25 to 2.75	20.50
Northern coke, foundry, No. 2, sil	
1.75 to 2.25	20.00
Northern high phos.	20.00
Southern foundry, sil 1.75 to 2.25	21.00
Malleable, not over 2.25 sil	20.00
Basic	20.00
Low phos., Valley furnace, sil 1 to 2	
per cent copper free	30.00
Silvery, sil 8 per cent	32.82

Ferrolloys.—Spiegeleisen has been advanced to \$30, Eastern furnace, or \$40.10 delivered. Furnace stocks are low and consist largely of 16 to 18 per cent material. Several sales of ferromanganese, ranging from one to two carloads, have been made at the new price of \$62.50, seaboard. A local steel works has bought 300 tons of 10 per cent Bessemer ferrosilicon at \$34 delivered.

We quote 78 to 82 per cent ferromanganese, \$70.90, delivered; 50 per cent ferrosilicon, \$56 to \$57.50, delivered; spiegeleisen, 16 to 18 per cent, \$40.10, delivered.

Railroad Equipment.—The Great Northern has ordered 500 refrigerator cars from the General Ameri-

can Car Co. It has deferred action on its box car inquiry and has reduced its gondola inquiry to 250 cars. It is expected to close presently on the gondolas and 500 stock cars.

Bars.—Business in soft steel bars is still expanding, although not sufficiently as yet to stiffen prices, which range from 1.50c. to 1.60c., Chicago, on ordinary orders. The sources of new business are growing more diversified from day to day, although large individual tonnages continue to be placed mainly for car construction and for reinforcing purposes. The Kansas City Bolt & Nut Co. will furnish 1100 tons of reinforcing for a building to be erected for the Kansas City Warehouse & Cold Storage Co. The Concrete Steel Co. has the contract for 800 tons for the Phoenix Knitting Co. plant, Milwaukee. The reinforcing for the Putnam Department Store, Davenport, Iowa, amounting to 135 tons, has been let to the Corrugated Bar Co. The Milwaukee Sewerage Commission has not yet made a formal award of the 5000 tons for the Jones Island disposal plant. Reinforcing jobs pending include 300 tons for the Churchill Hotel, Chicago, 300 tons for the Popular Mechanics Building, Chicago, and 120 tons for state highway work in Bureau County, Ill.

Bar iron demand is light and prices are weak at from 1.55c. to 1.60c., Chicago.

Mill prices are: Mild steel bars, 1.50c. to 1.60c., Chicago; common bar iron, 1.50c. to 1.60c., Chicago; rail carbon, 1.50c., mill or Chicago.

Jobbers quote 2.53c. for steel bars out of warehouse. The warehouse quotation on cold-rolled steel bars and shafting is 3.40c. for rounds and 3.90c. for flats, squares and hexagons. Jobbers quote hard and medium deformed steel bars at 1.90c. base. Hoops and bands, 3.13c.

Sheets.—Domestic demand is slow to improve, but local mills have export business to fall back upon to fill up holes in their rolling schedules. Prices are fairly firm. The local independent is running at capacity with over a month's work ahead.

Mill quotations are 3c. for No. 28 black, 2.25c. for No. 10 blue annealed and 4c. for No. 28 galvanized, all being Pittsburgh prices, subject to a freight rate to Chicago of 38c. per 100 lb.

Jobbers quote: Chicago delivery out of stock, No. 10 blue annealed, 3.38c.; No. 28 black, 4.15c.; No. 28 galvanized, 5.15c.

Wire Products.—Buying is of unsatisfactory volume for this time of the year and prices are unsteady. For mill prices see finished iron and steel, f.o.b. Pittsburgh, page 559.

We quote warehouse prices f.o.b. Chicago: No. 9 and heavier black annealed wire, \$3.13 per 100 lb.; No. 9 and heavier bright basic wire, \$3.28 per 100 lb.; common wire nails, \$3.25 per 100 lb.; cement coated nails, \$2.65 per keg.

Steel Castings.—The castings for the Burlington cars have not yet been let. Owing to the substitution of rolled steel construction for some car parts ordinarily supplied by the steel foundries, the tonnage of castings to be bought will not be so large as was expected. The castings market is generally quiet, although the prospect of further car lettings is encouraging. Figures submitted on a number of recent inquiries indicate a tendency toward firmness and a rather general adherence to prices which approximate those published on pages 348 to 350 of THE IRON AGE of Feb. 2, although the manner of quoting was in some cases different.

Plates.—Demand continues to broaden with orders coming from widely distributed sources. While the individual tonnages are generally small, their increasing number is regarded as an indication of growing confidence in the present market level as well as a gradual improvement in general industrial activity. While prices are still soft, ranging from 1.50c. to 1.60c., Chicago, on the general run of business, the tendency is toward greater firmness on the part of sellers. Further railroad car business has been let with more in sight, but little new work of consequence is being undertaken by the oil industry. The only recent oil tank job placed was a small one, consisting of 10 station tanks, involving 400 tons, to be fabricated and erected in this city for the Standard Oil Co. by the Graver Corporation.

The ruling mill quotations range from 1.50c. to 1.60c., Chicago. Jobbers quote 2.53c. for steel bars out of stock.

Rails and Track Supplies.—Track supplies are in active demand and specifications against rails on contract are heavier. The New York Central has placed 12,000 kegs of spikes, as well as some bolts and angle bars with the Illinois Steel Co. The Big Four is in the market for 6000 tons of tie plates. Recent inquiries for tie plates have brought out keen competition, the going market price of \$35 per net ton having been shaded in one or two instances. New rail orders reported include 3000 tons bought by the Hocking Valley from the Lackawanna Steel Co. and 2500 tons placed with the Gary mill by the Monon. The latter road has also released 2000 tons on contract. Altogether releases received by the Gary mill during the week totaled 20,000 tons, including 8000 tons for the Great Northern and substantial tonnages for the Baltimore & Ohio and the Missouri Pacific. The demand for light rails is light and prices range from 1.50c. to 1.60c., mill.

Standard Bessemer and open-hearth rails, \$40; light rails rolled from new steel, 1.50c. to 1.60c., f.o.b. makers' mills. Standard railroad spikes, 2.10c., Pittsburgh; track bolts with square nuts, 3.10c., Pittsburgh; tie plates, steel and iron, 1.75c., f.o.b. mill; angle bars, 2.40c., f.o.b. mill.

Bolts and Nuts.—Both jobbers and consumers are buying a little more freely, but bookings are still exceedingly unsatisfactory and discounts remain very weak.

Jobbers quote structural rivets, 3.43c.; boiler rivets, 3.53c.; machine bolts up to $\frac{3}{4}$ x 4 in., 60, 10 and 10 per cent off; larger sizes, 60 to 10 off; carriage bolts up to $\frac{3}{4}$ x 6 in., 60 and 10 off; larger sizes, 55 and 5 off; hot pressed nuts, square and hexagon tapped, \$3.75 off, blank nuts, \$4 off; coach or lag screws, gimlet points, square heads, 65 and 5 per cent off. Quantity extras are unchanged.

Structural Material.—There are few new lettings to report and while much fabricating work is in the formative stage, it is slow in getting to the bid-taking stage. Prices on plain material are still weak and the general market appears to range from 1.50c. to 1.60c., Chicago. Fabricating awards include:

Sun Drug Co. Building, Los Angeles, 600 tons, to Llewellyn Iron Works. Michigan State Highway Department, one 150-ft. through truss span near Rockland, Mich., 112 tons, to unnamed fabricators. Repairs to south approach Missouri River Bridge, Sioux City, Iowa, 200 tons, to American Bridge Co.

Pending business includes:

Northern Pacific Railway, miscellaneous spans for distribution over entire system, 1922 requirements, 2900 tons.

Central Y. M. C. A. building, Columbus, Ohio, 500 tons, bids in.

London Guarantee Life Assurance Building, Chicago, 4400 tons, general contractor's bids in.

Shrine Auditorium, Indianapolis, 350 tons.

Wisconsin Highway Commission bridge, Tomahawk, Wis., 278 tons, Stein Construction Co., Milwaukee, general contractor.

Jones Island Sewage Disposal Plant, Milwaukee, 450 tons, bids to be opened by John H. Fowles, City Hall, March 10.

The mill quotation on plain material ranges from 1.50c. to 1.60c., Chicago. Jobbers quote 2.63c. for plain material out of warehouse.

Cast-Iron Pipe.—The People's Gas Co., Chicago, has placed 9000 tons of gas pipe with the United States Cast Iron Pipe & Foundry Co., and the Milwaukee Gas Co. has awarded 500 tons to the Lynchburg Foundry Co. Other lettings include:

Brook Park, Ohio, 600 tons of water pipe to the National Cast Iron Pipe Co. Fairfax, Okla., 175 tons, to National Cast Iron Pipe Co. Muscatine, Iowa, 650 tons, to United States Cast Iron Pipe & Foundry Co. Detroit Fire Commissioners, 300 tons of high pressure pipe, to United States Cast Iron Pipe & Foundry Co. Minneapolis, 800 tons, to American Cast Iron Pipe Co.

Pending business includes:

Grove City, Ohio, 350 tons, bids in Feb. 28, contractor's job. Wausau, Wis., 200 tons, Feb. 18. Madison, Wis., 150 tons, Feb. 18. Moulton, Iowa, 300 tons, Feb. 23. Stratton, Col., 200 tons, Feb. 23. Cody, Wyo., 325 tons, Feb. 24. Muskegon, Mich., 150 tons, Feb. 24.

We quote per net ton, f.o.b. Chicago, as follows: Water pipe, 4-in., \$45.60 to \$46.60; 6-in. and above, \$41.60 to \$42.60; class A and gas pipe, \$3 extra.

Old Material.—Conservative buying has improved.

although it cannot be said that a real buying movement is under way. A number of important local melters have made fair purchases of cast and malleable, however, and an iron mill has closed for about 1500 tons of No. 1 busheling. It is also evident that there have been substantial purchases of open-hearth grades. According to an unauthenticated report, the Gary works has placed orders for 10,000 tons, while it is also said that several thousand tons have been bought by another steel mill. On the whole, prices show greater firmness and a number of grades have advanced. That dealers anticipate a rising market is indicated by the fact that they are paying higher prices for railroad material than are quoted below.

We quote delivery in consumers' yards, Chicago and vicinity, all freight and transfer charges paid, as follows:

Per Gross Ton	
Iron rails	\$16.00 to \$16.50
Relaying rails	20.00 to 25.00
Cast iron car wheels	15.00 to 16.50
Rolled or forged steel car wheels	13.00 to 13.50
Steel rails, rerolling	12.00 to 12.50
Steel rails, less than 3 ft.	12.75 to 12.25
Heavy melting steel	11.50 to 12.00
Frogs, switches and guards cut apart	11.50 to 12.00
Shoveling steel	11.00 to 11.50
Low phos., heavy melting steel	13.50 to 14.00
Drop large flashings	7.50 to 8.00
Hydraulic compressed sheet	8.00 to 8.50
Axle turnings	8.50 to 9.00

Per Net Ton	
Iron angles and splice bars	14.00 to 14.50
Steel angle bars	10.75 to 11.25
Iron arch bars and trapezoids	15.00 to 16.50
Iron car axles	19.50 to 20.00
Steel car axles	12.50 to 13.00
No. 1 busheling	8.50 to 9.00
No. 2 busheling	6.00 to 6.50
Cut forge	10.00 to 10.50
Pipes and flues	6.50 to 7.00
No. 1 railroad wrought	10.50 to 11.00
No. 2 railroad wrought	10.00 to 10.50
Steel knuckles and couplers	11.00 to 11.50
Coil springs	12.50 to 13.00
No. 1 machinery cast	13.50 to 14.00
No. 1 railroad cast	13.00 to 13.50
Low phos. punchings	11.00 to 11.50
Locomotive tires, smooth	10.00 to 10.50
Machine shop turnings	4.50 to 5.00
Cast borings	6.25 to 6.75
Stove plate	12.50 to 13.00
Grate bars	10.50 to 11.00
Brake shoes	10.50 to 11.00
Railroad malleable	11.50 to 12.00
Agricultural malleable	11.50 to 12.00

Cincinnati

CINCINNATI, Feb. 21.

Pig Iron.—Some fair sized sales of pig iron were reported during the week, but in the majority of cases carload orders were the rule. There are evidences however, that the melt of iron is increasing slightly, and buyers are more receptive to advances by the sellers. The inquiry from some districts is still light and prices are inclined to be rather unsteady. Reports are current that Southern iron has been sold at \$15, Birmingham base, and in this connection it is said that a Kentucky sanitary company has placed 1500 tons for prompt shipment at this figure. The general market, however, in the South remains quotable at \$15.50, but a desirable tonnage no doubt could be placed at lower prices. Sales are about evenly divided between Northern and Southern. Of the former, a Portsmouth stove maker took 300 tons, and a Mansfield melter 100. An Indiana manufacturer bought 400 at a price said to be \$18, Lake furnace. Several 100-ton sales of Northern furnaces also are reported. A Louisville melter bought 500 tons of Southern at \$15.50 base, and an Indiana melter 100 tons at the same figure. A Cleveland district melter took 400 tons of silvery iron at the schedule. Outside the district a Michigan melter bought 5000 tons of foundry iron, and a St. Louis district foundry 200 tons of low phosphorus. Prices in the North are ruling about the same as last week, although a firmer tone is noted in Chicago and Cleveland iron.

Based on freight rates of \$4.50 from Birmingham and \$2.52 from Ironton, we quote f.o.b. Cincinnati:

Southern coke, sil. 1.75 to 2.25 (base)	\$20.00 to \$20.50
Southern coke, sil. 2.25 to 2.75 (No. 2 soft)	20.50 to 21.00
Ohio silvery, 8 per cent sil.	30.02
Southern Ohio coke, sil. 1.75 to 2.25 (No. 2)	21.52 to 22.02
Basic, Northern	21.02
Malleable	22.02 to 22.52

Finished Material.—If one is to judge from reports, the aggregate tonnage placed during the week was perhaps the best for any similar period since Jan. 1. The orders, however, are still confined to carload lots, although occasionally up to 100 tons are desired. The largest inquiry reported is for 450 tons of bars for the L. & N. Railroad. There is no particular branch of the trade that is especially active and orders placed cover bars, shapes, plates and wire products. The sheet market has slowed up a little during the past two weeks, but several 100-ton orders were reported during the past week. Practically all orders placed are for immediate shipment and there is desire apparent on the part of buyers to contract for the future. Prices as a rule are holding at last week's levels, although it is said on wire fencing and wire nails, considerable shading is being done. Reports were current that one manufacturer of wire fencing was quoting 71 per cent off the list and that wire nails are available under the regular price of \$2.10 per keg. On bars, shapes and plates, the usual quotation is 1.40c., and on sheets 3c. and 4c. for black and galvanized, respectively. Several weeks ago it was reported that galvanized sheets could be had at 3.75c., but this price apparently has disappeared, as all the orders now being placed are at the full schedule. There was little activity in the structural field during the week, the only award of consequence being 250 tons for the Capital Hotel at Frankfort to the Dayton Structural Steel Co., Dayton, Ohio. The American Car & Foundry Co. is taking bids on an addition to its plant at Huntington, W. Va., involving 500 tons. Frank L. Packard, Columbus, Ohio, will shortly call for bids on a twelve-story office building at Canton, Ohio, and a twelve-story bank building at Ironton, Ohio. The same firm will, early in April, send out plans for the North High School at Columbus, which will take a considerable tonnage of steel. Bids will close on Feb. 28 for the Wilde Bank Building at Indianapolis, involving 500 tons, on March 1 for the Indianapolis Athletic Club, involving 1200 tons, and on the same date for the Business Men's Club in Cincinnati, involving 500 tons. Pending projects include two school buildings at Middletown, Ohio, bids for which will close on Feb. 23, and a high school at Greenville, Ohio, which will come up during April. The new Hotel William at Columbus, Ohio, will not likely be up for bids before late spring, and plans are now being completed for the new hotel to replace the old Neil House in the same city. This building will be of sixteen stories and will also contain a theatre. The Big Four Railroad is inquiring for approximately 100,000 tie-plates and 3200 kegs of track bolts, bids for which will close on Feb. 27.

Old Material.—Local dealers report several tentative inquiries from steel companies, and also from jobbing foundries, but actual sales are few. It is expected, however, that some activity will be shown during the next week or two. Prices are soft, but unchanged.

We quote dealers' buying prices for cars
Per Gross Ton

Bundled sheets	\$3.50 to \$4.00
Iron rods	11.50 to 12.00
Reboring rails 50 lb and up	24.50 to 25.00
Reboring steel rails	10.00 to 10.50
Heavy melting steel	8.50 to 9.00
Steel rails for melting	8.50 to 9.00
Car wheels	11.50 to 12.50

Per Net Ton

No. 1 railroad wrought	8.00 to 8.50
Cast borings	3.00 to 3.50
Steel turnings	2.00 to 2.50
Railroad cast	11.50 to 12.00
No. 1 machinery	13.00 to 13.50
Burnt scrap	7.00 to 7.50
Iron axes	15.00 to 15.50
Locomotive tires (smooth inside)	9.00 to 9.50
Pipes and flues	3.50 to 4.00

Coke.—The coke market is showing considerable activity, the threatened coal strike being responsible in large part. Prices are stiffening somewhat, and Connellsville foundry coke is now quoted at \$4 to \$4.50, Wise County foundry at \$5 to \$5.50, and New River foundry at \$7.50 to \$8.

Warehouse Business.—Local jobbers report a fair week with particularly good orders for concrete reinforcing bars. While the tonnages are not heavy, the number of orders is increasing and on the whole con-

ditions show some improvement. Some weakness has developed in the wire and nail market and it would not be surprising if lower prices were heard in the near future.

Iron and steel bars, 2.75c. base; hoops and bands, 3.35c. base; shapes and plates, 2.85c. base; reinforcing bars, 2.82½c. base; cold rolled rounds, 1½ in. and larger, 3.50c. base; under 1½ in. and flats, squares and hexagons, 4c.; No. 10 blue annealed sheets, 3.60c.; No. 28 black sheets, 4.25c.; No. 28 galvanized sheets, 5.25c.; wire nails, \$2.95 per keg base; No. 9 annealed wire, \$2.85 per 100 lb.

Proposed Merger for Japanese Iron Furnaces

"The proposal for a merger, which was recently started and at once dropped, is revived by Japanese furnaces, whose position, it is feared, becomes more helpless when the proposed naval holiday is effective," states the *Japan Advertiser* of Dec. 24. Views regarding the merger are again being exchanged among furnace managers, although it is thought that much time will elapse before the proposal materializes.

During the early months of 1921 the industry was confronted with its worst crisis, and at one time during the summer it was proposed by some ironmasters to render easier the position of the industry through the merger of all mills. This proposal was at once dropped because of some difficulties that were foreseen.

Buying, however, has been improving, which, coupled with the limited production at home and restricted importation from abroad, has served to lighten the burden of the market and industry. According to a stock report of Nov. 11, 1921, the total of the pig-iron stock in Japan was up to 255,990 tons. It is now believed to have fallen to approximately 250,000 tons.

Merger Proposal Revived

The proposal for a merger of the iron furnaces has again been revived, evidently because of the proposed naval holiday and its effect on the industry and also because of the uncertainty regarding the general revival of business. A short time ago representatives of several leading furnaces held a conference in the Industrial Club of Japan to discuss their present difficulty. As a result, the conclusion was reached that the only way open to them is to combine and readjust all Japanese furnaces.

It is stated in a report emanating from reliable quarters that managers of furnaces have begun the study of all problems pertaining to the maturing of their proposal, such as the warlike consumption of iron in Japan, the consumption of iron for commercial and industrial purposes, imports and exports, the cost of production at the different mills, etc.

Improved Situation in Spanish Iron Mines

Commercial Attaché Charles H. Cunningham, Madrid, says the situation in the mines of Bilbao is slightly improved, due to the increased demand for mineral ore in England. It is stated that orders have recently been received for about 115,000 tons of various classes of iron ore. This does not mean, however, a relief from the difficult situation which has prevailed in Bilbao during the past year, and where there are at present approximately 2,000,000 tons of red earth piled up without demand.

A voluntary petition in bankruptcy was filed Feb. 9 by the Racine Auto Tire Co., Racine, Wis. Schedules admit liabilities of \$1,453,216 and claim assets of \$1,642,836, which does not include the going or replacement value. Unsecured claims amount to \$972,675, and secured claims \$116,332. The largest secured creditor is the J. I. Case Threshing Machine Co., Racine, with a claim of \$90,000, secured by a land contract. The largest items of the assets is machinery, which is listed as having a value of \$402,185.

The referee in bankruptcy at Milwaukee has designated March 1 as the date when the entire assets of the defunct John Obenberger Forge Co. of West Allis, suburb of Milwaukee, are to be offered for sale at public auction. The sale will be held in room 502 of the Federal Building at Milwaukee, under the direction of J. F. Gerdis, trustee in bankruptcy.

Prices Finished Iron and Steel, f.o.b. Pittsburgh

Freight Rates

Freight rates from Pittsburgh on finished iron and steel products, in carload lots, to points named, per 100 lb., are as follows:

Philadelphia, domestic...	\$0.36	Kansas City	\$0.815
Philadelphia, export...	0.265	Kansas City (pipe)...	0.77
Baltimore, domestic...	0.35	St. Paul	0.665
Baltimore, export	0.255	Omaha	0.815
New York, domestic...	0.38	Omaha (pipe)	0.77
New York, export	0.285	Denver	1.35
Boston, domestic	0.405	Denver (wire products)...	1.115
Boston, export	0.285	Pacific Coast	1.665
Buffalo	0.295	Pacific Coast ship plates...	1.335
Cleveland	0.24	Birmingham	0.665
Detroit	0.325	Jacksonville, all rail...	0.555
Cincinnati	0.325	Jacksonville, rail and water	0.46
Indianapolis	0.345	New Orleans	0.515
Chicago	0.38		
St. Louis	0.475		

The minimum carload to most of the foregoing points is 36,000 lb. To Denver the minimum loading is 40,000 lb., while to the Pacific Coast on all iron and steel products, except structural material, the minimum is 50,000 lb. On the latter item the rate applies to a minimum of 30,000 lb., and there is an extra charge of 5c. per 100 lb. on carloads of a minimum of 40,000 lb. On shipments of wrought iron and steel pipe to Kansas City, St. Paul, Omaha and Denver the minimum carload is 46,000 lb. On iron and steel items not noted above the rates vary somewhat and are given in detail in the regular railroad tariffs.

Rates from Atlantic Coast ports (i.e., New York, Philadelphia and Baltimore) to Pacific Coast ports of call on most steamship lines, via the Panama Canal, are as follows: Pig iron, 55c.; ship plates, 75c.; ingot and muck bars, structural steel, common wire products, including cut or wire nails, spikes and wire hoops, 75c.; sheet and tin plates, 60c. to 75c.; rods, wire rope, cable and strands, \$1. wire fencing, netting and stretcher, 75c.; pipe, not over 8 in. in diameter, 75c.; over 8 in. in diameter, 2 1/2c. per in. or fraction thereof additional. All prices per 100 lb. in carload lots, minimum 40,000 lb.

Structural Material

I-beams, 3 to 15 in., channels, 3 to 15 in., angles, 3 to 6 in., on one or both legs, 1/4 in. thick and over, and zebs, structural sizes, 1.40c. to 1.50c.

Sheared plates, 1/4 in. and heavier, tank quality, 1.40c. to 1.50c.

Wire Products

Wire nails, \$2.40 to \$2.50 base per keg; galvanized, 1 in. and longer, including large-head barbed roofing nails, taking an advance over this price of \$1.25 and shorter than 1 in., \$1.75; bright Bessemer and basic wire, \$2.15 to \$2.25 per 100 lb.; annealed fence wire, Nos. 6 to 9, \$2.15 to \$2.25; galvanized wire, \$2.65 to \$2.75; galvanized barbed wire, \$3.00 to \$3.15; galvanized fence staples, \$3.00 to \$3.15; painted barbed wire, \$2.55 to \$2.65; polished fence staples, \$2.55 to \$2.65; cement-coated nails, per count keg, \$1.90 to \$2.00, these prices being subject to the usual advances for the smaller trade, all f.o.b. Pittsburgh, freight added to point of delivery, terms 60 days, net, less 2 per cent off for cash in 10 days. Discounts on woven-wire fencing are 10 1/2 per cent off list for carload lots; 6 1/2 per cent for 1000-rod lots, and 6 1/2 per cent for small lots, f.o.b. Pittsburgh.

Bolts and Nuts

Machine bolts, small, rolled threads, 70, 10 and 10 per cent off list
Machine bolts, small, cut threads, 70 and 10 per cent off list
Machine bolts, larger and longer, 70 and 10 per cent off list
Carriage bolts, 3/4 in. x 6 in., 70 and 10 per cent off list
Smaller and shorter rolled threads, 70 and 10 per cent off list
Cut threads, 70 and 10 per cent off list
Longer and larger sizes, 70, 10 and 5 per cent off list
Lag bolts, 70, 10 and 5 per cent off list
Plow bolts, Nos. 1, 2 and 3 heads, 60 and 10 per cent off list
Other style heads, 20 per cent extra
Machine bolts, c.p.c. and t. nuts, 3/4 in. x 4 in., 65, 10 and 5 per cent off list
Smaller and shorter, 65, 10 and 5 per cent off list
Larger and longer sizes, 65 and 10 per cent off list
Hot pressed sq. or hex. blank nuts, \$5.50 off list
Hot pressed nuts, tapped, \$5.25 off list
C.p.c. and t. sq. or hex. blank nuts, \$5.25 off list
C.p.c. and t. sq. or hex. blank nuts, tapped, \$5.00 off list
Semi-finished hex. nuts:
3/4 in. to 9/16 in. inclusive, 80, 10 and 10 per cent off list
Small sizes S. A. E., 80, 10 and 10 per cent off list
3/4 in. to 1 in. inclusive, U. S. S. and S. A. E., 70, 10, 10 and 10 per cent off list
Stove bolts in packages, 80 and 3 tens and 5 per cent off list
Stove bolts in bulk, 80, 3 tens and 2 1/2 per cent off list
Tire bolts, 70, 10 and 5 per cent off list
Track bolts, carloads, 3c. to 3.25c. base
Track bolts, less than carloads, 4c. to 4.25c.

Upset and Hex. Head Cap Screws

1/4 in. and under, 80 and 10 to 80, 10 and 10 per cent off list
9/16 in. to 3/4 in., 80 and 10 to 80, 10 and 10 per cent off list

Upset Set Screws

1/4 in. and under, 80, 10 and 5 to 85 per cent off list
9/16 in. to 3/4 in., 80, 10 and 5 to 85 per cent off list

Milled Square and Hex. Cap Screws

All sizes, 75 and 10 to 80 per cent off list

Milled Set Screws

All sizes, 70, 10 and 10 per cent off list

Rivets

Large structural and ship rivets, \$2.10
Large boiler rivets, 2.20
Small rivets, 1.75 and 10 off list

Wire Rods

No. 5 common basic or Bessemer rods to domestic consumers, \$35 to \$36; chain rods, \$35 to \$36, screw stock rods, \$40 to \$41, rivet and bolt rods and other rods of that character, \$35 to \$36; high carbon rods, \$42 to \$46, depending on carbons.

Railroad Spikes and Track Bolts

Railroad spikes, 9 1/2-in. and larger, \$2.15 to \$2.20 base per 100 lb. in lots of 200 kegs of 200 lb. each or more; spikes, 1 1/2 in., 3/4 in. and 7/16 in., \$2.25 to \$2.30 base; 5/16-in., \$2.25 to \$2.30 base. Bolt and nut spikes, \$2.25 to \$2.30 base per 100 lb. in carload lots of 200 kegs or more, f.o.b. Pittsburgh. Track bolts, 3/4 to 3 1/2 in. base per 100 lb. The plates, \$2 per 100 lb. Angle bars, \$2.10 per 100 lb.

Terne Plates

Prices of terne plates are as follows: 8 lb. coating, 200 lb., \$9.40 per package; 8 lb. coating, 1 C., \$9.60; 15-lb. coating, 1 C., \$11.80; 20-lb. coating, 1 C., \$13.25; 25-lb. coating, 1 C., \$14.25; 30-lb. coating, 1 C., \$15.25; 35-lb. coating, 1 C., \$16.25; 40-lb. coating, 1 C., \$17.25 per package, all f.o.b. Pittsburgh, freight added to point of delivery.

Iron and Steel Bars

Steel bars, 1.40c. from mill; refined bar iron, 2c. to 2.10c.

Welded Pipe

The following discounts are to jobbers for carload lots on the Pittsburgh basis card:

Butt Weld			Iron		
Inches	Steel	Galv.	Inches	Black	Galv.
1 1/2 to 2	4 1/2	28	1 1/2 to 2	4 1/2	22 1/2
2 1/2 to 3	60	33 1/2	2 1/2 to 3	36 1/2	18 1/2
3 1/2 to 4	65	50 1/2	3 1/2 to 4	42 1/2	27 1/2
4 1/2 to 5	69	56 1/2	4 1/2 to 5	44 1/2	29 1/2
5 1/2 to 6	71	58 1/2			
Lap Weld			Lap Weld		
2 1/2 to 3	64	51 1/2	2 1/2 to 3	39 1/2	25 1/2
3 1/2 to 4	68	55 1/2	3 1/2 to 4	42 1/2	29 1/2
4 1/2 to 5	65	51 1/2	4 1/2 to 5	40 1/2	27 1/2
5 1/2 to 6	64	50 1/2			
Butt Weld, extra strong, plain ends			Butt Weld, extra strong, plain ends		
1 1/2 to 2	50 1/2	33	1 1/2 to 2	41 1/2	27 1/2
2 1/2 to 3	55	38 1/2	2 1/2 to 3	35 1/2	23 1/2
3 1/2 to 4	62	50 1/2	3 1/2 to 4	42 1/2	28 1/2
4 1/2 to 5	67	55 1/2	4 1/2 to 5	44 1/2	30 1/2
5 1/2 to 6	69	57 1/2			
6 to 7	70	58 1/2			
Lap Weld, extra strong, plain ends			Lap Weld, extra strong, plain ends		
2 1/2 to 3	62	50 1/2	2 1/2 to 3	40 1/2	27 1/2
3 1/2 to 4	68	54 1/2	3 1/2 to 4	43 1/2	31 1/2
4 1/2 to 5	65	53 1/2	4 1/2 to 5	41 1/2	30 1/2
5 1/2 to 6	61	47 1/2	5 1/2 to 6	35 1/2	23 1/2
6 to 7	55	41 1/2	6 to 7	30 1/2	18 1/2

To the large jobbing trade the above discounts are increased by one point, with supplementary discounts of 5 and 2 1/2 per cent.

Boiler Tubes

The following are the discounts for carload lots f.o.b. Pittsburgh:

Lap Welded Steel		Charcoal Iron	
1 1/2 in.	26 1/2	1 1/2 in.	5
2 to 2 1/4 in.	41	1 1/2 to 1 3/4 in.	15
2 1/2 to 3 in.	52	2 to 2 1/4 in.	25
3 1/2 to 4 in.	57	2 1/2 to 3 in.	30
		3 1/2 to 4 in.	32

To large buyers of steel tubes, a supplementary discount of a per cent is allowed.

Standard Commercial Seamless Boiler Tubes

New discounts have been adopted on standard commercial seamless boiler tubes, but manufacturers are not yet ready to announce them for publication, and for that reason we publish no discounts this week.

Sheets

Prices for mill shipments on sheets of standard gage in carloads, f.o.b. Pittsburgh, follow:

Blue Annealed		Cents per Lb.	
No. 8 and heavier	2.20	Nos. 11 and 12	2.30
Nos. 9 and 10 (base)	2.25	Nos. 13 and 14	2.35
		Nos. 15 and 16	2.45
Box Annealed, One Pass Cold Rolled		Cents per Lb.	
Nos. 17 to 21	2.80	No. 28 (base)	3.00
Nos. 22 to 24	2.85	No. 29	3.10
Nos. 25 and 26	2.90	No. 30	3.20
No. 27	2.95		
Galvanized		Cents per Lb.	
Nos. 10 and 11	3.00	Nos. 25 and 26	3.70
Nos. 12 to 14	3.10	No. 27	3.85
Nos. 15 and 16	3.25	No. 28 (base)	4.00
Nos. 17 to 21	3.40	No. 29	4.25
Nos. 22 to 24	3.55	No. 30	4.50
Tin-Mill Black Plate		Cents per Lb.	
Nos. 15 and 16	2.80	No. 28 (base)	3.00
Nos. 17 to 21	2.85	No. 29	3.05
Nos. 22 to 24	2.90	No. 30	3.05
Nos. 25 to 27	2.95	Nos. 30 1/2 and 31	3.10

PERSONAL

Huntington Downer, who for the past two years has been district sales manager in Philadelphia for the Lackawanna Steel Co., Buffalo, has resigned that position to become manager of the iron and steel department of the Iron Trade Products Co., Pittsburgh.



HUNTINGTON DOWNER

Mr. Downer has had a thorough training in the steel business. After his graduation from Yale University, he entered the operating department of the Lackawanna Steel Co., learning the business from the mining of ore to the production of semi-finished and finished steel. He then entered sales work and was in the general sales department of the company at the time of his appointment to the position in Philadelphia. The Iron Trade Products Co., with which Mr. Downer becomes identified, is engaged on a brokerage basis in the sale of ore, pig iron, alloys, fluorspar and other materials used in the iron and steel trade.

Lewis D. McClaren, for a number of years on the sales force of Rogers, Brown & Co., pig iron brokers at Chicago, has resigned to become sales manager of the coke department of the Wisconsin Lime & Cement Co., Conway Building, Chicago. This company has the Chicago agency for the sale of Roberts by-product coke, manufactured by the St. Louis Coke & Chemical Co., Granite City, Ill. C. E. Trommer, sales representative Rogers, Brown & Co., at St. Louis, has been transferred to Chicago to take the place made vacant by Mr. McClaren.

Lester G. Sigourney has recently been chosen secretary of the New Departure Mfg. Co., Bristol, Conn., manufacturer of ball bearings, etc. He has been with the company for several years.

John D. Ryan, chairman of the board of directors of the Anaconda Copper Co., Cornelius F. Kelley, president of the same company, and Benj. B. Thayer, vice-president of the company, were all elected directors of the American Brass Co., Waterbury, Conn., at the recent meeting of the latter company. They were also chosen on the executive committee of the American Brass Co.

Hollinshead N. Taylor, president N. & G. Taylor Co., manufacturer of tin plate, Philadelphia, who was elected a member of the board of directors of the Philadelphia Chamber of Commerce to succeed James B. Bonner of the Carnegie Steel Co. on the latter's removal to Washington, has been appointed a member of the executive committee of that organization. He is also chairman of the industrial committee and a member of the committees on public utilities and aviation.

C. W. Forcier, 433 Union Arcade Building, has been appointed Pittsburgh district sales representative the Tacony Steel Co., Philadelphia.

Lorenz Maisel has disposed of his interest in the Madison, Wis., Tool & Stamping Works, and retires as treasurer and general manager. Mr. Maisel in November, 1920, resigned as general superintendent Burgess Battery Co., Madison, to take an important interest in the tool works, which he reorganized. He has not made public plans for the future.

C. L. Dewey, who was associated with Carl Akeley in the invention and development of the cement-gun, and who has done extensive cement-gun contract work under the names of the Dewey Cement-Gun Co. and the Traylor-Dewey Contracting Co., Allentown, Pa.,

has joined the forces of the Cement-Gun Construction Co., Chicago. He will devote his time exclusively to the development of cement-gun contract work.

Justus Egbert, director of purchases, American Radiator Co., Buffalo, has resigned, effective March 1, and will be succeeded by L. H. Beyer. In conjunction with Ralph Waldo of Rogers, Brown & Co., and W. J. McClain, Buffalo sales representative of Republic Iron & Steel Co., Mr. Egbert is forming a company to be known as Waldo, Egbert & McClain, Inc., with headquarters at Buffalo, to sell pig iron, coke, steel, various alloys, fire brick, molding sand, etc.

Ritchie Gill, of the International Sales Corporation, Victoria Street, London, S. W., has taken up his quarters at the Gotham Hotel, New York, and is desirous of getting in touch with substantial houses handling ironmongery in the United Kingdom and Europe.

Elliot D. Drury, formerly sales representative Greenfield Tap & Die Corporation, Greenfield, Mass., is now assistant sales manager American Wringer Co., Woonsocket, R. I.

J. T. Brierly, formerly general manager and treasurer Brierly-Lombard Co., Worcester, Mass., mill supplies, was elected president of the Thompson-Copeland Co., that city, lock washers, nuts, etc., at the annual stockholders' meeting last week. E. A. Copeland is vice-president, and Harry C. Thompson treasurer.

Charles C. Boyden, who resigned his position with the Alan Wood Iron & Steel Co., Philadelphia, a few months ago and went on a trip to California, has returned. His present address is Foxbury, Mass.

Paul L. Battey, formerly vice-president of the Arnold Co., Chicago, and for years chief engineer in charge of various industrial enterprises, including the large Willys-Overland establishment at Elizabeth, N. J., has established himself at 123 West Madison Street, Chicago, as consulting engineer for industrial plants.

Decision Favors U. S. Steel Products Co.

WASHINGTON, Feb. 21.—In a tentative opinion handed down to-day, Attorney Examiner Charles F. Gerry recommends that the Interstate Commerce Commission direct the Director General and the railroads involved to waive the collection of demurrage and storage charges assessed against the United States Steel Products Co. on shipments of iron and steel products delivered at Seattle and Tacoma, Wash., for export to the Philippine Islands, Japan and other Far Eastern destinations during the period from July 1, 1918, to Sept. 9, 1919.

It is held in the tentative report that the charges were legally applicable to the shipments, but that the defendants failed, in conformity with tariff provisions, to notify anyone that the shipments had arrived at Seattle or Tacoma or that they were ready to make delivery at such ports of exit and that therefore the charges were illegal. Charges for the detention of the shipments in excess of free time at those ports remain unpaid and delivering carriers have brought actions at law which are pending.

The Steel Products company took the case to the commission and by the tentative report has been upheld in its claims that the charges have been assessed without tariff authority and if found legally applicable are unjust and in violation of the Federal Control Act. Because of this, the Steel Products company has sought waiver of payment.

Steel Corporation Stock Subscriptions

It was announced at the office of the United States Steel Corporation, Monday, that the stock subscriptions to date this year were by 34,432 employees who subscribed 94,258 shares. Last year up to March 1, 81,710 employees subscribed for 255,325 shares, while in 1920, 66,407 employees subscribed for 167,407 shares. The periods of depression and prosperity have thus been reflected in subscriptions.

OBITUARY

JOSEPH E. SCHWAB, brother of Charles M. Schwab, chairman of the Bethlehem Steel Corporation, and himself prominent for many years in the steel industry, died last Friday afternoon at the Hotel Collingwood, New York, where he had made his home for some time past. The cause of death was given as diabetes, from which he had been suffering for nearly a year. Joseph E. Schwab was born at Loretto, Pa., on Feb. 23, 1864. He joined the engineering department of the Carnegie Steel Co. in 1883, two years after Charles M. Schwab became associated with that company. He continued his service in the engineering department until 1894, when he was made manager of the company's Duquesne Works and he remained there until the formation of the United States Steel Corporation, when he came to New York as assistant to Charles M. Schwab, who had become president of the corporation. Two years later Joseph E. Schwab was made president of the American Steel Foundries, but after a few years he retired from all business activities. He leaves a wife and two children, the elder a son, Charles M. Schwab, who was born on his uncle's birthday and named for him, and a daughter, Dorothy; also two brothers and two sisters, Charles M. and Edward H. Schwab, Mrs. David Barry of Johnstown, Pa., and Sister M. Cecilia of Seton Hill College, Greensburg, Pa. The funeral services were held privately at Loretto, Pa., on Monday.

WILLIAM C. SARGENT, for 22 years secretary and also a director of Chain Belt Co., Milwaukee, died suddenly on Feb. 5 as a result of heart failure. He was 73 years of age and had been in ill health for several years. Mr. Sargent, prominent in industrial circles of Milwaukee and St. Paul, had a wide national acquaintanceship. He was born at Troy, N. Y., Feb. 2, 1849. In 1871 he moved West, locating at St. Paul, where he organized the De Cou, Corliss & Sargent Co., manufacturer of sash and doors. He later became affiliated with the St. Paul Harvester Co. and met C. W. Le Valley, who later founded the Chain Belt Co. of Milwaukee. This meeting was the beginning of a long business association, for in 1900 Mr. Sargent went to Milwaukee to become secretary and later a director of the Chain Belt Co. He was also a director of the Federal Malleable Co., West Allis, Wis. His father was one of the founders of the Terre Haute, Alton & St. Louis Railroad.

JAMES M. ATCHESON, 73 years old, agent for the H. C. Frick Coke Co., with offices in the Carnegie Building, Pittsburgh, died Feb. 14, in St. Petersburg, Fla., where he was spending the winter. Mr. Atcheson had been in failing health for almost a year. He was born in Allegheny, Pa., and had been in the employ of the H. C. Frick Coke Co. more than 30 years.

LOUIS FRANCIS PHIPPS, chairman of the board of directors of the American Frog & Switch Co., Hamilton, Ohio, died suddenly at his home in Cincinnati on Feb. 14. Mr. Phipps was 70 years old and had been identified with the Hamilton company for the past 15 years. Before that time he was connected with the old Globe Rolling Mill. He is survived by a widow and six sisters.

WILLIAM R. KINNEAR, founder of the Kinnear Mfg. Co., Columbus, Ohio, died at his home in Indianapolis on Feb. 12, aged 75. Mr. Kinnear established the Kinnear Mfg. Co. 25 years ago, but sold out his interests 15 years ago and since that time has resided in New York and Indianapolis.

SIR GEORGE J. CARTER, managing director of the Birkenhead Works of Cammell, Laird & Co., Ltd., Sheffield and Birkenhead, England, died Feb. 11 at the age of 62.

R. K. DANA, manager York Insulated Wire Works of General Electric Co., New York, died Wednesday, Feb. 1.

Railroad Rate Hearings to Be Concluded This Week

WASHINGTON, Feb. 21.—Hearings in connection with the general rate investigation before the Interstate Commerce Commission will be concluded on Saturday of the present week. They have been under way for almost six weeks and shippers in every line have appeared before the commission and urged substantial reductions in rates as a means looking to the restoration of normal economic conditions. The iron and steel interests were vigorous in their expression of such an attitude. But from the first the railroads have combatted proposed general reductions, claiming that it would result in so depleting their revenues that they would be bankrupted. The contention of shippers has been that the increased traffic arising from lower rates would more than offset the present high rates and bring about larger net returns for the railroads.

It obviously is a question as to what the decision of the commission will be. It is evident, however, that the prevailing opinion of those who have followed the hearings is that the commission, if it makes any reductions, will content itself with lowering rates on raw products, and perhaps order certain readjustments in some lines. They do not think a general reduction is likely in the near future, but will be left to work itself out gradually. For one thing, it is believed by some that coal will be among the products whose rates will be cut. In this connection, significance is attached to the fact that discussion about coal freight rates engaged the attention of the cabinet meeting last Friday. It also is recalled that Secretary of Commerce Hoover urged reductions on raw products including several manufactured lines, among them metals and metal products, but opposed a general reduction in rates and urged an investigation as to the possibility of increasing some class rates.

Southern Iron Now Competitive in Chicago Territory

CHICAGO, Feb. 18.—The recent advance of local pig iron to \$20 base, Chicago, puts the delivered prices on that product above Southern iron at numerous points in Chicago territory. The comparative figures appended below, which were recently sent out in a circular letter to the trade by the local office of the Matthew Addy Co., are figured on a Birmingham base of \$15.50. The difference in favor of the South would be even greater if the base were placed at \$15 at which price, or its equivalent, some iron has been sold in that territory recently. Those Southern producers which are able to take advantage of combination river and rail rates are in even a better position to compete in the Chicago district. The Matthew Addy figures are as follows:

	Chicago	Birmingham
Battle Creek, Mich.	\$23.36	\$22.56
Benton Harbor, Mich.	22.94	22.17
Crown Point, Ind.	22.10	21.90
Dowagiac, Mich.	22.94	22.44
Grand Haven, Mich.	23.36	22.84
Grand Rapids, Mich.	23.36	22.84
Hastings, Mich.	23.36	22.84
Holland, Mich.	23.36	22.84
Kendallville, Ind.	22.94	22.17
Lansing, Mich.	22.50	22.56
LaPorte, Ind.	21.96	22.17
Manistee, Mich.	25.60	24.03
Mishawaka, Ind.	22.94	22.17
Muskegon, Mich.	23.36	22.84
Owosso, Mich.	23.50	23.10
South Bend, Ind.	22.10	22.17

Complaint of Furnace Co. Discussed

BUFFALO, Feb. 21.—Federal Judge John R. Hazel of United States Court has dismissed the complaint of the Buffalo Union Furnace Co. in its suit against the United States Shipping Board to collect payments for the undelivered portion of a tonnage of 1200 tons of pig iron contracted for in 1918. The Shipping Board canceled the contract after the signing of the armistice. Judge Hazel ruled the Board has the right to so cancel. Other actions growing out of similar cancellations have been held pending this decision.

NON-FERROUS METALS

The Week's Prices

Cents Per Pound for Early Delivery

Feb.	Copper New York Straits		Lead		Zinc	
	Lake	Electro	New York	St. Louis	New York	St. Louis
15	12.25	12.00	29.57½	1.10	4.85	4.50
16	12.10	12.87½	30.00	1.10	4.85	4.50
17	12.10	12.87½	30.00	1.10	4.85	4.50
18	12.00	12.75	29.62½	1.10	4.85	4.50
20	12.00	12.75	29.62½	1.10	4.85	4.50

*Refinery quotation

New York

NEW YORK, Feb. 20.

Some of the markets are more active than others, but demand in general is not heavy. The copper market continues to decline on light demand and offerings from dealer. The tin market has been active, but prices have declined. Good business has been done in lead and prices are firm. There has been no improvement in the zinc market except that prices have remained stationary.

Copper.—Consumers are no more interested in purchases of copper now than they have been for the last few weeks, and as a result the market has again declined because of the light demand and because of offerings from dealers and small producers. Electrolytic copper is quoted from 12c. to 12.25c. delivered, or 12.75c. to 13c., refinery, at which levels some business has been done. Most of the large producers will not meet these prices but are comfortably booked, at least for the first quarter. The opinion prevails that the market cannot go much lower because it has probably reached a level at which dealers bought their stocks, but this view may not prove to be true. The Lake copper market is quotably lower in sympathy with the electrolytic.

Tin. The feature of this market has been the sharp break in the London market to-day because of the liquidation on a fairly extended scale of a large Dutch syndicate. It is stated that Banca tin has been offered for shipment from England and Holland at an equivalent of 29c., delivered, New York. As a result of this the spot Straits market to-day is lower at 29.62½c., New York, and the London market is £7 to £8 per ton lower than a week ago, at £114 for spot standard, £146 for future standard and £146 15s. for spot Straits, with sales of 1200 tons of standard tin. Previous to to-day's developments, on Feb. 15, 16 and 17, there were fairly good sales in this market of Straits tin to consumers. On the first of those days about 400 to 500 tons, mostly future shipment, changed hands and on the other two days about 300 tons was sold, mostly to consumers, although dealers were fair purchasers on the last day. Arrivals thus far this month have been 2260 tons, with 7825 tons reported afloat.

Lead.—Very good business is reported to have been done in the last week and several thousand tons were sold to consumers, probably for March delivery, various consuming interests being the buyers. Prices have not changed and the leading interest continues to quote 4.70c., New York and St. Louis, while independents are selling at 4.40c., St. Louis, or 4.70c. to 4.75c., New York and Eastern points.

Zinc.—Fundamental conditions are unchanged and the market is neither active nor weak. Consumers still buy small lots for early delivery to cover immediate light needs and prime Western for February-March delivery is unchanged at 4.50c., St. Louis, or 4.85c., New York, with the market regarded as firm by some sellers and slightly weak by others. Sales below these levels are, however, not heard of and it is significant that this price has been shaded but once in the last four weeks.

Antimony.—The market continues quiet with whole-

sale lots for early delivery quoted at 4.40c., New York, duty paid.

Aluminum.—The leading interest continues to quote virgin metal, 98 to 99 per cent pure, in wholesale lots for early delivery at 19c. to 19.10c., f.o.b. plant, depending on the quantity, with the same grade offered by importers at 17c. to 18c., New York, duty paid.

Chicago

FEB. 20.—All of the metals are exceedingly quiet and weak, further reductions being recorded in copper and tin. We quote in carload lots: Lake copper, 13.25c.; tin, 31c.; lead, 4.50c.; spelter, 4.55c. to 4.60c.; antimony, 6.50c., in less than carload lots. On old metals we quote: Copper wire, crucible shapes and copper clips, 9.50c.; copper bottoms, 7.50c.; red brass, 7.50c.; yellow brass, 6c.; lead pipe, 3.25c.; zinc, 2c.; pewter, No. 1, 22c.; tin foil, 23c.; block tin, 25c.; all buying prices for less than carload lots.

Low Output of Canadian Iron in December

The production of pig iron in Canada during last December declined to the lowest level for the year, according to a recent issue of the *Monetary Times*. The total pig iron made amounted to only 39,917 long tons, all of which was made in blast furnaces. By kinds of iron produced the December output was: Basic, 30,698 tons; foundry, 2,948 tons; and malleable, 6,271 tons. Ferroalloys to the amount of 846 tons were produced. On Dec. 31 there were only two furnaces in blast, although the Dominion had at least five furnaces active throughout the greater part of the year. The average monthly output of pig iron during the 12 months ending December was 50,000 tons, or less than the average monthly record for any year since 1908. Throughout the entire period, during which a total of 595,000 long tons of pig iron were made, the market was decidedly quiet and the suspension of interest in iron was general.

Production of Steel Ingots and Castings

The output of steel ingots and castings for the months of November and December were, respectively, 75,039 tons and 42,653 tons. Of the December output 41,100 tons consisted of basic open-hearth steel ingots, made by the producers for their own further use in manufacturing. A total of 1,551 tons of direct steel castings was made, of which 1,458 tons were produced for direct sale, comprising 657 tons of basic open-hearth castings, 97 tons Bessemer castings, and 704 tons of steel castings from electric furnaces.

The production of steel ingots and castings during the 12 months ending December, 1921, was 667,484 long tons, as compared with 1,109,000 tons made during 1920. Of the total 1921 production, 645,075 tons were in the form of direct steel ingots, comprising 641,882 tons of basic open-hearth steel, 239 tons acid open-hearth steel, 94 tons Bessemer, and 2,860 tons made in electric furnaces.

At the Detroit meeting of the National Safety Congress during the week of Aug. 28 to Sept. 21 the sessions will be held entirely within the new Cass Technical High School, wherein are self-contained foundries, chemical laboratories, steel heating plants, machine shops and complete power machinery equipment, which will provide facilities for all of the sectional meetings.

The Bureau of Supplies and Accounts, Navy Department, Washington, is taking bids until Feb. 21 for 100, 700 lb. of steel plates and I-beams for use at the local navy yard.

The Purchasing Agent, office of the Board of Commissioners, District of Columbia, Washington, is taking bids until March 2 for 17,000 ft. of wire cable for the electrical department.

FERROMANGANESE SUPPLIES

1921 Output Lowest in Ten Years—Available Supplies—Small Production of Spiegeleisen

The sharp decline in pig iron production in 1921 has been paralleled by that of ferromanganese and spiegeleisen. According to the monthly blast furnace returns of THE IRON AGE, the production of ferromanganese last year was the lowest in 10 years. Still more striking was the fall in the output of spiegeleisen, which reached figures lower than any recorded in many years.

From an average in the first quarter of the year of 19,178 gross tons per month, the ferromanganese production declined to only 3758 tons per month in the fourth quarter. The total for the year was only 98,439 tons or 8203 tons per month or about the same as the production in the 5 years 1910 to 1914 of 8280 tons per month. In 1911 the total was 74,482 tons or 6207 tons per month. In 1918 the output was 345,306 tons or 28,775 tons per month, the high average.

Of spiegeleisen only 56,139 tons was made in 1921 which compares with 65,391 tons in 1919. In 1918 the production was 249,002 tons or nearly four times as much.

The following table gives the output of ferromanganese and spiegeleisen for 1921, compared with previous records:

Ferromanganese and Spiegeleisen Output in the United States in Gross Tons

	Ferromanganese	Spiegeleisen	Total	Average Per Month
First quar., 1921, av per mo.	19,178	11,667	30,845	...
Second quar., 1921, av per mo.	5,814	3,311	11,128	...
Third quar., 1921, av per mo.	2,892	1,338	4,230	...
October, 1921	3,902	...	...	...
November, 1921	3,575	...	...	...
December, 1921	3,817	...	...	...
Fourth quar., 1921, av per mo.	3,758	...	3,758	...
Total, 1921	98,439	56,139	154,578	12,881
Total, 1920	782,681	103,118	885,799	73,816
Total, 1919	179,029	65,391	244,420	20,368
Total, 1918	315,306	249,002	564,308	47,025
Total, 1913	119,196	126,081	245,277	20,439
January, 1922	5,614	1,230	6,844	...

For the first time since last July, spiegeleisen was produced in January, this year, and the output of ferromanganese advanced almost 2000 tons over the rate at the end of the year.

Available Supplies

The available supplies of ferromanganese for 1921 and previous years, as obtained from an analysis of the output, imports and exports were as follows:

Ferromanganese Output, Imports and Exports, and Available Supplies, in Gross Tons

	Output	Imports	Exports	Available
Average per month				
1921.....	8,203	759	57	8,901
1920.....	23,557	4,941	288	28,210
1919.....	14,923	2,752	255	17,420
1918.....	28,775	2,264	298	30,741
1917.....	21,486	3,703	*776	25,413
1916.....	17,365	7,577	...	...
1915.....	12,021	4,605	...	...
1913.....	9,958	10,672	...	...
1911.....	6,207	6,688	...	12,895
5-yr. aver (1910-14)				
per month	8,280	8,399	...	...

*First half only.

Available supplies fell in 1921 to only 8901 tons per month or to the lowest figure in many years. This was intensified by the low rate of imports of only 759 tons per month, a figure probably never reached before. Exports have never been a factor of magnitude but they were only one-fifth in 1921 of what they were in 1920.

Manganese Ore Imports

Manganese ore imports last year, while not the lowest in recent years, were down to 33,446 tons per month as compared with 27,779 tons per month in 1919, the lowest since 1913. In the last quarter of last year these imports had fallen to 20,093 tons per month. Im-

ports for the last quarter of 1921 and for the last few years are given in the following table:

Manganese Ore Imports in Gross Tons

	Total	Average Per Month
October, 1921	36,760	.....
November, 1921	8,620	.....
December, 1921	14,900	.....
Fourth quarter, 1921	60,280	20,093
Total, 1921	391,351	33,446
Total, 1920	606,937	50,578
Total, 1919	331,311	27,779
Total, 1918	431,303	40,942
Total, 1917	629,972	52,498
Total, 1916	376,321	31,360
Total, 1915	370,784	30,898
Total, 1913	314,081	26,173

British Supplies and Manganese Ore

The decline in the imports into Great Britain of manganese ore was much more severe last year than in the case of the American imports. The following table shows these imports for various periods and years:

British Imports of Manganese Ore

	Total	Average Per Month
First half, 1921	142,038	23,673
Third quarter, 1921	11,559	4,853
October, 1921	3,161	.....
November, 1921	6,174	.....
December, 1921	6,221	.....
Fourth quarter, 1921	16,359	5,419
Total, 1921	173,856	14,405
Total, 1920	132,613	11,051
Total, 1919	265,800	22,150
Total, 1918	365,606	30,467
Total, 1917	341,264	28,438
Total, 1916	139,509	11,625
Total, 1915	377,324	31,443
Total, 1914	479,137	39,928
Total, 1913	601,177	50,098

These data show that the imports have gradually declined, almost each year since 1913, until for 1921 they are only 14,405 tons per month or about one third of the 1913 receipts. At the end of last year, they had fallen to only 5419 tons per month or about one quarter of the American imports for the same period.

Supplies and Needs in 1921

In the last review of this nature in THE IRON AGE, Nov. 17, 1921, it was estimated that theoretically 147,000 tons of ferromanganese would be needed, if the steel ingot and castings output totalled 21,000,000 tons. Later estimates placed the steel output at 20,000,000 tons, which would require 140,000 tons of ferromanganese. To meet this theoretical need there was 98,439 tons produced and 9059 tons imported which with the exports at 684 tons would leave available 106,814 tons. At the end of last year therefore, there was an apparent deficiency of about 33,000 tons, but heavy supplies carried over from 1920 probably amply cover this apparent deficiency.

More Shipments by River

WHEELING, Feb. 20.—Use of the inland waterways in the shipment of steel products as a means of offsetting the advantage of freight which Middle Western mills now have on business in the South and Southwest, is extending. The Wheeling Steel Products Co., the sales subsidiary of the Wheeling Steel Corporation, last week made a shipment of 1600 tons of steel pipe from the tube works at Benwood, W. Va. This is understood to be the first step toward the establishment of a regular river transportation service by the company. It has been found that water shipments take little, if any, more time than rail freight deliveries and the cost is considerably less.

The Barrio Metals Corporation, New York, will commence at once the installation of a new alloy melting department including the installation of four electric melting furnaces. The contract for the complete melting department has been awarded to F. J. Ryan & Co., industrial furnace engineers, Wesley Building, Philadelphia.

BOOK REVIEWS

Hardware Buying Directory. Pages 722, 7 x 10½ in. Published by Hardware Age, 239 West Thirty-ninth Street, New York.

Hardware Buyers Directory is a substantially bound reference book which is designed to acquaint the wholesale and retail hardware dealers with the names, addresses and trade names of manufacturers of products in the hardware and allied lines. The January issue contains about 2500 headings of products under which are listed approximately 35,000 names, addresses and trade names.

Many manufacturers show illustrated and descriptive data of their products, which in connection with the listings enhance the value of the directory as a reference book. Distribution is made quarterly to 40,000 wholesale and retail hardware dealers in the United States, Canada and to foreign countries where English is the commercial language.

Mineral Land Surveying.—By James Underhill, mining engineer, U. S. Mineral Surveyor for Colorado. Pages 237, 5½ by 7¾. Published by John Wiley & Sons, Inc., New York.

This is the third edition, and several additions have been made, especially in the treatment of the direct solar observation. The specimen field notes, to illustrate the requirements of the office of the United States Surveyor General for Colorado, have been entirely rewritten, a different group of claims being used, and they represent the practice at the present time in the survey of mineral lines in the Western portion of the United States.

Mechanical World Year Book for 1922. Reference book; thirty fifth year of publication. Published by Emmott & Co., Ltd., 65 King Street, Manchester, England. Size, 4 x 6 in., with 348 pages of text, 267 pages to a buyers' directory and 54 pages for diary and memoranda. Price, 2s. 6d.

Conventional engineers reference book, giving considerable space to power plant equipment, including steam, oil and gas engines, boilers, condensers, turbines and other apparatus. Several pages are devoted to the properties of metals and alloys and also to structural iron and steel work. A comparatively large section is given to toothed gearing and several pages to grinding, screw cutting, indexing on the universal milling machine, limit gages and allied subjects. Space is also devoted to ball and roller bearings, friction and lubrication, hydraulic work, and the heating and evaporating of liquids. A section on pipes and tubes contains a concise collection of data on pipes of cast iron, wrought iron, steel and copper, with many tables of dimensions and details of tees, bends, etc.

The volume includes many useful mathematical and other tables. The subject classifications in the buyers' directory are given in English, French, Spanish and Russian.

The Ship Compendium and Year Book 1922. published by Compendiums, Ltd., 18 Old Compton Street, London, W. 1, England, is a volume of 1008 pages claimed to be the first international reference book on ship construction, equipment, ownership and maintenance. It supplies in 800 sections the names and addresses of 30,000 firms whose interests are germane to ships and shipping. Book is published at £2 9s. 6d., post free for foreign delivery.

New Books Received

Mineral Resources of the United States, 1918. Part I., Metals, G. F. Loughlin, geologist in charge; Part II., Nonmetals, R. W. Stone, geologist in charge. Pages vol. I., 1096; vol. II., 1557, 9 x 5½ in. Published by Government Printing Office, Washington.

Burning Liquid Fuel. By William Newton Best. Pages 341, 9 x 6 in.; illustrations 316. Published by U. P. C. Book Co., 243 West Thirty-ninth Street, New York. Price \$5.

NEW TRADE PUBLICATIONS

Oil Burners.—Denver Fire Clay Co., Denver, Col. A 32-page booklet covering the advantages and operation of oil burners, composition and heating value of various brands of oils, their viscosity, specific gravity and other information, accompanied by tables and charts. The process of oil combustion in the burner is explained and illustrated with drawings. Sectional drawings show oil burners applied to various types of boilers and forges. There is also an illustrated page of refractories manufactured by this company.

Grinding Machines.—Cincinnati Grinder Co., Cincinnati. Booklet illustrating automotive parts grinding machine and power feed and hand feed machines, together with type of work. Illustrations of sections and parts are accompanied by brief descriptions.

Steel Tanks.—Ferguson-Allan Co., 504 Bailey Avenue, Buffalo. Bulletin No. 101, dealing with oil and gasoline storage tanks. Lane drawings and tables of dimensions, weights and capacities of tanks are included and drawings of compartment truck and wagon tanks and steel dump bodies.

Stokers. Under-Feed Stoker Co. of America, Book Building, Detroit. Bulletin describing the Jones standard side-dump stoker, a new type. Construction, capacity, automatic air and fuel control and mechanical features are covered with numerous illustrations.

Crawl Tread Crane.—Industrial Works, Bay City, Mich. Catalog No. 113 illustrating type RC crawling tractor crane of 20,000 lb. capacity, designed for road contractors, lumber and coal dealers, foundries and railroad reclamation and storage yards.

Milling on Locomotive Repairs.—Cincinnati Milling Machine Co., Cincinnati. Booklet of 32 pages, compiled to prove to railroad shops the economy of milling their parts. Line drawings show many of the parts which may be milled and there is a listing of 49 parts which come into a railroad repair shop that should be milled.

Industrial Plant Construction.—W. W. Lindsay & Co., Inc., Harrison Building, Philadelphia. Booklet containing views of industrial plants built by the company.

Machine Tools.—Triplex Machine Tool Corporation, 18 East Forty-first Street, New York. Catalog No. 1 describes this company's bench machine, adaptable to turning and boring, angular and vertical milling, thread cutting and drilling.

Waterproofing.—Truscon Laboratories, Detroit. A 32-page booklet dealing with the "Science and Practice of Integral Waterproofing." Specifications are given for waterproofing mass concrete, general masonry by using the cement plaster coat method and waterproofing cement stucco. A section covers the application of the cement plaster coat.

Testing.—Dorr Co., engineer, 101 Park Avenue, New York. Illustrated booklet describing company's plant at Westport, Conn., and methods in handling a test or analysis and the scope of this work are explained.

Fire Alarms.—United States Automatic Fire Alarm Co., Kansas City, Mo. A 32-page booklet of automatic fire alarms illustrating circuit panels, transmitters, circuit breakers, thermostats, punch registers, generators, etc.

The monthly stock list of Joseph T. Ryerson & Son, Sixteenth and Rockwell streets, Chicago, has been enlarged from 64 to 128 pages with the January-February issue and will hereafter bear the title "Ryerson Journal and Stock List." Besides the usual stock list the machine tools handled by the company are illustrated and there are several brief articles and news notes.

The Wetmore Reamer Co., 62-66 Twenty-seventh Street, Milwaukee, recently consolidated with the Wisconsin Tool & Supply Co., 210 Second Street, has increased its working schedules and force and is now operating at approximately 95 per cent of capacity on orders for reamers, gages, tools, dies and fixtures. New business is developing on a broader scale, especially in the East and in automotive centers, according to E. J. Waltzer, president and general manager.

A reduction of 10 per cent in wages for all employees has been approved by the employees of the Commonwealth Steel Co., Granite City, Ill. The Commonwealth company has been paying more than the union scale. Under the reduction molders will receive 90c. an hour as against the union scale of 75c. an hour, and laborers 35c. an hour, as against the union scale of 40c.

First Sectional Meeting of the American Society for Steel Treating

The first sectional meeting of the American Society for Steel Treating will be held at the Hotel McAlpin, New York, on Friday, March 3. The program is as follows:

- 11:00 a.m. to
- 1:30 p.m.—Registration.
- 1:30 p.m.—Address of welcome.
- 2:00 p.m. to
- 4:30 p.m.—Technical session. Chairman, George L. Norris, chairman New York Chapter; vice-chairman, Irving H. Cowdrey, chairman Boston Chapter.
- "Cold Headed Bolts—Their Metallography and Heat Treatment" (illustrated), by V. E. Hillman, metallurgist Crompton & Knowles Loom Works, Worcester, Mass.
- "New Developments on the Influence of Mass in Heat Treatment," by E. J. Janitzky, metallurgist Illinois Steel Co., South Chicago.
- "The Magnetic Testing of Small Case Hardened Chain" (An actual demonstration of the process and results of the testing will be given by the author), by A. V. DeForest, metallurgist American Chain Co., Bridgeport, Conn.
- "Stainless Steel in Cutlery Use" (illustrated), by R. G. Hall, research engineer R. Wallace & Sons Mfg. Co., Wallingford, Conn.
- "Callite—A New Heat-Resisting Alloy" (illustrated), by G. R. Brophy, metallurgist research laboratory General Electric Co., Schenectady, N. Y.
- 6:00 p.m. to
- 7:30 p.m.—Informal dinner, Yates' Restaurant, Forty-third Street, near Broadway.
- 8:00 p.m. to
- 10:00 p.m.—Technical session. Chairman, A. W. F. Green, chairman Philadelphia Chapter. Presentation of certificate of honorary membership to Dr. John A. Mathews.
- "Perfecting a Drop Forging" (illustrated), by J. H. G. Williams, assistant works manager Billings & Spencer Co., Hartford, Conn.
- "The Manufacture of Steel" (illustrated), by B. H. DeLong, metallurgist Carpenter Steel Co., Reading, Pa.

Nearly all of the technical papers in this program have been published in the February *Transactions* of the society and both members and non-members are urgently requested to participate in the discussions. This sectional meeting will serve the membership of 14 of the Eastern and New England chapters of the society and any one, interested in the art of steel treating but not members of the society, is cordially invited to attend.

The second sectional meeting will be held at Pittsburgh in the Bureau of Mines auditorium, May 25 and 26.

The annual exposition and convention of the national organization will be held in the General Motors Building, Detroit, Oct. 2 to 7 instead of in September as originally planned.

Meeting of Electric Steel Founders' Research Group

Officers and operating representatives of the Electric Steel Founders' Research Group held their last regular meeting in Milwaukee on Feb. 6, 7 and 8. This group was formed about two years ago for the systematic prosecution of co-operative technical work which could be directly applied in improving the manufacture of steel castings.

The idea back of this co-operation originated from the realization that the technical experts who are usually found directing the operating departments of steel foundries are prevented by routine work from concentrating on the investigations. These could be prosecuted more effectively if they would engage the exclusive attention of one individual and if he would co-ordinate the technical activities of a few plants whose processes and products place the companies in the same class.

The members of the group are the Electric Steel

Co., Chicago; the Ft. Pitt Steel Casting Co., McKeesport, Pa.; the Lebanon Steel Foundry, Lebanon, Pa.; the Michigan Steel Casting Co., Detroit, and the Sivyer Steel Casting Co., Milwaukee. The group's headquarters are at 639 Diversey Parkway, Chicago, where Major R. A. Bull, research director of the organization, maintains his office.

At the Milwaukee meeting reports were made by the operating heads of plants on comprehensive investigations into important foundry problems that had been delegated by the group to the several companies. It is stated that much progress is being made through these group investigations and that prospects for future accomplishments are most encouraging. The group researches which were reported in detail at the Milwaukee meeting included those on the subjects of annealing, core practice, facing sands, furnace practice and pouring practice.

An inspection was made by all members of the group of the processes employed at the plant of the Sivyer Steel Casting Co.

Roberts Coke Oven Discussed

The Roberts coke oven was the subject of a paper presented at Pittsburgh before the Eastern States Blast Furnace and Coke Oven Association at the William Penn Hotel on the evening of Feb. 16, by M. W. Ditto, consulting engineer of the American Coke & Chemical Co., Chicago. Mr. Ditto covered construction features and also the experience with the use of the coke in the blast furnace of the National Enameling & Stamping Co. at Granite City, Ill. The coke plant comprises 80 Roberts recuperative by-product coke ovens in two batteries built by the St. Louis Coke & Chemical Co., a subsidiary of the American company.

About ninety members and guests were present. A dinner preceded the technical session and seated with President West of the association and with Mr. Ditto was C. A. Meissner, as guest of honor, of the United States Steel Corporation.

The twenty-fifth annual convention of the American Mining Congress will be held in Cleveland, Oct. 9 to 14. The National Exposition of Mines and Mining Equipment, which attracted attention at the annual meeting in Chicago last fall, will again be a feature of this industrial gathering. The exposition will be staged in the Public Hall in Cleveland—a modern convention building recently completed by the city.

COMING MEETINGS

February

American Association of Engineers. Feb. 22. Congress Hotel, Chicago. Secretary C. E. Drayer, 63 West Adams Street, Chicago.

March

American Society for Steel Treating. March 3. Sectional meeting, Hotel McAlpin, New York. Secretary, W. H. Biscumman, 4600 Prospect Avenue, Cleveland.

Refractories Manufacturers' Association. March 15, 16 and 17. Annual meeting, Chicago. Secretary, F. W. Donahoe.

April

National Metal Trades Association. April 19 and 20. Annual meeting, Hotel Astor, New York. Secretary, Louis W. Fischer, Peoples Gas Building, Chicago.

American Supply and Machinery Manufacturers' Association and Southern Supply & Machinery Dealers' Association. Joint Meeting. April 24 to 26, Birmingham. F. D. Mitchell, 233 Broadway, New York, is secretary of the American association and A. M. Smith, Smith-Courtney Co., Richmond, Va., is secretary of the Southern association.

Society of Industrial Engineers. April 26 to 28. Spring meeting, Hotel Statler, Detroit. George C. Dent, business manager, 327 S. La Salle Street, Chicago.

American Electrochemical Society. April 27 to 29. Spring meeting, Baltimore. Acting secretary, Dr. Colin G. Fink, 110 Park Avenue, New York.

Trade Changes

Coto Bros. Mfg. Corporation, maker of the "Simplicity" refillable fuse with general offices at 1125 First National Bank Building, Chicago, has established branch offices during the past month in New York, Philadelphia, Boston, San Francisco, Cleveland, Tampa and Denver.

The Eclipse Stove Co., Mansfield, Ohio, has changed its name to the Tappen Stove Co. The new name was adopted owing to the fact that members of the Tappen family have been permanently identified with the Eclipse Stove Co. during the 10 years that it has been in existence.

The Carey-Hampton Co., Chicago, will remove its business to Chelsea, Mich., occupying the No. 8 plant, power plant and foundry of the Lewis Spring & Ash Co. This property will be purchased from F. H. Lewis.

George W. Cravens, formerly of Westfield, N. J., has been elected president of the Climax Engineering Co., Clinton, Iowa, a subsidiary of the Dulany Trust. G. W. Dulany, Jr., has been president of the Dulany Trust since its organization in 1915 and also chairman of the board of trustees of the trust. The business of the Climax Engineering Co. has grown to such a degree that the presence of a president who could give more time than Mr. Dulany could give, hence the election of Mr. Cravens. Mr. Dulany was re-elected president of the board of trustees, C. B. Stebbins was re-elected vice president, Mr. R. D. Upton, re-elected treasurer, and Mr. J. M. Thompson was re-elected secretary. Mr. Cravens, the new president, was for many years with the General Electric Co.

Oliver Machinery Co., Grand Rapids, Mich., has established a new branch office at 716 Lincoln Bank Building, Minneapolis. **George C. Rainer**, who has had extended experience in the sales department, will be in charge.

McMullen Machinery Co., 64-66 Tonia Avenue, Grand Rapids, Mich., has been appointed exclusive representative by the Diamond Tool & Mfg. Co. Inc., 91-97 Runyon Street, Newark, N. J., in connection with the sale of Diamond standard punch and die sets in the territory covered by all of the northern peninsula of Michigan and the southern peninsula of Michigan west of the counties of Bay, Saginaw, Shiawassee, Ionia, Jackson and Hillsdale.

The Wackoff Driven Steel Co., Brick Building, Pittsburgh, announces the appointment of the recently organized Crane-Schraeder Steel Co., with general offices and warehouse at 6149 Greenwood Avenue, Detroit, as its exclusive sales representative and distributor in the Michigan territory.

The Andrews rust proofing process used extensively during the war by the British Government is now available to manufacturers for forming an ebony rust proofed finish on ferrous metals. It is claimed that this rust proofing process has stood the Government "salt spray" test with 100 per cent success. The Surface Combustion Co., Inc., industrial furnace engineer and manufacturer, 366-368 Gerard Avenue, Bronx, New York, has secured the exclusive license for exploiting this process in this country and foreign countries.

The Hesse-Martin Iron Works and the Ersted Machinery Mfg. Co., Portland, Ore., have been consolidated under the name of the Hesse-Ersted Iron Works Co., with \$150,000 capital stock. The merged company will operate at the Hesse-Martin plant, 468 East Taylor Street, which will be enlarged and improved. The incorporators of the new company are Fred Hesse, A. J. Ersted and A. M. Mears.

The Reeves Pulley Co., Columbus, Ind., has appointed the Dodge Sales Engineering Co., Mishawaka, Ind., general sales agent for the "Reeves" variable speed transmission at the Dodge branches in Pittsburgh, Cincinnati, Atlanta, Minneapolis and Chicago.

Effective March 1, the name of the Medart Patent Pulley Co., St. Louis, will be changed to the Medart Co.

The Commercial Shearing & Stamping Co., Youngstown, Ohio, has moved its general offices to new quarters in connection with its plant in the Logan Avenue district, Youngstown.

The Argo Iron & Metal Co., Chicago, has moved its scrap iron and metal yards to 1640-52 Elston Avenue, where it is located on a siding of the Chicago & Northwestern Railroad.

The Chicago office of the **Matthew Addy Co.**, pig iron brokers, will be moved from the McCormick Building to 1901 People's Gas Building, effective May 1.

The Max Ams Machine Co., New York, expects to state that it will not open the Rochester office at this time, as stated in a previous announcement.

Plans of New Companies

The Efficient Electrical Display Co., Inc., 26 Court St., Brooklyn, is in the market for factory equipment to increase its output to 100 good sized signs per month. In about five or six weeks, it will be in the market for 15,000 two-piece sign receptacles and also 20,000 ft. of No. 14 rubber covered wire. The only contract awarded thus far has been for the alterations of a building purchased for the manufacture of signs.

Sundh Engineering & Machine Co., Philadelphia, manufacturer of finishing machinery for brass, copper and steel strip mills, has closed its branch office at Eleventh Avenue and Twenty-sixth Street, New York and opened a Philadelphia downtown office in the Otis Bldg., Sixteenth and Sansom Streets.

East Chicago Mfg. Co., East Chicago, Ind., expects to do some of its work by contract and some in its own plant. It is not yet ready to name the material which it will manufacture.

The Detroit Marine-Aero Engine Co., 4196 Bellevue Avenue, Detroit, has completed the construction of a steel and corrugated iron building containing 12,500 square feet.

The Beaver Enameling Co., Ellwood City, Pa., has taken over the business of the Crichton Curl Enameling Co. It does not intend to build and is not in the market for equipment.

The Hackney Iron & Steel Co., Enid, Okla., is putting in a stock of reinforcing bars, structural steel and is doing some fabricating. It also has a foundry which is in operation.

G. B. Wickersham, secretary-treasurer of the Muncie Steel Supply Co., has organized **G. B. Wickersham & Co.**, Keenan Building, Pittsburgh, to handle scrap and conduct a general business as auctioneers, appraisers and liquidators. The firm expects to open a yard equipped for economical handling of scrap. Mr. Wickersham retains his interest in the position with the Muncie Steel Supply Co.

Bayonne Steel Products Co. is located at 216-218 Jelliff Avenue, Newark, N. J. This is only temporary quarters, as the company intends to build a fine warehouse in Newark the coming spring or early summer.

L. T. Petersen, former vice-president and general manager of the Republic Rubber Corp., Youngstown, Ohio, is engaged in the organization of a company to manufacture a new type of conveyor belting. The belting has been patented by Mr. Petersen and is claimed to be especially adaptable for use in conveying ore, limestone, coke, metal, grain and other heavy materials.

Schraeder, Gocher & Co. Organized

G. A. R. Schraeder, formerly a partner with J. W. Sanders Co., New York, and **Donald Gocher**, formerly with sales department of Certain-teed Products Corporation's Philadelphia office, have formed a sales organization as **Schraeder, Gocher & Co.**, 1218 Chestnut Street, Philadelphia, which has assumed the management of the sales department of the Bridesburg Foundry & Engineering Co., Inc., Frankford, Philadelphia, founder of brass, bronze and aluminum castings, both rough and machined.

This company is also selling the product of **Atlas Foundry Co.**, Livingston, N. J., cast-iron welding rods and miscellaneous iron castings. In conjunction with the J. W. Sanders Co., New York, also manufacturers' representative, this company is covering the Philadelphia territory for the **Crosby Co.**, Buffalo, sheet metal stampings; **Elliott-Blair Steel Co.**, New Castle, Pa., manufacturer of fine cold-rolled strip steel, and the **Lakeside Forge Co.**, Erie, Pa., on miscellaneous drop forgings and wrenches.

The Amalgamated Metals Selling Co., Ltd., 42 Broadway, New York, has been appointed sole representative in the United States of the **Erfstwerke A. G.**, Grevenbroich, Cologne, Germany. This company is known as the largest and most important producer of virgin aluminum in Germany.

The Interstate Commerce Commission opened a hearing on an application for revised rates on scrap iron and steel at Washington on Feb. 20. The contention is that scrap rates are too high, especially when pig iron rates are used as a standard for comparison.

IRON AND INDUSTRIAL STOCKS

Better Demand for Steel and Equipment Issues During the Past Week

Under the leadership of such issues as United States Steel common and the locomotive shares, there was a better demand and generally higher prices for steel and equipment securities. The buying possibly is based on the greater activity in buying of railroad equipment and in steel mills. Investors in a great many instances, however, are satisfied with developments dealing with the bonus question, and the accompanying higher prices for war bonds. The recovery in sterling exchange is another constructive feature that has encouraged renewed buying of domestic industrial securities. Higher prices quoted for pipe securities reflect better buying of that product.

The range of prices on active iron and industrial stocks from Monday of last week to Monday of this week was as follows:

Allis-Chal. com. 44 - 45 1/2	Int. Har. pf. 105 1/2 - 106 1/2
Allis-Chal. pf. 92 - 93	Lack. Steel 46 1/2 - 48 1/2
Am. Can. com. 37 1/2 - 40 1/2	Armstrong Steel 29 1/2 - 30 1/2
Am. Can. pf. 96 1/2 - 99	Nat. Acme 10 1/2 - 11
Am. C. & P. com. 145 1/2 - 149	Nat. E. & S. com. 49 1/2 - 53 1/2
Am. C. & P. pf. 119 1/2 - 123	N. Y. Air Brake 59 - 59 1/2
Am. Loco. com. 106 1/2 - 110 1/2	Nova Scotia Steel 21 1/2 - 23
Am. Loco. pf. 114 1/2 - 117 1/2	Press. Steel com. 63 1/2 - 65 1/2
Am. Rad. com. 83 1/2 - 89 1/2	Press. Steel pf. 21 - 22
Am. Rad. pf. 32 - 32 1/2	Ry. S. Spg. com. 95 1/2 - 98
Bald. Loco. com. 102 1/2 - 106	Ry. S. Spg. pf. 113 1/2 - 114 1/2
Bald. Loco. pf. 106 - 107 1/2	Republic Steel 51 1/2 - 53 1/2
Beth. Steel com. 88 1/2 - 90	Republic pf. 82 - 84
Beth. Steel. Cl. B 62 1/2 - 65 1/2	Sloss com. 39 1/2 - 41
Beth. Steel. 8 1/2 pf. 106 1/2 - 107 1/2	Un. Alloy Steel 26 1/2 - 27
Chic. Pneu. Tool. 65 1/2 - 67	U. S. Pipe com. 24 1/2 - 26 1/2
Colorado Fuel 26 1/2 - 27	U. S. Pipe pf. 60 - 63 1/2
Cruc. Steel com. 60 1/2 - 62 1/2	U. S. Steel com. 88 1/2 - 91 1/2
Cruc. Steel pf. 81 - 82	U. S. Steel pf. 116 1/2 - 118 1/2
Gen. Electric 146 - 151	Vanadium Steel 34 - 35 1/2
Gt. No. Ore Cert. 34 1/2 - 35 1/2	Va. I. C. & C. 50 - 55
Gulf States Steel 72 1/2 - 76 1/2	Westhouse Elec. 52 1/2 - 55
Int. Har. com. 84 1/2 - 85 1/2	

Annual Financial Statements

The report of the Thomas Iron Co., Hokendauqua, Pa., for 1921 shows a net loss for the year of \$69,536.50, this including the operation of its subsidiary, the Ironton Railroad Co. At the close of last year the inventories of pig iron and iron ore were marked down \$89,714.18 to present-day values. The company's total production of iron in 1921 was only 18,169 tons.

Earnings of the Pressed Steel Car Co. for 1921 were much lower than in the previous year. Last year's surplus totalled \$681,906, compared with a surplus of \$2,531,305 at the close of business in 1920. The 1921 earnings provide for \$5.45 a share on \$12,500,000 preferred stock, as compared with a 1920 surplus which not only took care of the preferred stock dividend but left \$13.25 a share for the common stock.

The Baldwin Locomotive Works earned net profits in 1921 amounting to \$5,044,096, equivalent, after payment of preferred dividends, to \$18.22 a share on the \$20,000,000 common stock, as compared with net profits of \$4,428,518, or \$15.14 a share, on the same amount of common stock in 1920.

Earnings of the Albia-Chalmers Mfg. Co. for 1921 show a net profit of \$2,215,467, equal to \$4.11 a share on the common stock after deducting preferred dividends. The 1920 net profits were \$3,564,248, or \$9.35 a share on the common stock.

The annual report of the American Can Co. for the year ended Dec. 31, 1921, shows net earnings of \$7,020,261, as compared with \$9,851,876 in the previous year. The surplus after preferred dividends of \$1,141,530 compares with \$1,944,587 in 1920.

The Continental Can Co., Inc., for 1921, reports a surplus after depreciation and federal taxes of \$811,004, equivalent after preferred dividends to \$3.75 a share on the outstanding \$13,500,000 common stock. In 1920 the company showed a surplus of \$1,548,620, or \$9.19 a share.

A special stockholders' meeting of the Walworth Mfg. Co., Boston, wrenches, fittings, etc., has been called for Feb. 27 to act on a proposed \$7,500,000 bond issue. The purpose of the proposed issue is to raise funds to retire outstanding bonded indebtedness and to provide additional working capital.

Stockholders of the Saco-Lowell Shops, Boston, textile machinery, have ratified the proposed increase of \$1,762,500 in the common stock for the purpose of paying a 50 per cent stock dividend to common shareholders.

The Truscon Steel Co. last year, after charges, depreciation and dividends, showed a loss of \$338,000. The company wrote off \$380,000 on its inventory and plant depreciation. At the annual meeting President Kahn stated that business in January and so far in February was 30 per cent ahead of that for the corresponding period last year.

The Truscon Steel Co., Youngstown, Ohio, has declared the regular quarterly preferred dividend of \$1.75 per share, payable March 1 to stockholders of record Feb. 18.

The Composite Metal Lath Co., Hobart, Ind., has been declared bankrupt. The liabilities of the company are listed at \$117,119, while the assets are placed at \$16,448.

The Fred Medar Mfg. Co. has increased its capital stock from \$150,000 to \$750,000, of which 58 3/10 per cent is paid. The company has assets of \$1,053,936.21 and liabilities of \$380,962.41.

Study of Income Tax Returns

Washington, Feb. 21.—Statistical study of the economic data compiled from the returns of the net income of individuals, corporations and partnerships, for the calendar year ended Dec. 31, 1919, by the office of the Commission of Internal Revenue, reported to the Secretary of Treasury, was made public yesterday and reveals the large portion of total taxes paid by manufacturers of metal and metal products, including iron and steel makers and allied lines.

The figures also reveal, through deficits reported, the general slump in business for that year. The number of corporation income tax returns for 1919, other than those of personal service corporations, was 320,198, of which 209,634 reported net incomes amounting to \$9,411,418,458; income tax, \$743,535,888; war profits and excess profits taxes, \$1,431,805,690, making the total taxes \$2,175,341,578. For the calendar year 1918, the number was 317,579 of which 202,061 reported net income of \$8,361,511,249, and taxes aggregating \$3,158,764,422.

The number of individuals who filed income tax returns for 1919 amounted to 5,332,760. The total amount of net revenue reported by these returns was \$19,859,491,448, and the normal tax and surtax amounted to \$1,269,630,104. As compared with 1919, these figures show a growth of 907,646, in the number of returns filed, and an increase in the total net income reported amounting to \$3,934,852,093. Likewise, an increase of \$141,908,269 is noted in the total tax.

The total number of producers of metal and metal products reporting in 1919 was 13,118, of which 9,689, or 73.86 per cent, reported net incomes amounting to \$1,789,212,574. The gross income was \$12,616,661,680, and the total deductions aggregated \$10,827,449,106. The total number of corporations reporting was 67,852, of which 51,903, or 76.49 per cent, reported net income amounting to \$5,219,334,985. The gross income of all the manufacturing interests was \$45,704,873,968, with total deductions aggregating \$40,485,528,983.

It will be seen that the net income of producers of metal and metal products for the year was 30 per cent of the total for all manufacturers. The income tax paid by makers of metal and metal products was \$142,561,320, and the war profits and excess profits taxes \$314,690,473, making a total tax of \$457,251,793, which constituted 21.02 per cent of the distribution of the total taxes paid by all industrial groups, or 25.55 per cent of the total tax compared with the net income. The income tax paid by all manufacturing interests was \$414,891,763, and the war profits and excess profits tax aggregated \$944,306,603, making a total tax of \$1,359,198,366, or 62.48 per cent of the distribution of the total taxes paid by all industrial groups, or 26.04 per cent of the total tax as compared with the net income.

There were 3,429 producers of metal and metal products who reported deficits in 1919. This represented 26.14 per cent of the total number of producers of metal and metal products. The deficit reported aggregated \$119,834,070. The gross income of these manufacturers was \$897,478,703, while total deductions were \$1,017,312,773. The total number of manufacturers reporting deficits was 15,949, or 23.51 per

cent of all manufacturers. The aggregate deficit was \$266,745,733. Their gross income was \$6,548,702,815, while their total deductions amounted to \$6,951,448,548.

Showing the distribution of corporation income by industrial groups and by nature of deductions, the study of the Commissioner reports that including both those reporting net income and those reporting no net income, the total gross income of the 13,118 producers of metal and metal products was \$13,514,140,383. This cost of goods was \$9,044,525,883. The compensation of officers was \$293,724,391, the interest paid being \$122,444,338, while the domestic tax was \$126,560,917; exhaustion, amortization and depletion, \$334,825,764; miscellaneous expenses, \$2,012,677,586; total deductions, \$11,844,761,879; net income before deducting \$1,669,378,504, while the net income after deducting the taxes was \$1,212,126,711. The cost of goods or producers of metal and metal products was 66.93 per cent of the total gross income; the compensation of officers

1.51 per cent; interest paid 0.91 per cent; domestic tax, 0.94 per cent; exhaustion, amortization and depletion 2.48; miscellaneous expenses 14.88; total deductions 87.65; net income before deducting taxes 12.35; income tax, war profits and excess profits taxes, 3.38, and net income after deducting taxes 8.97.

The table shows that the net income of manufacturers of metal and metal products was 17.65 per cent of the invested capital of those paying taxes, while the total taxes was 25.55 per cent of the net income.

The 373 metal mining interests making returns in 1919 reported an invested capital of \$443,920,533, with a net income of \$72,192,392, on which an income tax of \$6,469,539 was paid, while the war profits and excess profit taxes amounted to \$2,690,155, making a total tax of \$9,159,694. Their total tax was 16.26 per cent of the invested capital and 12.69 per cent of the total net income.

UNEMPLOYMENT

Study Suggested by President's Conference— Kenyon Bills Have Rough Skidding

WASHINGTON, Feb. 21.—Study of the fundamentals of unemployment, and especially the methods for controlling the business cycle, was begun yesterday at a meeting at the Department of Commerce. A tentative plan drawn by Dr. Wesley C. Mitchell, of the National Bureau of Economic Research, was presented and a discussion of the subject was made. The meeting was addressed by Secretary of Commerce Hoover. Owen D. Young is chairman of the committee which has charge of the study. The meeting was inaugurated under the President's recent conference on unemployment, and its purpose is to illuminate the subject of cyclical unemployment.

Secretary Hoover is of the opinion that more information is necessary before the problem is solved, and indicated that until a more thorough understanding of the question is obtained, legislation on the subject is not timely. Because of this, the Administration is not disappointed at the failure of the Senate to pass the bill prepared and introduced by Senator Kenyon of Iowa to press public works during times of depression and to retard them during periods of industrial activity. After a two-day discussion, the bill was referred by the Senate last Thursday to the Committee on Education and Labor. This is considered to be equivalent to killing the measure for this season, at least.

Senators attacked the bill on the ground that it would give too much power to executive officials of the Government who would be empowered by the measure to control employment on public works by the method suggested.

Senator Sterling, of South Dakota, declared the bill was paternalistic in spirit and was supported by "big business." Senator Kenyon asserted that he had presented the bill chiefly in the interest of labor and that it had the endorsement of the American Federation of Labor, the Chamber of Commerce of the United States, and other organizations, and contended that it was a concrete result of the conference on unemployment and embodied principles recommended. In this connection, however, members of the conference feel that more information on the subject is necessary.

Senator Kenyon's bill to control the coal mining industry, details of which were explained in THE IRON AGE of Feb. 2, was also introduced last week and appears to have little support either in Congress or in Administration circles. Its passage at the present session, at least, does not appear at all likely. It had been hoped by Senator Kenyon, who has resigned from the Senate, effective Feb. 24, to become a judge of the United States Circuit Court, that the bill could be passed in time to set up the proposed coal mining board, so that the latter would be functioning, in an effort to prevent the threatened coal strike set for April 1.

To Prevent Jurisdictional Strikes

WASHINGTON, Feb. 21.—The Associated General Contractors of America, the American Institute of Architects, the Engineering Council, the National Building Trades Employers' Association, and the Building Trades Department of the American Federation of Labor through the National Board for Jurisdictional Awards which has just concluded its regular quarterly meeting in Washington, have reached a national agreement through a resolution heavily penalizing union workmen who refuse to abide by the decisions of the board.

The resolution provides that local building trades councils of union labor shall suspend unions and refuse to recognize or support those unions which refuse to abide by decisions of the National Board; it also provides that general contractors and sub-contractors who employ only union labor shall incorporate in their agreements with labor a provision that will secure compliance with all the decisions of the board and that they shall refuse employment to members of local unions which do not abide by such decisions and further that architects and engineers shall insert in all their specifications and contracts a clause that such decisions shall be followed.

This resolution is of far reaching consequence to settle those jurisdictional disputes, which have caused many strikes, with resulting delays and economic losses.

Flurry in Coal and Coke Markets

UNIONTOWN, PA., Feb. 20.—A flurry in both the coal and coke markets has been evident in the Connellsville region this week. This is attributable, in a measure, to the threatened strike in the union fields on April 1. Most observers, however, believe they see in the present situation an improvement which will be sustained and improved from month to month.

Several deals for furnace coke were closed this week for March requirements at \$3.25. A number of coal sales covering March requirements also have been made during the week. The Pittsburgh and Lake Erie Railroad has bought considerable coal during the week.

Frick Coke Co. operations in both coal and coke were strengthened this week.

Harry I. Worman, superintendent of motive power of the St. Louis & San Francisco Railroad, Springfield, Mo., has announced that the shops there will be leased to contractors and operated on a piece-work basis if the car workers reject the proposal to return to the piece-work basis.

A. E. Crockett, manager of the Bureau of Instruction of Jones & Laughlin Steel Co., Pittsburgh, gave an illustrated lecture on the manufacture of steel before the members of the Rotary Club of St. Louis on Feb. 16.

Machinery Markets and News of the Works

LULL IN INQUIRIES AND SALES

Market Spotty and Orders for Most Part Are for Single Tools

Otis Elevator Co. Issues List for Nine Machines and a Textile Interest a List for Ten

A lull in inquiry and sales is reported quite generally. In view of the hopes aroused by events of December and January, business so far this month has been disappointing. Orders are for the most part for single tools and competition is keen on each inquiry that appears. There is a fair degree of interest shown in used tools and in this connection it is reported from Cincinnati that used machines are coming into the market freely and at extremely low prices. A Massachusetts textile interest came into the market during the week with a list of 10 tools and miscellaneous equipment.

The Otis Elevator Co. has issued a list calling for four lathes of 14, 18 and 24-in. size; two drilling machines; two double-end grinders, and one cold cut-off saw.

Except for a revival of an old list of the Sewell Valley Railroad involving a 36-in. planer, a 250-ton wheel press, a 1200-ton steam drop hammer and a universal milling machine, no railroad inquiries have ap-

peared nor has any action been taken on pending lists.

During the week the Hammond, Ind., Board of Education awarded the list of tools reported last week to a local dealer in Chicago. The Kelly Valve Co., Muskegon, Mich., placed an order in the Chicago district for four No. 2 turret lathes and miscellaneous equipment. Part of the list recently issued by the H. B. Smith Co., Westfield, Mass., and involving a fairly heavy equipment, has been placed with a Worcester machine-tool builder.

Machine-tool builders in other districts are taking a hopeful view of the future. Although still far from active, machine shops in New England are showing more signs of life. Makers of road machinery are beginning to secure substantial orders and in the Pittsburgh district makers of steel mill equipment note better inquiry. In this connection it is reported that expenditures of a considerable sum for new equipment in one of the Pittsburgh district units of the Steel Corporation is under consideration. In Chicago the trade is encouraged by the opening of the new tractor works of the International Harvester Co. and the Milwaukee plant of that company is expected to resume in the near future.

The price situation remains substantially the same, the only change noted being a reduction averaging 15 per cent on hack saws by the Racine Tool & Machine Co. and a 25 per cent cut on turret lathes by the Warner & Swasey Co.

New York

NEW YORK, Feb. 21.

This month has been a great disappointment to those who expected that improvement in business, which was promised by events of December and January, has not materialized. Sales in this market for February will probably fall below those of the two preceding months. A large machine-tool company which keeps a chart of its sales reports that the curve was upward beginning in November and continuing to the end of January, but that the line will probably take a dip downward for February unless considerably more business should develop before the end of the month.

A fair degree of interest in used tools is shown by some buyers, but orders for new tools are at very low ebb and prospects are not numerous.

From the viewpoint of sales the crane market is dull, but there is an increasing number of inquiries pending. Few new inquiries are reported in the market this week. Russell, Burdall & Ward, Portchester, N. Y., are receiving quotations on a 2-ton transfer crane. The Wallingford Steel Co., Wallingford, Conn., reported to have purchased 10-ton and 3-ton overhead traveling cranes last week, placed this order with the Niles-Bement-Pond Co. The U. G. I. Contracting Co., Philadelphia, has purchased a 40-ton power house crane for Syracuse, N. Y., from the Niles-Bement-Pond Co. The L. B. Foster Co., Pittsburgh, Pa., has purchased a 20-ton, 50 ft. boom, used, Browning locomotive crane from Philip T. King, 30 Church Street, New York. The Milwaukee Electric Railroad & Light Co., Milwaukee, Wis., has purchased a 12½-ton, 15-ft. and 30-ft. boom locomotive crane from the Industrial Works. The electric tramrail division of the Cleveland Crane & Engineering Co. recently sold a 2-ton, 1200-ft. tramrail and 24 trolleys to the Hydro-United Tire Co., Pottstown, Pa., four 1-ton electric hoists for this installation being furnished by the Shepard Electric Crane & Hoist Co.

The Yonkers Electric Light & Power Co., 9 Manor Square, Yonkers, N. Y., has completed plans and will soon commence the erection of a new one-story power house on Columbus Avenue, estimated to cost about \$250,000, including equipment. Thomas E. Murray, 55 Duane Street, New York, is engineer.

The Columbia Ice Corporation, New York, care of Ophuls, Hill & McCreery, 112 West Forty-second Street, engineers, has completed plans for a two-story, reinforced-concrete ice manufacturing plant at Whitlock and Bryant avenues, estimated to cost about \$225,000, including machinery.

Seven electrically operated centrifugal pumps, electric motors and other equipment will be installed at the new pumping plant and filter station at the municipal waterworks, Newburgh, N. Y. Bids for the construction and equipment are being received up to March 20 by the city manager. W. Johnston McKay, George W. Fuller and James C. Harding, 170 Broadway, New York, are engineers.

The New York Edison Co., 120 East Fifteenth Street, New York, has completed plans for the erection of a new two-story power house at 33 Attorney Street, 25 x 100 ft., estimated to cost about \$75,000. William Whitehall, Sixth Avenue and Forty-first Street, is architect.

The George Hauss Mfg. Co., Canal Place, New York, manufacturer of coal handling machinery, wagon loaders, etc., has filed plans for a new one-story building, 75 x 95 ft. It will be owned by the Hauss Realty Co., a subsidiary organization.

A vocational department will be installed in the new high school to be erected at Hornell, N. Y., estimated to cost about \$350,000, and for which bids will be asked early in March. Tooker & Marsh, 101 Park Avenue, New York, are architects.

The Witherbee Storage Battery Co., 643 West Forty-third Street, New York, will discontinue operations at its local plant, as well as at North Bergen, N. Y., and will concentrate production in its new works at Belleville, N. J., totaling about 30,000 sq. ft. of floor space. Machinery from the present plants will be used and additional equipment installed. The entire works will be used for electric battery manufacture.

The Board of Water Commissioners, Scarsdale, N. Y., will install three new centrifugal pumps, electrically operated, switchboard and other equipment at the municipal waterworks. Bids will be received until Feb. 27 for the machinery. The George A. Johnson Co., 150 Nassau Street, New York, are consulting engineers. George W. Field is clerk for the board.

William C. Hespe, Vienna, N. J., has acquired the local foundry of Daniel D. Wolfe, manufacturer of plows, castings, etc., and will remodel and improve the structure for the manufacture of stoves and ranges.

The U-Need Ice Co., Inc., 2150 Amsterdam Avenue, New York, has completed plans and will take bids for a two-story ice-manufacturing plant at Mt. Eden and Inwood Avenue, estimated to cost about \$75,000. Koch & Wagner, 32 Court Street, Brooklyn, are architects.

The Parklap Construction Corporation, 84 Pine Street, New York, is planning for a new hydroelectric power plant at Diamond Creek, Ariz., estimated to cost about \$10,000,000, including transmission system and dam, 400 ft. high. It will

have an initial capacity of 150,000 hp. Parsons, Klapp, Brinckerhoff & Douglas, 84 Pine Street, New York, are engineers.

A vocational department will be installed in the three-story high school to be erected by the Board of Education, Jersey City, N. J., at Bergen and Bostwick avenues, estimated to cost \$800,000. Plans have been completed by John T. Rowland, Jr., architect, 100 Sip Avenue.

The Tidewater Oil Co., Constable Hook, Bayonne, N. J., will make additions in the tankage department at its refinery, including steel tanks, piping, etc., estimated to cost approximately \$275,000.

The Lock Joint Rule Co., Cornelia Street and Albert Avenue, Newark, has filed plans for a number of shop buildings, including power house.

The County Board of School Directors, Newark, has voted in favor of a bond issue of \$500,000 for the proposed vocational school at Bloomfield, N. J., and the proposition has been referred to the Board of Freeholders for approval. Preliminary plans for the school have been prepared by Guilbert & Detelle, 516 Broad Street, architects.

Anton Franz Mottel, Nurnberg, Germany, desires to get in touch with American manufacturers of machinery for making cloth in round and square shapes for writing purposes.

The power house and other buildings at the plant of the Conin Chemical Works, River Road, East Paterson, N. J., were destroyed by fire, Jan. 27, with loss estimated at about \$150,000, including equipment. Frederick Conin is head.

Philadelphia

PHILADELPHIA, Feb. 20.

The Guard Cycle Stores, 1022 West Guard Avenue, Philadelphia, will take bids at once for a new two-story service and repair works, 50 x 66 ft., at Hutchinson and Thompson streets, estimated to cost about \$32,000. I. W. Levitt, 1011 Chestnut Street, is architect.

Fire, Feb. 13, destroyed the main portion of the plant of the Ritter Can & Specialty Co., 1517-45 North Hutchinson Street, Philadelphia, manufacturer of cans, metal signs, etc., with loss estimated at about \$100,000, including equipment. William H. Ritter is president.

Freight-handling machinery, loading and unloading equipment, etc., will be installed by the Department of Wharves Philadelphia, on the new piers at Wolf and Porter streets. Each of the piers will be 300 x 900 ft., and will cost in excess of \$2,000,000. Work has been commenced.

The Board of Trustees, Presbyterian Hospital, Thirty-ninth and Filbert streets, Philadelphia, will build a power house in connection with the new group of buildings to be erected at Saunders and Powelton avenues, estimated to cost about \$3,000,000, complete. Dr. H. G. Paul is president of the board.

A new one-story power house will be erected at the plant of the Bloch Go Cart Co., 1136 North American Street. W. E. S. Dyer, Land Title Building, is engineer.

The United States Shipping Board Emergency Fleet Corporation, Bristol, Pa., has placed the local plant of the Merchants' Shipbuilding Corporation on the market, and all buildings, plant machinery, etc., will be sold within the next few months. The equipment to be disposed of includes 18 15-ton tower cranes, 9, 10 and 15-ton gantry cranes, and one 15-ton portal pier crane; also, power house complete, with turbo-generators, boilers, pumps, etc., and machine and tool shop equipment.

Martin H. Walrath, Philadelphia, operating a general millwork factory at Park and Glenwood streets, has taken bids for a new plant, including power house, at Sixteenth and Indiana streets. Eugene A. Stopper, 1507 Arch Street, is architect and engineer.

The Pierce, Butler & Pierce Mfg. Corporation, Broad and Race streets, Philadelphia, manufacturer of boilers and radiators, with plant at Syracuse, N. Y., has leased a portion of the two-story building to be erected at Oxford and Thirtieth streets by the Nelson Redley Construction Co. for a local branch.

Fire, Feb. 14, destroyed a portion of the plant of the Berry Engineering Co., 610-28 Crosby Street, Chester, Pa., manufacturer of machinery and parts, with loss estimated at close to \$100,000.

The Standard Tank & Seat Co., 316 North Front Street, Camden, N. J., has awarded contract to Barclay, White & Co., 1713 Sansom Street, Philadelphia, for a new three-story plant, 32 x 78 ft., to cost close to \$30,000.

Sydney L. Wright, president New Jersey & Pennsylvania Traction Co., West Hanover Street, Trenton, N. J., and other officials of the company are organizing a company under the name of the Plumstead Township-Bucks County Electric Co. to operate a power plant and furnish light and power

service at Point Pleasant, Pa., and vicinity. Active operations will begin at an early date.

Arnold Orr, Slatington, Pa., formerly operating a machine and welding repair works at Plymouth, Pa., has acquired the Morgan property on McDowell Street, for the establishment of a similar plant. The building will be remodeled.

The Consumers' Auto Supply Co., 375 Bennett Street, Luzerne, Pa., has filed plans for a new one-story automobile service and repair building, 70 x 130 ft., on Main Street, estimated to cost about \$50,000. James Corgan is president.

The Board of Directors, Montgomery School, Wynnewood, Pa., has acquired the Hooper Estate property, totaling about 56 acres of land, as a site for a new school. An adjoining structure will be used for vocational work, to include machine and repair shop, electrical and other departments. Plans will be prepared at once by Arthur H. Brockie, 254 South Fifteenth Street, Philadelphia. Percy H. Clark is president of the school board.

The Superintendent of Public Grounds and Buildings, Capitol Building, Harrisburg, Pa., will receive bids until Mar. 14, for the installation of equipment at the power house for the new state highway garage building, Twelfth and State streets, comprising two 80-hp. return tubular boilers, with steel breechings and stack, vacuum pumps, blowers and auxiliary equipment. T. W. Templeton is superintendent.

The Harrisburg Taxicab Co., Harrisburg, Pa., will make extensions and improvements in its garage and repair works to double the present capacity, providing facilities for about 75 cars.

The Westmoreland Hospital, Greensburg, Pa., will build a new power house in connection with an addition to the institution. Edward L. Tilton, 141 East Forty-fifth Street, New York, is architect.

The coal reclaiming plant of the Milton Mfg. Co., Milton, Pa., manufacturer of nuts, etc., near Snyderstown, Pa., was partially destroyed by fire, Feb. 11, with loss estimated at about \$17,000. It will be rebuilt.

The Pennsylvania Power & Light Co., 802 Hamilton Street, Allentown, Pa., has arranged for a large increase in capital, the proceeds to be used for extensions and improvements to power plants and system. The company is operated by the Electric Bond & Share Co., 71 Broadway, New York.

The Short Mountain Colliery Co., Lykens, Pa., has perfected plans for the immediate reconstruction of its pulverizing plant. New equipment will be installed. The McClintic-Marshall Co., Pottstown, Pa., has the construction contract.

A vocational department will be installed in the new three-story high school to be erected at Pottstown, Pa., J. H. Carey, secretary. Ritter & Shay, North American Building, Philadelphia, architects, have been commissioned to prepare plans.

The Triumph Motor Truck Co., Medina, N. Y., has completed plans for a new plant on property recently acquired at DuBois, Pa., and will commence work at an early date. Charles A. Meikle is president.

Vocational departments will be installed in connection with the three new junior high schools and one combination junior-senior high school to be erected by the Board of Education, Philadelphia. The structures are estimated to cost about \$3,225,000. Bids for two will be received in March, and for the other two at some time prior to June.

The Lansdale Foundry Co., Lansdale, Pa., manufacturer of gray iron castings, has added numerous improvements to its plant in the last four months and is again manufacturing a full line of calorific steam and hot water heaters.

The Inter-State Safety Appliance Co., Beech and Noble streets, Norristown, Pa., which was recently organized, will engage in manufacturing and jobbing of all kinds of safety devices. It will soon be in the market for foundry equipment, wood-working and stamping machinery.

George Shearmann, Atlantic City, N. J., care of Haining & Pallister, Guarantee Trust Building, architects, will soon take bids for a one-story machine shop at Pennsylvania and Adriatic avenues, 36 x 70 ft.

Baltimore

BALTIMORE, Feb. 20.

The Continental Garage & Service Corporation, 715 Gaither Building, Baltimore, has awarded contract to the Consolidated Engineering Co., Calvert Building, for a five-story service, repair and parts manufacturing plant, estimated to cost about \$350,000, including equipment. A complete machine shop will be installed. John C. Tolson heads the company.

The Bureau of Supplies and Accounts, Navy Department, Washington, will receive bids until March 2 for lathes, drills, grinders and other machine tools for use at the Norfolk, Va., navy yard.

The Central of Georgia Railway, Savannah, Ga., is having plans prepared for a new coaling plant at Columbus, Ga. C. K. Lawrence is chief engineer.

Freight handling and conveying machinery, hoisting equipment, etc., will be installed on the new piers to be constructed by the Port Development Commission, Baltimore. A fund of \$10,000,000 has been arranged for the entire project, and the initial expenditure will approximate \$2,200,000.

The American Belting Co., Baltimore, has acquired property at 1624-26 Bank Street, and will remodel the building for a new plant. M. C. Raslin is president.

A vocational department will be installed in the new two-story and basement high school to be erected at Leesburg, Va., bids for which are being taken until March 8. G. R. Ragan, Terry Building, Roanoke, Va., is architect.

The Southern Toy Co., Hickory, N. C., will take bids at once for a new plant at West Hickory, comprising three buildings, 40 x 100 ft., 40 x 50 ft., and 20 x 50 ft., respectively. A list of equipment is being arranged. G. E. Ivey is president.

A vocational department will be installed in the new two-story and basement high school to be erected at Reidsville, N. C., estimated to cost about \$300,000. W. C. Northup, Winston-Salem, N. C., architect, will prepare plans.

The Dublin Veneer Mill, Dublin, Ga., is planning for the installation of new machinery to increase its capacity about 50 per cent. T. C. Alexander is head.

The Town Council, Dillon, S. C., is planning for extensions and improvements in the municipal electric light and power plant.

A vocational department will be installed in the new two-story and basement high school, 165 x 265 ft., to be erected at Gastonia, N. C., estimated to cost about \$300,000. White, Streeter & Chamberlain, Gastonia, are architects.

Chicago

CHICAGO, Feb. 20

The local market is spotty, some dealers reporting practically no new business, while other houses have booked a number of fair sized orders. One local dealer was awarded most of the machine tools on a list just purchased by the Hammond, Ind., Board of Education. This inquiry was published in this column last week and the purchases just made amount to about \$15,000. Another order was placed locally by the Kelly Valve Co., Muskegon, Mich., which bought four No. 2 turret lathes and miscellaneous equipment. On the whole, current orders are for single machines and competition is exceedingly keen on each inquiry that appears. Purchases by industries are confined to the addition of a machine or two to round out present equipment. Large industries which have been important buyers in past years are notably absent from the market. The trade is encouraged, however, by the fact that the local tractor works of the International Harvester Co. started up with 1200 men last week after a long period of idleness. The Milwaukee tractor plant of that company is also expected to resume operations in the near future. No new railroad inquiries have appeared and action on the extensive lists pending has not been taken. New construction is confined largely to garages for which some equipment is being bought from time to time. No auction sales have been held recently, but the equipment of the Obenberger Drop Forge Co., Milwaukee, is to be sold soon to satisfy the claims of the creditors. This consists largely of forging equipment.

The price situation remains substantially the same, the only changes being a reduction on hack saws by the Racine Tool & Machine Co., averaging 15 per cent and a 25 per cent cut on turret lathes by the Warner & Swasey Co.

The crane market remains quiet, the only order reported being a 3½-ton motor-driven traveling overhead Shaw crane bought by the Tuthill Building Materials Co., Blue Island, Ill.

The Damascus Steel Products Corporation, 1500 Fourteenth Ave., Rockford, Ill., recently incorporated with \$50,000 capital stock to manufacture cutlery and small tools, has leased 5000 sq. ft. of floor space for manufacturing purposes and has purchased the following equipment to date: Three trip hammers, six grinding and polishing stands, one shaper, one engine lathe, two forges and three gas furnaces. The officers include C. F. Maitland, president; J. R. Hughes and A. T. Hayes, vice-presidents; C. P. Twomey, secretary, Jacob Aaron, treasurer, and H. M. Hanson, assistant treasurer.

The Cabrange Mfg. Co., has increased its capital stock from \$250,000 to \$750,000 and will remove its plant from Taylorville, Ill. to Granite City, where a site has been secured and buildings are now being erected at a cost of

make and prepare all parts in its new plant, which will include a foundry and an enameling department.

Ronneberg, Pierce & Hauber, architects, 10 South La Salle Street, Chicago, are receiving bids on a machine shop, 75 x 96 ft., at 2704-10 West Lake Street, for J. Nielsen, at cost \$20,000.

The Briskin Mfg. Co., sheet metal manufacturer, 212 South Hoyne Avenue, Chicago, has let contract for a two-story factory, 50 x 127 ft., to cost \$10,000.

Ignatz Engel, 3056 Palmer Square, Chicago, is taking bids on a garage, 100 x 125 ft., at Milwaukee Avenue, near Crawford Avenue, to cost \$15,000.

E. T. Davis, 133 West Washington Street, Chicago, is taking bids on a one-story garage, 50 x 100 ft., at Wilmette, Ill., to cost \$20,000.

The Hudson Motor Co. of Illinois is taking bids through Alfred S. Aischuler, Chicago, on a three-story salesroom and service building, 100 x 300 ft., fronting on Michigan Avenue and extending back to Wabash Avenue, adjoining the Marmon building.

R. O. McDonald is equipping a machine shop in the west room of the Hancock Implement Co. building, Tekamah, Neb., and will be prepared to do all kinds of automobile repair work.

Bids have been taken on a power plant for St. Joseph's College, Rensselaer, Ind. It will contain boiler room, machine shop, engine room, pump room, etc., and will be two stories, the first, 73 x 110 ft., and the second, 32 x 72 ft.

The Lake City Utility Co., Lake City, Iowa, has been incorporated with \$10,000 capital stock to construct a light and power plant. H. D. Yetter is president.

The F. P. Smith Wire & Iron Works, 2316 Clivbourn Avenue, Chicago, will break ground at once for the erection of a three-story, rear addition, 25 x 40 ft.

In connection with an appropriation of \$4,035,000 for the purchase of new rolling stock, improvements, etc., the Pere Marquette Railroad Co., South Wells and West Harrison streets, Chicago, will build a number of car and locomotive shops, estimated to cost approximately \$500,000, including equipment.

The Denver Gas & Electric Light Co., Denver, Colo., has arranged for a bond issue of \$3,000,000, a portion of the proceeds to be used for power plant extensions and improvements.

The Chicago, Burlington & Quincy Railroad Co., 547 West Jackson Boulevard, Chicago, has plans under way for the erection of a new electric power house at Broadway and Clark streets, Aurora, Ill., estimated to cost about \$100,000. William T. Krausch, 517 West Jackson Boulevard, is architect.

A vocational department will be installed in the new high school to be erected at Waseca, Minn., and for which William B. Ittner, architect, Board of Education Building, St. Louis, Mo., will prepare plans.

The Speeder Machinery Co., Fairfield, Iowa, is considering preliminary plans for the erection of a new factory.

The Illinois Traction Co., Champaign, Ill., is planning the erection of a new power plant at Decatur, Ill., estimated to cost about \$100,000, including equipment.

A new one-story power house will be erected by the Roth Packing Co., Waterloo, Iowa. The installation will comprise two 500-hp. boiler and auxiliary operating machinery.

A vocational department will be installed in the new two-story high school to be erected at Clear Lake, Iowa, estimated to cost about \$150,000. G. L. Lockhart, 1353 University Avenue, St. Paul, Minn., is architect.

New England

BOSTON, Feb. 20.

It is the consensus of opinion among local dealers that machine-tool sales in this district the past week were smaller than for any previous seven-day period this year. At the same time evidence suggesting better business later is noted. The General Electric Co., West Lynn, Mass., has not, as was anticipated, closed on its list of 42 machine tools for special production work, nor on its list of other equipment, and the Maine Central Railroad failed to take expected action on the three large machines wanted. A Massachusetts textile interest came into the market the past week with a list of 10 miscellaneous tools. These and other inquiries bring the aggregate number under consideration by local dealers up to more than 100. It does not, however, include several inquiries for used machinery, developed this week, as prospective buyers' ideas of prices are too low to be taken seriously, but it does include a considerable number of used tools under negotiation.

Several New England cities contemplate the purchase of machine shop equipment, but only a few have begun to make up lists. The report that Lowell and Quincy, Mass., are in

Pittsburgh

PITTSBURGH, Feb. 20.

here, is incorrect. Both cities intend at some future date to buy, but lists have not been completed.

Local machine-tool dealers take a hopeful view of the future. Machine shops throughout New England are showing more signs of life, but are still far from active. Some of the largest industrial plants also are growing busier, which leads machinery dealers to believe equipment will be purchased sooner or later, especially by those having tools under consideration. A Westboro, Mass., machine tool builder has secured a contract for 15,000 large carbonators. Operations at other plants show little, if any, expansion. Makers of road machinery are beginning to secure some substantial orders.

Sales the past week include part of a list recently issued by the H. B. Smith Co., Weymouth, Mass., heaters and radiators, and involve fairly heavy production equipment by a Worcester machine tool builder, and a Boston representative of a builder closed on some half dozen machines, subject to shipping instructions to be issued later. The Eastern Nail Co., Providence, bought a 16-in. used shaper, and a Brockton, Mass., manufacturer a similar tool. A local sheet metal concern closed on four power shearing shears, a Providence firm on a 15-in. x 6-ft. lathe, a Maine garage on two 9-in. x 4-ft. lathes, a Weymouth, N. H., garage on a one-spindle drill, all new tools, and perhaps a half dozen other miscellaneous small tools have changed hands, most of them costing less than \$100 each.

In connection with greater activity among machine shops, larger sales of hand hoists are noted, business in such lines being more active than in months.

The Phillips Mfg. Co., overhead trolley equipment, will locate in Easthampton, Mass. It recently purchased three heavy shears and punches.

The property and equipment of the Winnisimmet Ship Yard, Inc., Chelsea, Mass., will be sold at public auction by J. E. Conant & Co., Lowell, Mass., on March 12 and 13.

The Eastern Malleable Foundry Co., Naugatuck, Conn., is considering the erection of a one-story foundry, 50 x 250 ft., at Watervliet, N. Y.

Plans are being drawn for the Dennison Mfg. Co., Framingham, Mass., paper novelties, etc., for a four-story factory, 70 x 300 ft., in Southboro, Mass.

The Boston Elevated Railway Co. is having plans drawn for a one-story, 50 x 500 ft. shop to be erected at its Forest Hill station, Edward Dana, 108 Massachusetts Avenue, Boston, is general manager.

The Thompson Copeland Co., Vine Street, Worcester, Mass., lock washers, steel cotter and screw machinery, has purchased the assets, including machinery, of the Worcester Nut Co., which will be removed to Vine Street.

The Victor Page Motors Corporation, New York City and Farmingdale, L. I., automobiles, will erect a manufacturing plant at Stamford, Conn.

The Bureau of Yards and Docks, Navy Department, Washington, has had plans prepared for new coal-handling equipment to be installed at the Boston Navy Yard, and will call for bids at an early date. The work will be handled under specification 4553.

Superstructure erection of the new power house of the Cambridge Electric Light Co., 46 Blackstone Street, Cambridge, Mass., will be commenced at an early date. It will be 80 x 180 ft. and 40½ ft. high.

A vocational department will be installed in the new four-story high school, 145 x 180 ft., to be erected at Danbury, Conn., estimated to cost about \$150,000. Sunderland & Watson, Main Street, are architects.

A one-story power plant, 50 x 60 ft., will be erected by the Mason & Hamlin Co., 492 Boylston Street, Boston, in connection with its new piano factory at Broadway and Third streets, Cambridge, Mass. Monks & Johnson, 99 Chauncy Street, Boston, are engineers.

A vocational department will be installed in the new three-story high school to be erected on Greenfield Street, Hartford, Conn., estimated to cost close to \$1,500,000. Bids will be asked at an early date. The F. I. Cooper Corporation, 88 Cornhill Street, Boston is architect. W. H. Scoville is chairman of the school board.

The E. Howard Clock Co., Eustis Street, Roxbury, Mass., has purchased the three-story factory, 60 x 200 ft., of the Peabody Leather Co., Peabody, Mass., with power plant, and will remove its works to this location. Employment will be given to about 300.

The Amesbury Body Co., Amesbury, Mass., manufacturer of automobile bodies, has acquired a brick factory at Clark's road, Amesbury, where it will remove its present works. New equipment will be installed.

The Director of State Institutions, Middlebury, Vt., has had plans prepared and will soon take bids for a one and two-story automobile service and repair building, 55 x 240 ft., at the State School for Feeble Minded, Brandon, Vt., estimated to cost about \$75,000. Lyman Austin, 240 College Street, Burlington, Vt., is architect.

Business in machinery and tools is moderate in the extreme. Some of the small shops in this district are occasional buyers, but demands from the larger units are few and far between. A few fair-sized inquiries are before the trade. Some of the foundries which bid on the segments for the New York and New Jersey vehicular tunnel have made tentative inquiries for tools, but ordering them is contingent on their getting some of the segment business. The Sewell Valley Railroad, Rinaldo, W. Va., has revived an old list and again is asking bids on a 36-in. planer, a 250-ton wheel press, a 1200-ton steam drop hammer and a universal milling machine. Little is going on in the crane market, but something should develop in the next few weeks in view of the many inquiries recently received. Steel mill equipment manufacturers note a better inquiry, and while current orders are few the impression prevails that better business is not far off. Expenditures of a considerable sum for new equipment in one of the Pittsburgh district units of the Steel Corporation is under consideration. This work was originally projected four or five years ago and now seems in a fair way of going ahead. The Allis-Chalmers Mfg. Co. recently took an order for three 24,000-hp. oil pumps for the Gulf Refining Co. for installation at Port Arthur, Tex.

The Westinghouse Electric & Mfg. Co. reports a marked increase in the sale of large power apparatus this year. January sales reached a total value of \$1,500,000 in turbine generators and condensers. Some of the buyers were the Pennsylvania Edison Co., Easton, Pa.; Madison Gas & Electric Co., Madison, Wis., and the North Carolina Light & Power Co. Most of the business was included in ten units. Takata & Co., Japan, have ordered another large turbine generator for one of its new plants. Fifty steam auxiliary units were sold during the month for a wide range of application, many purchasers being industrial power plants.

J. C. Forster & Son, 2519 Penn Avenue, Pittsburgh, manufacturers of stamped ware, tin products, etc., have awarded contract to R. E. Murray, 310 Iron Exchange Building, for a new two-story and basement plant, 50 x 100 ft., estimated to cost about \$25,000. J. L. Forster is head.

Fire, Feb. 16, destroyed a portion of the plant of the Enterprise Foundry Co., Manhattan and Nixon streets, Northside, Pittsburgh, manufacturer of iron and steel castings, with loss estimated at about \$50,000, including equipment.

The Butler Buick Co., Main Street, Butler, Pa., is completing plans for a new three-story automobile service and repair building, 85 x 110 ft., estimated to cost about \$150,000. The Hunting-Davis Co., Century Building, Pittsburgh, is architect.

The Citizens' Light & Power Co., Oil City, Pa., has arranged for a bond issue of \$43,000, for extensions and improvements in power plant and system.

Scoble & Parker, Pittsburgh, agricultural machinery, have leased the eight-story building, 30 x 120 ft., at 427 Liberty Avenue, for a five-year period, for its local works and headquarters.

The Negley Avenue Garage Co., Pittsburgh, has filed plans for a one-story service and repair building at South Negley Avenue and the Pennsylvania Railroad, estimated to cost about \$50,000.

The H. C. Fricke Coke Co., Pittsburgh, is planning for the erection of a new coal tipple at its mines at Whitney, Pa. Work to commence early in the spring.

The Westinghouse Electric & Mfg. Co., East Pittsburgh, has rejected all bids for its four-story addition, 100 x 200 ft., and will call for new bids later. Bernard H. Prack, Keystone Building, Pittsburgh, is architect. The company has acquired about 1220 acres of coal properties in Stowe and West Deer Townships from the Monarch Fuel Co., for a consideration of \$733,000, and plans for extensive developments and operations on the land.

Fire, Feb. 12, destroyed the plant of the Blystone Mfg. Co., Cambridge Springs, Pa., manufacturer of machinery and parts, with loss estimated at about \$100,000, including equipment.

The Gilbert Water & Light Co., Gilbert, W. Va., recently organized, is planning for the erection of a local power house. J. A. Berry is treasurer and general manager.

The Mountain State Motor Car Co., McFarland Street, Charleston, W. Va., has preliminary plans under way for a new two-story service and repair works, estimated to cost about \$100,000, including equipment. A. D. Ellison is president.

A vocational department will be installed in the new high school to be erected by the East River District Board of Education, Princeton, W. Va., estimated to cost about \$125,000. Bids will be taken up to March 15. Wyman & Jones, Princeton, are architects.

The Bluefield Ice & Cold Storage Co., Bluefield, W. Va.,

will commence the immediate erection of a new ice-manufacturing plant at Bluefield Avenue and Poplar Street, estimated to cost about \$60,000.

The County Road Department, Clarksburg, W. Va., S. L. Coyle, County Road Engineer, will build a one-story automobile service and repair shop for county cars.

Milwaukee

MILWAUKEE, Feb. 20.

Machine-tool inquiry is becoming more active and sales more frequent, but the call is limited to one or two tools. Indications are that more business will open up before long and some foundries have received orders that justified taking on more men. The motor parts and accessory group is overcoming a temporary slowing up, although it is yet too early for automobile producers to know what to bank on in the spring selling season. The manufacture of trucks is making slow progress. That the outlook is growing more promising is indicated by the establishment of a number of new concerns in the metal-working industry.

The American Brass Co., since Feb. 1 under the ownership of the Anaconda Copper Co., has made public tentative plans for a considerable extension of production at the Western branch works in Kenosha, Wis. George H. Allen, formerly general manager at Kenosha, and now a vice-president of the company, spent the week in Kenosha to survey the works. It is planned to establish a new mill for drawing fine copper wire. This involves no new construction, as the mill will be installed in the former plant of the Kenosha Refrigerator Co., which was acquired by the American Brass Co. in 1916.

The Richards Iron Works, Manitowoc, Wis., has been converted into a corporation without change of name. The capital stock is \$125,000 and the incorporators are Henry and Reuben Richards and John W. Barnes. It does a general foundry and machine shop business and also is a fabricator of rolled steel products.

Cahill & Douglas, consulting engineers, 217 West Water Street, Milwaukee, are engaged in surveys contemplating the electrification of the power plant and factory drive of the Interior Woodwork Co., 521-529 Park Street, Milwaukee, and additional power plant and boiler house facilities for the Rhinelander Paper Co., Rhinelander, Wis.

The H. & D. Mfg. Co., Racine, Wis., has been incorporated with a capital stock of \$25,000, and will establish a plant for the production of pistons, piston rings and similar gas engine and automotive parts, accessories and specialties. The incorporators are Martin Horelli, William C. Draeger, Joseph F. Dodd, Walter R. Draeger and Charles Jenista, all of Racine.

Harry W. Bolens, president and general manager Gilson Mfg. Co., Port Washington, Wis., has purchased at public auction the plant, equipment and other property of the defunct Globe Metal Products Co., Sheboygan, Wis., for \$65,700. It consists of a gray iron foundry and machine shop. The Gilson company manufactures gas engines, implements, and farm tools and also does a large jobbing business in chair and furniture castings. Mr. Bolens expects to make a statement later relative to the use to which the former Globe works are to be put, and intimated that the production of a new type of power hoe and lawn mower tractor, recently developed at Port Washington, may be transferred to the newly acquired works.

The Wisconsin Electric Appliance Co., Menasha, Wis., has been organized with a capital stock of \$75,000 by Victor M. Gombert, G. E. Lewis and H. E. Ballard, all of Menasha. It will establish a factory for the manufacture of a general line of electric appliances and devices, but the incorporators are not ready to make details public.

The Norman Motor Car Co., Hurley, Wis., has plans for a two-story public garage and machine shop, 50 x 155 ft., estimated to cost \$30,000. Alvin J. Norman is president and manager.

The Milwaukee-Western Fuel Co., 120 Wisconsin Street, Milwaukee, sustained an estimated loss of \$150,000 by the destruction by fire of the anthracite coal shed at Canal Street and Sixth Avenue on Feb. 13. The building was 175 x 400 ft., and contained hoisting machinery and other equipment which is a total loss. It will be rebuilt immediately and inquiry is now being made for new equipment. William F. Ardern is vice-president and general superintendent.

The Board of Education, Durand, Wis., will take bids after March 15 for a new high school and vocational training institute, to cost about \$120,000. The architects are Oppenhamer & Obel, Wausau, Wis. H. H. Miles is secretary of the board.

The Borges-Baker Co., 551-563 Edison Street, Milwaukee, manufacturer of metal shears and similar metal-working devices, has incorporated with a capital stock of \$10,000. The owners are William F. and Arthur F. Borges and

Charles Baker, who also own and operate the W. R. Shaver Co., doing automotive repair work, repainting, trimming, body construction, etc. The two plants occupy the same buildings.

The Board of Education, Whitehall, Wis., has plans by Oppenhamer & Obel, architects, Wausau, Wis., for a new combination high and industrial training school, 72 x 150 ft., two stories and basement, estimated to cost \$130,000, with school and shop equipment. A. D. Peterson, clerk of the board, will take bids about March 20.

The Tomah Iron Works, Tomah, Wis., which for some time past has conducted a public garage, machine and automotive repair shop in connection with its foundry and general machine shop business, has incorporated as the Tomah Iron Works Garage, Inc. The capital stock is \$30,000. The owners are Robert S. Murray, Carl A. Sweet and Harry M. Warren.

The Stoughton, Wis., works of the Moline Plow Co., has resumed the operation of its gray iron foundry for a limited period to turn out a number of orders for parts for new material as well as replacement parts. According to George Ford, general manager at Stoughton, it is impossible to predict if conditions will permit the continuance of production after present specifications have been filled.

Cincinnati

CINCINNATI, Feb. 20.

Local manufacturers report a slight falling off in inquiries and orders the past week. There are, however, still a few inquiries of some size being worked on. Orders booked were confined almost exclusively to single machines and while the past week showed a slight decline the general situation continues to improve and manufacturers in this district are confident that the industry is definitely on the upturn. Makers report difficulty in closing on inquiries and much shopping is being done by prospective purchasers in the hope of receiving substantial reductions in price. Very little success is being met with, however, but used machines are coming on the market more freely at very low prices.

The Breese Brothers Co., Cincinnati, metal manufacturer, has placed contract with the Fisher-Beyore Construction Co. for the concrete work for its new building on Hunt Street, to replace the one destroyed by fire in December. Zettl & Rapp, Mercantile Library Building, are the architects.

The National Protecto Pump Co., Dayton, Ohio, has purchased the plant formerly owned and occupied by the Dayton Metal Body Co., North Dayton, and will make alterations preparatory to moving its plant from its present location in West Dayton.

The Expression Player Piano Co., Columbus, Ohio, has purchased property near Dana Avenue and West Broad Street and is having plans prepared for a modern two-story factory, 48 x 240 ft. It will manufacture electric reproducing player piano actions. Charles E. Bard is president.

The Sterling Stove Co., Portsmouth, Ohio, has been incorporated with a capitalization of \$100,000 to manufacture gas cooking and heating stoves, with plant at Tenth and Scott streets. Henry Scott and B. W. Hopkins head the company.

The Jones Machine Tool Co., Cincinnati, is in the market for a used No. 23 New Britain automatic machine, 2-in. capacity, for brass work.

Detroit

DETROIT, Feb. 20.

The Hirsch Mfg. Co., Sturgis, Mich., manufacturer of metal products, will soon take bids for a three-story and basement addition, 130 x 200 ft., estimated to cost about \$100,000. E. S. Patterson, 405 Hanselman Building, Kalamazoo, Mich., is architect. C. Hirsch is president.

A. O. LeGrande, Ferndale, Mich., operating a sheet metal works at 393 Woodland Avenue, is planning for the installation of additional equipment.

The Holley Carburetor Co., Vancouver Avenue, Detroit, manufacturer of carburetors and other ignition equipment, has awarded a contract to Culbertson & Kelly, 872 West Milwaukee Street, for the erection of a one and two-story plant addition at Vancouver and Military avenues.

The Consumers Power Co., Jackson, Mich., has plans nearing completion for a new two-story power house at Powers, Mich., estimated to cost about \$400,000, including equipment. It will replace a generating station recently destroyed by fire.

A one-story power plant will be constructed by the Michigan Canned Food Co., 817 Book Building, Detroit, in connection with its proposed new factory at Greenville, Mich., estimated to cost about \$150,000. The Industrial Construction Co., Eau Claire, Wis., is preparing plans.

A vocational department will be installed in the new high school to be erected by the board of education, Albion, Mich., estimated to cost about \$150,000. R. A. LeRoy, 102 Pratt Building, Kalamazoo, Mich., is architect. Donald Harrington is superintendent of schools.

A vocational department will be installed in the new East Junior high school to be erected at Lansing, Mich., estimated to cost about \$150,000. J. N. Churchill, 514 Oakland Building, is architect. L. W. Cooper is secretary of the board.

The city of Bath Creek, Mich., will spend this year approximately \$5,000 for new equipment at the Verona water pumping station. It will include air lift pumps and engines.

Buffalo

BUFFALO, Feb. 20.

The Buffalo Chemical Fire Extinguisher Co., 67 Carroll Street, Buffalo, manufacturer of fire extinguishers and general fire fighting equipment, has acquired about two acres of land at Central Avenue and the Erie Railroad as a site for a new plant, 100 x 300 ft., with two story office building. This will comprise the first unit and will give employment to about 125. A second unit of like size will be built later. George R. Stephens is president.

The Niagara Power Co., Buffalo, will expend about \$11,000,000 for its new electric generating plant at Niagara Falls, N. Y., foundation and tunnel work for which has been commenced. A steel tower transmission line will be constructed to Buffalo. The plant will have an initial capacity of 200,000 hp.

A vocational department will be installed in the new high school to be erected at Medina, N. Y., estimated to cost about \$125,000. H. W. Robbins is chairman of the board. Plans have been prepared.

Fire, Feb. 13, destroyed a portion of the plant of the New Conklin Wagon Co., 420 East State Street, Olean, N. Y., with loss estimated at about \$300,000, including buildings and machinery. It is planned to rebuild.

Vocational departments will be installed in the two new junior high schools to be erected at Niagara Falls, N. Y., estimated to cost about \$1,000,000. Bids will be asked immediately.

The Clipper Tool Co., Buffalo, N. Y., has reduced its prices on clamp vises and oval slide vises, saw sets and machinists' hammers.

The Central South

ST. LOUIS, Feb. 20.

J. M. Kurn, president St. Louis & San Francisco Railroad has announced that a 200-ton crane will be purchased for the company's main shops at Springfield, Mo., and that other equipment will be purchased at a total cost of \$205,000. No bids have been issued by the purchasing department.

The Columbian Steel Tank Co., Kansas City, Mo., has acquired property adjoining its plant for proposed extensions. A. A. Kramer is head.

Fire, Feb. 8, destroyed the Dardanelle Machine Works plant, Dardanelle, Ark., with loss estimated at about \$18,000.

The City Council, St. Joseph, Mo., has called a special election, April 11, to vote bonds for \$300,000, for the construction of a municipal electric light and power plant.

J. M. Griffin, Laurel, Miss., and associates, have acquired about 25,000 acres of timber property in the vicinity of Hattiesburg, Miss., and plans the erection of a lumber mill, estimated to cost in excess of \$150,000, including machinery. It will have a capacity of over 50,000 ft. per day.

The Common Council, Charleston, Ark., has granted permission to E. C. Lanley, Charleston, for the erection of an electric light and power plant for local service. Plans will be prepared at once.

Fire, Feb. 11, destroyed a portion of the plant of the Kentucky Veneer Mills, Louisville, with loss estimated at about \$75,000, including machinery.

W. B. Haarstick, Vandalla, Mo., and associates, are perfecting plans for the organization of a new company to construct and operate a plant at Jefferson City, Mo., for the manufacture of chains. It will be two stories and is estimated to cost about \$75,000.

The Baldwin Garage Co., Columbus, Kan., has plans under way for the erection of a new one-story service and repair works, 120 x 150 ft., estimated to cost about \$50,000.

A vocational department will be installed in the new three-story and basement junior high school, 110 x 124 ft., now being constructed by the Board of Education, El Reno, Okla., estimated to cost \$215,000.

J. G. Allin Construction Co., 1443 Syndicate Trust

Building, St. Louis, is making inquiries for about 15,000 lb. of standard brass pipe, sizes 1/2 to 3 in.

The Crab Tree Corporation, Johnson City, Tenn., Frank R. Scott, president, is planning for the erection of a new grinding mill at its feldspar and mica properties in Mitchell County, N. C. A housing development for employees will also be built.

A vocational department will be installed in the new junior high school to be erected at Sapulpa, Okla., estimated to cost about \$100,000. Plans will be prepared at an early date.

The Common Council, McCracken, Kan., will take bids early in March for a new power plant and equipment. The Buckel Engineering Co., Hutchinson, Kan., is engineer. L. L. Ryan is city clerk.

D. C. Hale, Paducah, Ky., and associates, are organizing a company to construct and operate a crushing and grinding plant at properties in the vicinity of Bowling Green, Ky. About 1,000 acres has been acquired. The plant is estimated to cost about \$75,000.

The Kot-N-Wood Products Co., Memphis, Tenn., will equip a portion of its new plant, now in course of erection, for the manufacture of disk wheels for automobiles. George B. Stryker is president.

Indiana

INDIANAPOLIS, Feb. 20.

The Haskell & Barker Car Co., Michigan City, Ind., has plans under way for a two-story addition to its shops to cost about \$150,000. Howard Shaw, 39 South State Street, Chicago, is architect.

The plant of the Buckeye Mfg. Co., Anderson, Ind., manufacturer of engines, has been sold by Linfield Myers, receiver, to James W. Sansberry, Anderson, and associates, for a consideration of \$45,100, including buildings and equipment. The property was appraised recently at \$170,000.

A power plant will be constructed by the Board of Trustees, Indiana Village for Epileptics, Newcastle, Ind., in connection with new institutional buildings on a site near the city.

Motors and other electrical equipment, ovens, etc., will be installed in the new four-story baking plant to be erected by the Craig Biscuit Co., 115 Montgomery Street, Fort Wayne, Ind., estimated to cost about \$150,000. The McCormick Co., Inc., 41 Park Row, New York, is architect and engineer.

A power plant will be installed in the new fifteen-story hotel to be erected by the Keenan Hotel Co., Fort Wayne, Ind., care of the Anthony Hotel, 128 West Berry Street, estimated to cost about \$900,000. C. R. Weatherhogg, Citizens' Trust Building, is architect.

Freight-handling and conveying machinery will be installed in the new seven-story and basement terminal warehouse, 195 x 245 ft., to be erected at Pennsylvania and Georgia streets, Indianapolis, by the Terminal Building Corporation, Albert E. Metz, president, Fletcher Savings & Trust Building, estimated to cost about \$250,000. Plans will be prepared at an early date.

R. O. Bright, president Arvac Mfg. Co., Anderson, Ind., announces the necessity of additional equipment owing to increased demand for its chief products, disk universal joints for automobiles. The manufacture of the company's original line, metal universal joints, will be continued.

The Gulf States

BIRMINGHAM, Feb. 20.

The Common Council, Altoona, Ala., is planning for the construction of a municipal electric light and power plant.

The Owens Boll Weevil Exterminator Co., Weatherford, Tex., is planning for the operation of a local plant to manufacture a special machine for boll weevil extermination in the cotton fields. J. P. Owens is president and general manager.

The Douglass Drilling Co., Rockdale, Tex., is completing plans for a new oil refinery with an initial daily output of about 50 bbl., to be increased later.

The Oklawaha Reclamation Farms, Leesburg, Fla., is planning for the construction and operation of a new hydro-electric generating plant in the vicinity of Moss Bluff, Fla. J. D. Young, Leesburg, is engineer.

The Board of City Commissioners, Vernon, Tex., is having plans prepared for the construction of a municipal electric light and power plant. It is expected to start the work in the near future.

The McGraw-Hill Co., 1221 Ave. of the Americas, New York

La., recently organized with a capital of \$250,000, is planning for the establishment of a local plant for the manufacture of oil well drilling and other tools. Wade E. Hampton is president and treasurer, and J. F. McDowell, secretary.

The Bedell Structural Steel Works, fabricator and erector, 3620 Boudin Street, New Orleans, is in the market for the following used equipment: Machine to shear $\frac{3}{4}$ -in. plates, punch $1\frac{1}{4}$ -in. holes, cut $\frac{3}{4}$ x 6 x 6-in. angles; compressor complete; drill press and screw cutter for machine bolts up to 2 in., also for threading pipe.

The Malone-Harrison Motor Co., Dothan, Ala., recently incorporated, has completed plans and will take bids at once for a new one-story service and repair building, 100 x 200 ft. J. V. Harrison, 118 North St. Andrews Street, is secretary and general manager.

The W. L. Lemly Foundry Co., Bessemer, Ala., manufacturer of cast iron pipe, is planning for enlargements in its local plant. It recently acquired the Columbus Foundry Co., Columbus, Ga.

James P. Owens, Weatherford, Tex., in co-operation with the Chamber of Commerce, Rockdale, Tex., is arranging for the erection of a new plant to manufacture special machinery to be used in connection with cotton plantation work.

The Miranda City Refining Co., Miranda City, Tex., has perfected plans for a new refinery to handle crude oil from the Laredo district.

The Miami-Cadillac Co., Miami, Fla., has awarded contract to P. J. Davis, Miami, for a one-story automobile service and repair works, 50 x 120 ft. J. E. Junkin is president.

The Switzer-Parke Co., 105 Paige Street, Houston, Tex., recently organized, has awarded contract to the H. H. Sparks Co., 1606 Bingham Street, for a new plant to manufacture electro-plated ware, enameled products, metal ware, etc. It will approximate about 11,000 sq. ft. of floor space, and the installation will include ovens, generators, motors, boilers and other equipment. Willard M. Parke is president, and Homer E. Switzer, secretary and treasurer.

The Oklawaha Farms & Reclamation Co., Ocala, Fla., has preliminary plans under way for the construction of a new hydroelectric generating plant on the Oklawaha River.

The Texas & Pacific Railroad Co., Marshall, Tex., is completing the erection of a new three-story building on its local shop grounds, to be equipped for instruction and study in car and locomotive work for apprentices. Facilities will be provided for about 150 men and boys.

The Pacific Coast

SEATTLE, Feb. 14.

The Mineral Metal & Hyproducts Co., American National Bank Building, San Francisco, has plans under way for the first unit of its new works at San Mateo, Cal., in property recently acquired, comprising about 1370 acres of tidelands.

The Power Implement Machine Works, Modesto, Cal., has acquired property on San Fernando Road, Glendale, Cal., 113 x 400 ft., as a site for a new plant to cost about \$25,000. J. J. Ferlin is president.

The James Graham Mfg. Co., Newark, Cal., manufacturer of stoves, ranges, etc., is planning the erection of a new reinforced-concrete factory to cost about \$50,000.

The City Council, Santa Ana, Cal., is planning for the installation of an electric power plant at the municipal waterworks, estimated to cost about \$75,000. Bonds in this amount will be arranged at an early date.

The Santa Fe Railway Co., Kerckhoff Building, Los Angeles, has awarded a contract to A. C. Fellows, Central Building, for its one-story machine shop at San Bernardino, Cal., 65 x 510 ft., estimated to cost about \$250,000, including machinery, cranes, etc.

The A. Meister Sons Co., Sacramento, Cal., manufacturer of automobile bodies, street car equipment, etc., is planning the erection of new works at Fresno, Cal., to cost about \$150,000, including machinery.

M. Easane, 130 Montgomery Street, San Francisco, Cal., has awarded a contract to MacDonald & Kahn, San Francisco, for a new one-story machine shop at Fourth and Washington streets, Alameda, Cal.

The Los Angeles Automotive Co., Los Angeles, has awarded a contract to the Moran Co., Los Angeles, for a new one-story plant, 50 x 250 ft., for assembling electrically-operated automobile trucks and for parts manufacture.

The Wasserman Water Heater Mfg. Co., Burton Street, Los Angeles, has filed plans for an addition, 40 x 65 ft.

The Wasserman Water Heater Mfg. Co., Burton Street, Los Angeles, has filed plans for an addition, 40 x 65 ft.

with a capital of \$200,000, to manufacture special turbine pumps, parts, etc., has selected a site for the erection of a new plant. Dean H. Thompson, president and general manager, is inventor of the pump.

The Kimball Motor, Truck Co., 1245 American Avenue, Long Beach, Cal., will commence immediately erection of a plant at Spring Street and the line of the Pacific Electric Railway, Willowville section, to manufacture motor trucks. It will be one-story and approximate 24,000 sq. ft. of floor space. M. O. C. Hull is general manager.

The Northern Pacific Railway Co., Seattle, Wash., is considering the erection of new car and locomotive shops at South Tacoma, Wash., and extensions in local yard facilities, estimated to cost about \$350,000.

Cleveland

CLEVELAND, Feb. 20.

Machine-tool dealers and manufacturers report a slight gain in orders and inquiries from week to week. Orders are almost wholly for single machines and come from widely scattered sources. The Otis Elevator Co., New York, has issued a list of nine machines for its Cleveland and Detroit plants which is the only inquiry of any size that came out the past week. Manufacturers of automatic screw machines report an improvement in single tool orders and a better volume of inquiry. An order from Japan for a large turret lathe was placed with a Cleveland machine manufacturer during the week, which is the first Japanese order taken by this company in a year.

The Warner & Swasey Co., Cleveland, has announced a 25 per cent reduction on its line of turret lathes. This follows a 16 per cent cut made by the company last year.

The Otis Elevator Co. has issued the following list of machines, all motor driven, for its Cleveland and Detroit plants. One 14-in. geared head engine lathe; two 18-in. geared head engine lathes; one 24-in. geared head engine lathe; two $\frac{3}{4}$ -in. single spindle high speed drill presses; two double-end dry grinders and one cold cut-off saw.

Canada

TORONTO, Feb. 20.

During the past week a decided change for the better has appeared in the Canadian machine tool market. The automobile industry is the chief factor in the betterment of the demand and some dealers state that orders the past ten days have been much better than for any like period this year. In general, industrial activity throughout the Dominion has been making steady progress and both dealers and manufacturers are receiving orders from many unexpected sources. Municipalities which carried by law the first of the year for large expenditure on waterworks, sewage and electric plants are now making preparations to carry out these undertakings and are asking for information and ordering the required equipment. Renewed activity is reported in the mining fields of northern Ontario and dealers are receiving inquiries for equipment from this source. Improved manufacturing conditions is likewise having a good effect on the demand for small tools, practically all lines of which are moving in increased volume. Prices on machinery and small tools are showing a little more strength, and no announcement of any revision has been made during the week.

The Waterworks Commission, Brantford, Ont., is having plans prepared for an addition to the pumping station to cost \$250,000, including the installation of three gage centrifugal pumps with electric motors.

The City Council of Goderich, Ont., plans improvement to the waterworks system, including the erection and equipment of a new pump house to cost about \$50,000.

The town of Warton, Ont., plans the installation of electric pump and engine for the waterworks plant to cost \$10,000.

The International Burr Co., Watertown, N. Y., is establishing a manufacturing plant at Belleville, Ont.

Plans for hydroelectric development in the Calumet channel of the Ottawa River at Bryson, Que., have been deposited by the Ottawa & Hull Power & Mfg. Co. with the Minister of Public Works at Ottawa, Ont., and the Land Registry Office at Quebec, Que., disclosing the fact that the company is considering future expansion of its power development.

The Acme Pattern & Tool Co., Buffalo, N. Y., has leased the Thorpe factory on Courtright Street, Bridgeburg, Ont., where it will establish a Canadian branch factory.

The city of St. Thomas, Ont., plans to install new transformers and equipment to cost \$25,000. Mr. Miller is engineer.

The York Sandstone Brick Co., East Toronto, is asking for prices on a horizontal return tubular boiler, 72 x 18, 150 lb. pressure, drum and tubes only.

Current Metal Prices

On Small Lots, Delivered from Merchants' Stocks, New York City

The following quotations are made by New York City warehouses.

As there are many consumers whose requirements are not sufficiently heavy to warrant their placing orders with manufacturers for shipment in carload lots from mills, these prices are given for their convenience.

On a number of articles the base price only is given, it being impossible to name every size.

The wholesale prices at which large lots are sold by manufacturers for direct shipment from mills are given in the market reports appearing in a preceding part of THE IRON AGE under the general heading of "Iron and Steel Markets" and "Non-ferrous Metals."

Iron and Soft Steel Bars and Shapes

Bars:	Per Lb.
Refined bars, base price	2.53c.
Swedish bars, base price	10.00c.
Soft steel bars, base price	2.53c.
Hoops, base price	3.38c.
Bands, base price	3.13c.
Beams and channels, angles and tees	
3 in. x 1/4 in. and larger, base	2.63c.
Channels, angles and tees under 3 in. x 1/4 in., base	2.53c.

Merchant Steel

	Per Lb.
Tire, 1 1/2 x 1/4 in. and larger	2.50c.
(Smooth finish, 1 to 2 1/2 x 1/4 in. and larger)	2.70c.
Tool, 1/2 x 1/4 in. and larger	3.20c.
Cold-rolled strip, soft and quarter hard	6.25c. to 7.25c.
Open-hearth spring steel	3.55c. to 6c.
Shafting and Screw Stock:	
Rounds	3.45c.
Squares, flats and hex.	3.95c.
Standard cast steel, base price	12.00c.
Extra cast steel	17.00c.
Special cast steel	22.00c.

Tank Plates—Steel

1/4 in. and heavier	2.63c.
---------------------	--------

Sheets

Blue Annealed

	Per Lb.
No. 10	3.28c. to 3.53c.
No. 12	3.33c. to 3.58c.
No. 14	3.38c. to 3.63c.
No. 16	3.48c. to 3.73c.

Box Annealed—Black

	Soft Steel C. R., One Pass Per Lb.	Blued Stove Pipe Sheet, Per Lb.
Nos. 18 to 20	3.55c. to 3.80c.	4.10c.
Nos. 22 and 24	3.60c. to 3.85c.	4.10c.
No. 26	3.65c. to 3.90c.	4.15c.
No. 28	3.75c. to 4.00c.	4.25c.
No. 30	4.00c. to 4.25c.	4.25c.
No. 28 and lighter, 36 in. wide, 10c. higher.		

Galvanized

	Per Lb.
No. 14	3.85c. to 4.10c.
No. 16	4.00c. to 4.25c.
Nos. 18 and 20	4.15c. to 4.40c.
Nos. 22 and 24	4.30c. to 4.55c.
No. 26	4.45c. to 4.70c.
No. 28	4.60c. to 4.85c.
No. 30	4.75c. to 5.00c.
No. 30	5.25c. to 5.50c.
No. 28 and lighter, 36 in. wide, 20c. higher.	

Welded Pipe

Standard Steel

	Black	Galv.
1-in. Butt.	—50	—40
2-in. Butt.	—61	—47
3-in. Butt.	—63	—49
4-in. Butt.	—60	—46
5-in. Butt.	—56	—44
6-in. Butt.	—55	—43

Wrought Iron

	Black	Galv.
1/4-in. Butt.	—30	—13
1 1/2-in. Butt.	—32	—15
2-in. Lap.	—27	—10
2 1/2-in. Lap.	—30	—15
7-12-in. Lap.	—23	—7

Steel Wire

BASED PRICE* ON NO. 9 GAGE AND COARSER

	Per Lb.
Bright basic	3.50c. to 3.75c.
Annealed soft	3.50c. to 3.75c.
Galvanized annealed	4.25c. to 4.50c.
Coated basic	4.00c. to 4.25c.
Coated soft	5.50c. to 5.75c.

Brass Sheet, Rod, Tube and Wire

BASE PRICE

High brass sheet	17 1/4 c. to 17 1/2 c.
High brass wire	17 1/4 c. to 17 1/2 c.
Brass rod	14 1/4 c. to 14 1/2 c.
Brass tube, brazed	26 c. to 27 1/2 c.
Brass tube, seamless	18 1/2 c. to 19 c.
Copper tube, seamless	21 1/2 c.

Copper Sheets

Sheet copper, hot rolled, 24 oz., 21c. to 21 1/2c. per lb. base.

Cold rolled, 14 oz. and heavier, 2c. per lb. advance over hot rolled.

Tin Plates

Bright Tin	Grade "AAA" Charcoal 14x20	Grade "A" Charcoal 14x20	Coke—14-20	Primes Wasters
	IC.. \$10.00	\$8.50	80 lb...	\$6.05 \$5.80
	IX.. 11.25	10.00	90 lb...	6.15 5.90
	IXX.. 13.00	11.50	100 lb...	6.25 6.00
	IXXX.. 14.75	13.25	IC...	6.40 6.15
	IXXXX.. 16.25	15.00	IX..	7.40 7.15
			IXX..	8.40 8.15
			IXXX..	9.40 9.15
			IXXXX..	10.40 10.15

Terne Plates

8-lb. Coating 14 x 20

100 lb.	\$7.00
IC	7.25
IX	7.50
Fire door stock	10.00

Tin

Straits, pig	33c.
Bar	38c. to 43c.

Copper

Lake ingot	15 c.
Electrolytic	14 1/2 c.
Casting	14 1/2 c.

Spelter and Sheet Zinc

Western spelter	6 1/2 c. to 7c.
Sheet zinc, No. 9 base, casks	10 1/2 c. open 11c.

Lead and Solder*

American pig lead	5 1/2 c. to 6 1/2 c.
Bar lead	6 1/2 c. to 7 c.
Solder, 1/2 and 1/2 guaranteed	24c.
No. 1 solder	22c.
Refined solder	18c.

*Prices of solder indicated by private brand vary according to composition.

Babbitt Metal

Best grade, per lb.	75c.
Commercial grade, per lb.	35c.
Grade D, per lb.	25c.

Antimony

Asiatic	6c. to 6 1/2 c.
---------	-----------------

Aluminum

No. 1 aluminum (guaranteed over 99 per cent pure), in ingots for remelting, per lb.	26c. to 28c.
---	--------------

Old Metals

Prices are a little lower and business is difficult except at concessions. Dealers' buying prices are nominally as follows:

	Cents Per Lb.
Copper, heavy crucible	10.75
Copper, heavy wire	10.00
Copper, light and bottoms	8.00
Brass, heavy	5.25
Brass, light	4.50
Heavy machine composition	7.25
No. 1 yellow brass turnings	5.80
Red brass or composition turnings	7.00
Lead, heavy	4.75
Lead, light	4.50

THE IRON AGE

New York, March 2, 1922

ESTABLISHED 1855

VOL. 109, No. 1

Open-Hearth Furnace Design

Calculations for Hearth Area, Depth of Metal,
Incline of Parts and Velocity
of Gases

BY A. D. WILLIAMS

DESIGN computations for an open hearth furnace do not require any large amount of mathematical knowledge, for the principles involved are comparatively simple. As in all other engineering and chemical propositions, it involves compromising a number of different requirements, and co-ordinating them in the right manner to secure a desired result. All elements of the problem are closely inter-related, and

of the computation being to illustrate the formulae used and their application.

Reactions in the open hearth furnace are well known. Their main effect as far as the flue gases are concerned, is an increase in CO_2 and the moisture content, the latter in the first part of the heat, and the former during the boil and after adding limestone. The fuel consumption will vary with the method of working

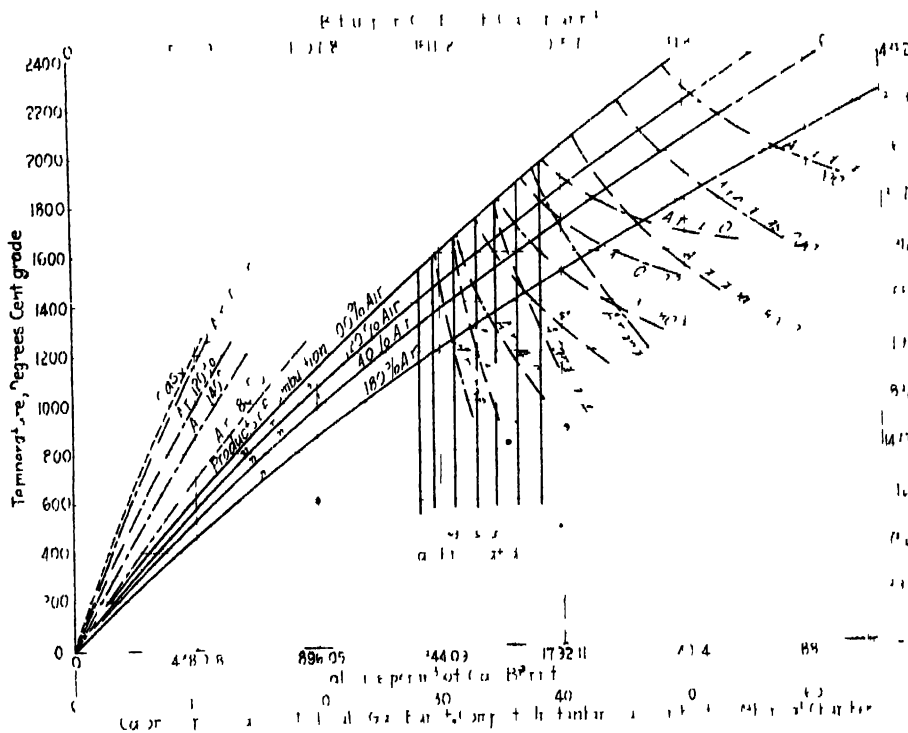


Fig. 1 Gas and Air Curves for Combustion with Varying Supply of Air

changes and modifications at one point necessitate carrying a corresponding modification through the entire system which it affects.

To establish a base for departure, it has been assumed that a furnace having a nominal capacity of 100 tons is to be built, that it is to be fired with producer gas and that the actual hearth area will be 650 sq. ft. The computations will be limited to those required to establish the design lines. Certain factors may be more or less arbitrarily fixed, without regard to current practice or whether they are desirable or not, merely for the purpose of furnishing a working base, the purpose

the furnace, etc., ranging from 185 lb (220 kg.) per ton when using molten pig, up to 770 lb (350 kg.) per ton and higher. The fuel consumption is not uniform during each furnace cycle, from charge to charge, but varies about as follows:

Percentage of Cycle (Time)	Percentage of Fuel Consumed
63.0	18.0
17.0	15.2
14.0	8.4
1.0	0.4
5.0	
100.0	100.0

For the case in hand it is assumed that the

consumption will be about 560 lb. (250 kg.) per ton, converted into producer gas of the following percentage composition: H_2 , 12.10; CH_4 , 2.60; C_2H_4 , 0.40; CO , 21.78; O_2 , 0.02; CO_2 , 5.68; H_2O , 3.82; N_2 , 53.60; having a thermal value of 142 B.t.u. per cu. ft. (1261 calories per cu. m.) low value. The heat capacity of this gas, and the air supply required for its combustion and for the products of combustion, are shown by the curves, Fig. 1, which are similar to those shown on

Table 1 Combustion of Producer Gas

Volumetric Composition of Gas, Per Cent	B.t.u. Per Cu. Ft. of Element	H.C.U. Per 100 Cu. Ft. of Gas	Percentage of Gas Volume			
			O ₂ Required	CO ₂	H ₂ O	N ₂ *
H ₂ 12.10	293.2	3,548	6.05	12.10	24.20	
CH ₄ 2.60	983.1	2,557	5.20	2.60	2.60	20.80
C ₂ H ₄ 0.40	1,610.0	614	0.60	0.80	0.80	2.40
CO 21.78	342.6	7,484	10.89	21.78		43.56
O ₂ 0.02			-0.02			-0.08
CO ₂ 5.68				5.68		
H ₂ O 3.82					3.82	
N ₂ 53.60						53.60

100.00 14,233 22.72 30.86 21.92 144.48
Theoretical air supply = 22.72 × 5.00 = 113.60 cu. ft. per 100 cu. ft. gas.

*Assuming atmosphere to consist of 80 per cent N₂ and 20 per cent O₂.

Air Supply Per Cent	Volume	Excess Air	Products of Combustion of 100 Volumes of Gas				
			O ₂	CO ₂	H ₂ O	N ₂	Total
100	113.60	0.00	0.00	30.86	21.92	144.48	197.26
120	126.32	22.72	4.54	30.86	21.92	162.66	219.98
140	159.01	45.41	9.09	30.86	21.92	180.83	242.70
180	204.48	90.88	18.18	30.86	21.92	217.18	288.14

page 1225, THE IRON AGE, April 29, 1920. Table I gives the combustion and air supply data for this gas.

One pound of coal produces 70 cu. ft. of this gas, its specific weight being 0.07024 lb. The products of combustion, with 40 per cent excess air, weigh 0.08241 lb. per cu. ft. At the maximum rate of working, the gas will be burnt at the rate of 188 cu. ft. per second, requiring 300 cu. ft. of air, and the products of combustion will be 451 cu. ft. These are the volumes at 82 deg. Fahr. and 29.92 in. barometer. As the volu-

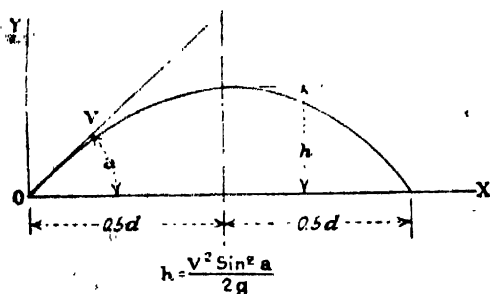


Fig. 2. The Parabolic Curve of an Inclined Jet

metric correction for pressure is comparatively small, it will be neglected in the computation, and temperature corrections alone used.

As the capacity of the furnace is to be 100 tons, the metal volume will be 523 cu. ft. With a hearth area fixed at 650 sq. ft., the approximate depth of the bath will be:

$$d = \frac{80}{\pi} \times \frac{3 \times 523}{650} = 2.41 \text{ ft.} = 29 \text{ in. of metal}$$

As the bottom will slope toward the tap hole, and be banked at both ends and sides, the actual maximum metal depth will depend upon the way this is done. As there will be at least 12 in. of bottom, the depth to the brick will be about 42 in. from the sills of the charging doors, and the port sill or bridge will be fixed 4 in. higher, making the total maximum depth that the flame must drop below the port, 48 in.

The brick lines of the hearth will have to be fixed

outside of the bath area to be fixed. The inside width between walls will be made 15 ft. (4.5 m. 00) and the length between port sills 44 ft. 8 in. (13 m. 50), giving an area of 726 sq. ft. (67 m.² 80). If the length is cut to 42 ft. 8 in. (13 m. 00) the area will be reduced to 700 sq. ft. (65 m.² 00). Or, the width might be reduced slightly by increasing the length. There are advantages in reducing the span of the roof, as well as disadvantages in making the furnace too long; but it is possible that a length of 46 ft. (14 m. 00), with a width of 15 ft. 3 in. (4 m. 650), giving an area of 701 sq. ft. (65 m.² 11), would be satisfactory.

The temperature in the heating chamber will be 3275 deg. (1800 deg. Cent.) for the gases, the roof being 100 to 200 deg. (55 to 110 deg. Cent.) cooler and

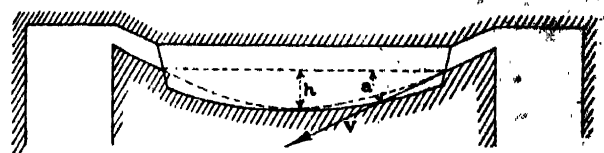


Fig. 3. The Inverted Parabola of a Flame in Making Bottom.

the bath from 270 to 450 deg. (150 to 250 deg. Cent.) cooler. The height of the chamber may be approximated by Yesmann's formula:

$$h_t = A \sqrt{\frac{Q_t^2}{B - t}}$$

In which,

h_t = the thickness in ft. of the moving gas layer;
 Q_t = the volume of gas in cu. ft. at t deg. (Cent.) temperature;
 B = the width of the furnace in ft.;
 A = a coefficient which varies for each value of h_t and B in accordance with the following table.*

h_t	Values of B				
	3 ft.	6 ft.	9 ft.	12 ft.	16 ft.
1 ft.	2.275	2.36	2.4	2.42	2.48
1.5 2.0	2.215	2.32	2.38	2.4	2.41
2.0 2.5	2.15	2.28	2.35	2.38	2.39
2.5 3.0	2.08	2.245	2.32	2.36	2.38
	2.01	2.2	2.3	2.35	2.375

The metric formula, together with many others used herein, will be found in "The Flow of Gases in Furnaces," by W. E. Groume-Grjmailo. For the case in hand:

$$Q_t = Q_0 (1 + \alpha t) = 451 \times 7.606 = 3430 \text{ cu. ft.} \\ (= 97 \text{ m}^3 \cdot 14) \\ t = 3275 \text{ deg. Fahr. } (= 1800 \text{ deg. Cent.}) \\ B = 16.4 \text{ ft. } (= 5 \text{ m. 00}) \text{ or } 15.25 \text{ ft. } (4 \text{ m. 650}) \\ A = 2.37 \text{ and } 2.34, \text{ approximately.}$$

The formula may now be written with these values, as follows:

$$\text{For } B = 16.4 \text{ ft. } h_t = 2.37 \sqrt{\frac{(3430)^2}{(16.4)^2 \times 1800}} = 6.88 \text{ ft.} \\ \text{For } B = 15.25 \text{ ft. } h_t = 2.34 \sqrt{\frac{(3430)^2}{(15.25)^2 \times 1800}} = 7.11 \text{ ft.}$$

This will be the distance from the surface of the bath to the center of gravity of the roof segment. It will give an approximate height of the skewbacks, above the door sills, of 5 ft. 4 in. (1630 mm.) for the wider chamber, and 5 ft. 7 in. (1700 mm.) for the narrower chamber.

With a chamber area of 700 sq. ft. (65 m.²) the chamber volume will be approximately 5087 cu. ft. (144 m.³) for the wider chamber and 5280 cu. ft. (149 m.³ 50) for the narrower chamber. The gases will remain in the chamber approximately 1½ seconds; which, with a temperature drop of 360 deg. (200 deg. Cent.) per second means a temperature of approximately 2715 deg. (1500 deg. Cent.) for the gases leaving the chamber. Referring to the curve, Fig. 1, and allowing for a drop in calorific intensity of about 360 deg. (200 deg. Cent.) it will be seen that a preheat of the air and gas of between 1470 and 1830 deg. (800 and 1000 deg. Cent.)

*Using metric units throughout, the table of values is as follows:

h_t	Values of B				
	1.0 m.	2.0 m.	3.0 m.	4.0 m.	5.0 m.
0.3 m.	2.42	2.48	2.5	2.52	2.58
0.5 0.7	2.215	2.32	2.38	2.4	2.41
0.7 1.0	2.15	2.28	2.35	2.38	2.39
	2.08	2.245	2.32	2.36	2.38
	2.01	2.2	2.3	2.35	2.375

will be required. Allowing for a possible loss of temperature in the necks, cinder pockets and on the checkerwork will be proportioned to supply a constant of 2200 deg. (1200 deg. Cent.).

The distance the jet of flame must drop below the bridge or port sill, to permit the sintering of the bottom, has been fixed at 48 in. (1200 mm.). An assumed resultant velocity of the air and gas will fix the resultant angle of the two jets. The higher the assumed resultant velocity, the less the resultant angle will be, and the further beyond the center of the chamber the point of maximum depression of the jet of flame.

High velocities, in addition, cause the incoming end of the chamber to work cold and the outgoing end to work hot, while the desirable condition is that both ends of the chambers shall work, as nearly as possible, uniformly. High velocities for either the gas or the air mean reduced port areas, and high velocities for the outgoing products of combustion, which in turn call for an increased draft depression to pull the gases through the ports. This draft depression creates a suction acting to pull air in through the valves, flues and chamber walls. At the same time, it is necessary to have sufficient draft to draw the waste gases out of the chamber and down through the checkerwork, but the lower this draft depression, the less the tendency to induce air leakage or infiltration.

As the flame has to drop 48 in. in one-half the 46-ft. (14 m. 00) length of the furnace, an angle somewhat greater than 10 deg. must be allowed for the trajectory of the jet. Yesmann's formula for this case is:

$$H = \frac{v^2 \sin^2 \alpha}{2g} \times \frac{459 + t_i}{t_m - t_i}$$

In which,

H = the middle ordinate of the parabola, in this case 4 ft.;
 v = the resultant velocity of the two jets uniting to form the flame;

$\sin \alpha$ = the sine of the resultant angle of the two jets;

$2g$ = gravitational constant = $2 \times 32.2 = 64.4$;

t_i = the temperature of the gases within the chamber;

t_m = the temperature of the gases in the jet.

When a furnace is heating up, the stream of flame tends to follow the roof until the interior of the cham-

ber becomes raised to a temperature sufficient to permit it to drop, and the drop of the flame is an index of the progress made in heating the furnace. It is likewise desirable to be able to sinter the bottom, when the furnace for any reason may be cooler than usual, or the ports eroded. The temperature of the jet of flame, t_m , may be assumed as 3275 deg. (1800 deg. Cent.) and the gases in the chamber as 1475 deg. (800 deg. Cent.) = t_i . Velocities of $v = 50, 65$ and 80 ft. (15, 20 and 25 meters) per second, tried out in the formula and solving for $\sin \alpha$, give a resultant angle as follows:

$$\begin{aligned} \text{For } v &= 50 \text{ ft. per second } \alpha = 18^\circ 34' \\ v &= 65 \text{ ft. per second } \alpha = 14^\circ 11' \\ v &= 80 \text{ ft. per second } \alpha = 11^\circ 29' \end{aligned}$$

In solving to obtain these angles:

$$\begin{aligned} t_i &= 1475 \\ 459 + t_i &= 1834 \\ t_m - t_i &= 3275 - 1475 = 1800 \\ H &= 4 \quad 2g = 2 \times 32.2 = 64.4 \end{aligned}$$

The formula can now be written:

$$H = 4 = \frac{v^2 \sin^2 \alpha \times 1834}{64.4 \times 1800}$$

which becomes

$$\sin \alpha = \sqrt{\frac{253.5}{v^2}} = \frac{15.92}{v}$$

$$\text{For } v = 50 \text{ ft. per sec. } \sin \alpha = 0.3184$$

$$\text{For } v = 65 \text{ ft. per sec. } \sin \alpha = 0.2449$$

$$\text{For } v = 80 \text{ ft. per sec. } \sin \alpha = 0.1990$$

Should t_i be given a higher value than 1475 deg. (800 deg. Cent.) the angle will be less. Two components may be selected to suit the resultant angle and velocity, but this cannot be intelligently done until the pressures available for impressing velocity upon both the gas and the air have been approximated. For the air, the pressure available will be entirely due to the chimney effect of the system, diminished by the resistance to the flow of the air, unless a fan is used. The same pressure is available, in the case of the gas, plus the pressure in the gas main, which is more or less under control through the steam blower on the producer. To determine this chimney effect, it is necessary to arrive at the regenerator height.

Industrial Conditions in Belgium

WASHINGTON, Feb. 28.—The revival of Belgian industries during the last quarter of 1921 was largely artificial, being caused by a combination of temporary factors, especially the decline of German competition, says Acting Commercial Attache Cross in a cable to the Department of Commerce. Since Jan. 1 this improvement has been abruptly checked, especially in the window glass, coal and metallurgical industries. The rise in French exchange, price reductions on British coal, iron and steel, and American window glass, have been chiefly responsible for the reaction, and Belgian manufacturers are finding drastic measures necessary in meeting foreign competition. Wage reductions are under negotiation in the coal mines and window glass plants. Coal prices have been cut from 6 to 10 francs per ton to meet the British competition, and price reductions in window glass are being considered to meet the American cuts. Colliery stocks are increasing, and the tendency toward the combination of coal mines and purchase of collieries by metallurgical interests is continuing. Coke production has been greatly stimulated by the foreign demand and all ovens are working to capacity.

On Feb. 1, 18 blast furnaces were operating as compared with 15 a month previous. These are now producing 546 tons of foundry iron and 2470 tons of basic pig per 24 hours. The increased production has resulted in a marked price reduction which has been further hastened by the low British quotations which have occurred in all metallurgical lines during the past few weeks, representing decreases ranging from 10 to 20 francs on billets and from 50 francs on billets and 100 francs on open hearth steel and

erally are down 1 franc per kilo. From the Belgian standpoint, further reductions are both probable and essential, owing to the persistent low offers of British pig iron and semi-finished productions in the local centers.

The Sambre et Moselle works have recently received an order for 40,000 tons of rails from Argentina, and Brazil has placed an order for 32,000 tons with the Usines de la Providence. Other important rail orders have been received from Holland and Bulgaria.

Corporations Granted Extension of Time

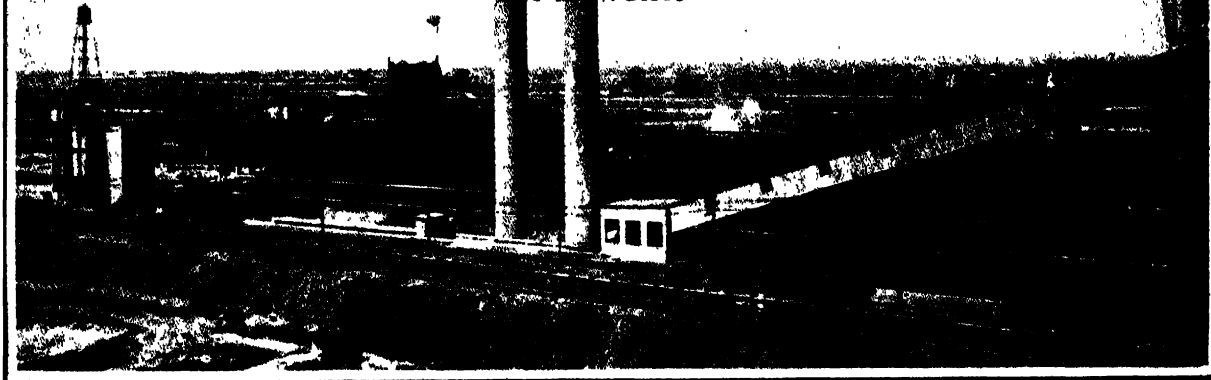
WASHINGTON, Feb. 28.—Commissioner of Internal Revenue Blair has granted a general extension of time to domestic corporations for completing returns of income for the calendar year 1921, the fiscal year ended Jan. 31, 1922, and the fiscal year ending Feb. 28, 1922. The extension is conditional upon the filing of tentative returns with the Collector of Internal Revenue on or before March 15, April 15 and May 15, 1922, respectively, accompanied with at least one-fourth of the estimated amount of tax due, together with a statement setting forth the reason why the return cannot be completed within the prescribed time, and a formal request for the extension.

This permission was granted on the plea of corporations which insisted that it was a physical impossibility to make the returns on the date required in the revenue act of 1921. The tentative returns must be so labeled and only the name and address of the taxpayer and the estimated amount, if any, of the tax due need be stated. The law provides for a levy of 6 per cent in the event of a delinquency in the first instalment.

Roberts Type of By-Product Coke Ovens

Granite City Batteries Produce Metallurgical Coke from
Illinois and Indiana Coals—Design and
Operation—Results Secured

BY M. W. DITTO



Editor's Note: The successful production of metallurgical coke from the high volatile coals of the Illinois and Indiana fields has long been regarded as impossible. Yet by-product ovens, designed for that very purpose, have been in operation for a year. The blast furnace of the new plant of the St. Louis Coke & Chemical Co., Granite City, Ill., was described in an illustrated article in THE IRON AGE of Jan. 6, 1921. The first published description of the Roberts type coke ovens of that company is appended below. The author is consulting engineer of the St. Louis Coke & Chemical Co., and also of the American Coke & Chemical Co., of which the former is a subsidiary. The outstanding difference between the Roberts oven, as constructed at Granite City, and other by-product installations lies in the baffled structure of the wall, which permits the heat to be absorbed from the heating gases in the combustion chamber at a higher rate than in the flue type of oven. The heating walls are always maintained at a temperature above the heat requirements of the coal, eliminating the variation in temperature resulting from heat absorption by fresh coal, and thereby preventing the volatilization of the binding elements.

PIG iron was produced in and about St. Louis in some quantity before it was produced in the Chicago district and other places that have since become famous as iron producing centers. What pig iron was produced in this district was mostly from native Missouri ore with charcoal as fuel. The production of iron gradually decreased, however, as other producing centers, such as Pittsburgh, the Valley district and Chicago, grew up, until it ceased entirely. At the meantime St. Louis became one of the largest iron melting towns in the United States, and depended entirely upon iron shipped in from other districts.

In view of the fact that St. Louis was contiguous to one of the largest coal deposits in the world, and that freight rates on ore were on an equitable basis with other iron producing points, there seemed to be only one thing that prevented St. Louis from becoming a permanent iron producing center, and that was the inability to utilize the coals contiguous to it. Previous to the time that the Steel Corporation was formed, John W. Gates and Levi Z. Leiter of Chicago became interested in the production of coke from these coals on a large scale. Mr. Leiter carried out some early experiments that indicated that it was possible to use these coals if apparatus that could be economically operated could be devised. Unfortunately Mr. Leiter died before the conclusion of his earlier plans, and the development work on the use of Illinois coal for the production of metallurgical coke lay dormant for several years.

Development work was undertaken again, however,

and finally concentrated itself around the organization built up by Arthur Roberts of Chicago and his associates, and crystallized in the construction of the St. Louis Coke & Chemical Co. plant at Granite City, Ill. This plant was completed and put into operation in January, 1921. It consists of one 500-ton blast furnace, designed by Freyn, Brassert & Co., Chicago, and 80 Roberts by-product coke ovens, arranged in two batteries of 40 each.

The furnace is of standard design of the following dimensions: Height, 86 ft.; hearth, 17 ft.; bosh, 20 ft. 6 in.; bosh angle, 80 deg. 5 min. The furnace has been successfully operated since its installation on coke made from Illinois and Indiana coal. It is operated in conjunction with the National Enameling & Stamping Co., which has ten open-hearth furnaces and produces practically all of the steel used in its enameling and stamping departments. The iron is transmitted from the furnace to the open-hearth furnaces in the hot metal form in Treadwell ladles, and the furnaces are heated with coke oven gas and tar.

As it is anticipated that the successful coking of Illinois coals will lead to great expansion of the steel industry in the St. Louis district, the plant at Granite City was laid out for an ultimate daily capacity of 3000 tons of pig iron and 8000 tons of coal, consisting of six blast furnaces and 320 ovens. The initial installation is so arranged that the two units closest together are now built, and the extensions will be made in both direction from these units.

As stated, the coke ovens are arranged in two bat-

consists of 24 ovens each, supplied from one coal storage bin, having a capacity of 1900 tons. All of the equipment of the coke oven plant is standard, the only peculiarity of the plant being the design of the coke ovens themselves.

Before building this plant, the only installation of Roberts ovens that was used for producing coke from high volatile coal for blast furnace purposes was a group of 24 at Dover, Ohio, in conjunction with the M. A. Hanna Co. furnace there. The practice established at that point was the basis for the Granite City design. The Dover ovens used the common regenerators for preheating the air, similar to the old Otto-Hoffman type, but aside from the regenerative feature the ovens are practically the same as in St. Louis.

Considerable interest was created when it was announced that the Granite City ovens were to be equipped with recuperators made of silica brick and covering the entire space underneath the ovens, similar to the individual regenerative type of oven. A brief description of the ovens will clearly show how the design differs from what has been known as common practice in coke oven construction up to the present time.

Construction features of the oven are shown clearly in the skeletonized model view. It will be noted that the recuperators are divided into two individual independent sections, and occupying all of the space underneath the ovens with the exception of the dividing wall. The waste gases make two passes in each of these sections and each section is made up of 16 flues of 4 tiers each. The gases pass through the flues, and the air flows countercurrent upward on the outside of the flues. The entire recuperator is constructed of silica brick.

Each oven has a capacity of 600 cu. ft. of coal, and an average width of 14 in. The coal is charged within one foot of the top of the coke oven chamber, through five charging holes. The products of distillation are taken off on the pusher side through a single ascension pipe, and both batteries are equipped with duplex foul gas mains, so that the gas can be separated. All of the fuel gas is introduced at the top of the oven, the primary gas being introduced at a point about 12 in. below the coal line, and the secondary, half way down the wall.

The primary and secondary gas headers or manifolds at the top are independent. These headers are rectangular in shape, with a partition in the center, one side being for the primary gas and the other side for the secondary. The primary gas goes through a

4-in. hole lined with fire clay tile, having a 3-in. hole in it.

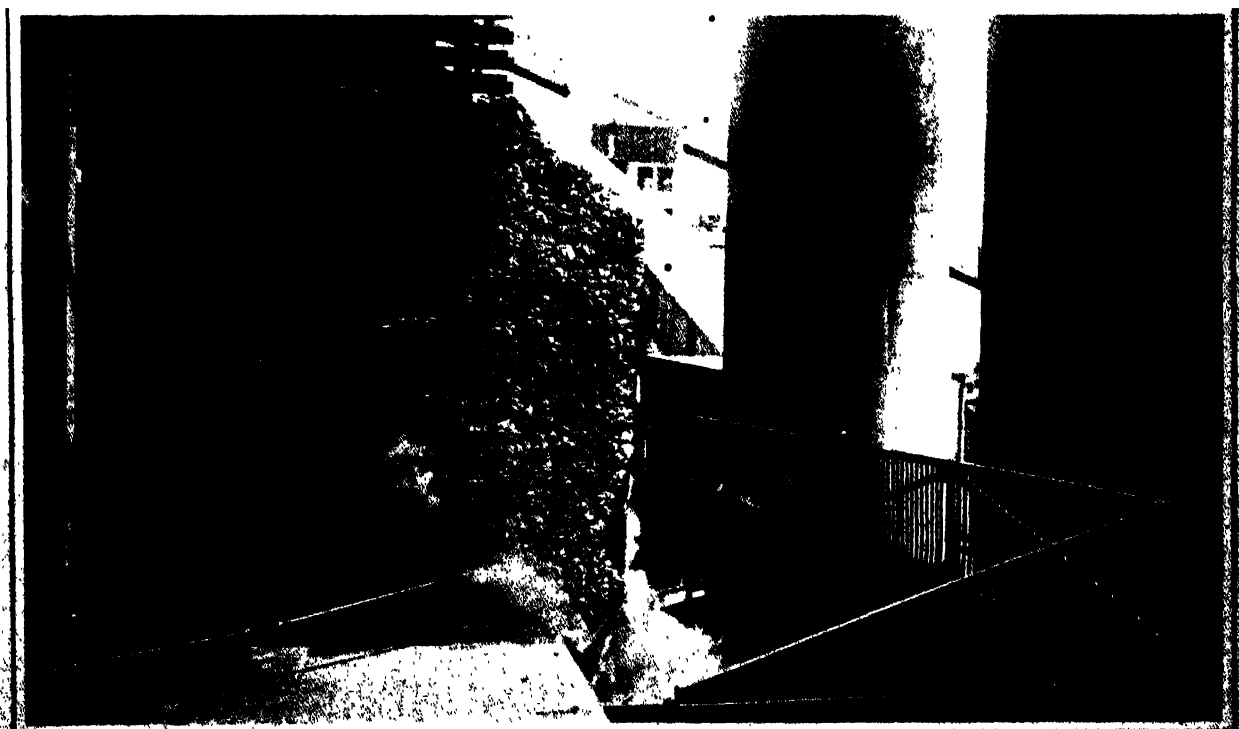
Air coming out of the top of the recuperators rises through the center wall to practically the top of the coke oven chamber. There it is transferred across the wall and passes down through ports on each side of the port through which the primary gas is introduced. All of the air is introduced at this point and our common practice is to introduce only 50 to 60 per cent of the gas required for the carbonizing of the coal at the orifices of the primary gas. The balance of the gas enters through the secondary ports, which are reached by ducts coming from the top of the wall through the center wall, and enters the combustion chamber through inclined slots in the side of the brick.

All of the products of combustion, accumulating in the upper sole flue, are allowed to go through ports, regulated by slide brick, into the lower sole flue, where they are all brought to the end of the oven and thence downward to the first pass into the top of the recuperator. After passing through the lower section of the recuperator they are discharged into the waste gas offtakes, in which a butterfly valve is inserted to regulate the draft on each oven.

There are seven ducts in the concrete foundation supporting the oven structure. The air comes into these ducts from the ends of the foundations at both extremities of the battery, and passes through the ports on top of the first course of fire clay brick into the base of the recuperator. These ports have cast iron slide dampers over them to regulate the quantity of air. This has proved a very satisfactory way of introducing the air, because we have been able to maintain the concrete work underneath the ovens at practically atmospheric temperature, so that there have been no expansion problems involved in that part of the installation.

In designing this oven the principal things we kept in mind were the fact that we wished to produce a large tonnage of coke, per dollar invested in the plant, and to simplify the operation of the ovens to as high a degree as possible. Therefore, there are no points in the oven where regulation of both air and gas or products of combustion is dependent upon a combination of regulator dampers. The draft is regulated by the butterfly valve in the waste gas offtakes. The distribution of the draft is regulated by the slide brick on the ports at the bottom of the upper sole flue.

The amount of air going to each primary burner is regulated by the slide brick at the top of the wall, and the amount of gas passing into the wall at any one



Coke Being Pushed into the Receiving Car

point is regulated by the adjustment of the cocks coming off of the distribution manifolds along the top of the oven. The gas is regulated by drilling a predetermined size hole in the plug that goes into each individual cock. These holes vary in size according to the width of the oven, and the quantity of gas that each oven gets is determined by the pressure carried upon the main header, based upon the well-known fact that a given quantity of gas at constant pressure will flow through a given size orifice in a unit of time.

To vary the quantity of gas being burned per unit of time requires merely the changing of the pressure on the main headers, which is done by setting a governor instead of changing the sizes of the orifices in the individual cocks. After having determined the quantity of gas required for a given coking time and having placed the proper size orifice in the cocks, the only function of the heater from that time on is inspection of burners to see that they do not become clogged.

The secondary gas is regulated in the same way. On the ends of the gas manifolds there is an auxiliary pipe connection coming from a separate header, in which air at 1 lb. pressure is supplied by an ordinary high-speed blower.

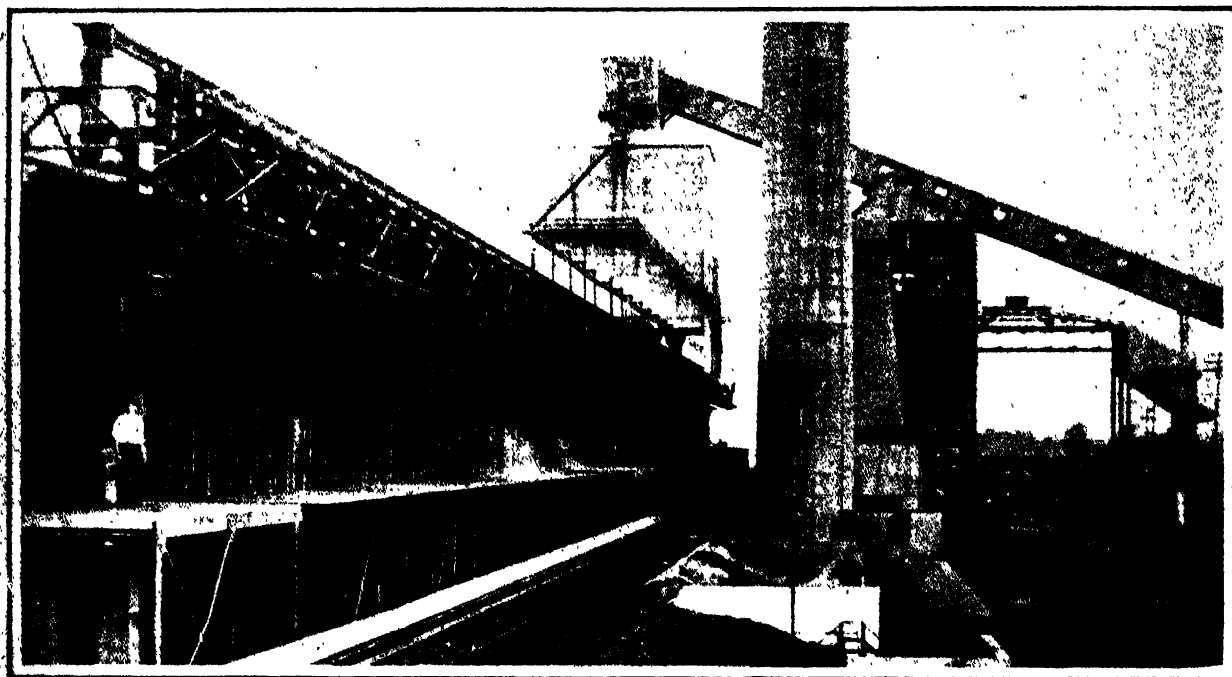
Our practice is to cut off the gas entering the

naturally arises as to the relative value of introducing gas into a coke oven wall at more than one point in its elevation does not present any operating difficulties, and in our opinion the advantages gained by these means are worthy of serious consideration.

The height of the walls of the Roberts oven is 13 ft. 9 in. The ordinary lean coke oven gas running high in hydrogen necessarily burns with short flame. Hence by using the method of distributing and burning the gas described, we have no difficulty in maintaining a uniform temperature on the high wall, thereby getting the benefit of the greater tonnage with narrower coke oven chambers.

The brick work in the coke oven wall is of standard Roberts type, making a combustion chamber that is intercommunicating throughout its entire length, with the exception of the baffles, partially isolating the three end burners. These baffles are put in to make it possible, by draft regulation, to compensate for the extra heat required to keep the ends at the same temperature as the balance of the wall.

The action of the gas being introduced into a coke oven wall of this type is interesting. It has always been assumed that, by satisfying the given quantity of gas with all of the air necessary to burn it, this



Coke Discharge Side of Ovens

secondary gas ducts every 6 or 8 hr., and allow the air at 1 lb. pressure to pass through them. In this space of time there will be from 1/16 to 1/8 in. of carbon formed on the walls of the duct, which is 1 1/2 in. in diameter. As this carbon is red hot the admittance of air into the duct starts combustion immediately, and in the space of from 10 to 15 min. the carbon is all burned out. We do not consider that there is any heat loss from this, because observation shows that the temperature of these ducts is hotter at the end of the decarbonization period than at the beginning, and the products of combustion resulting from burning the carbon are hot enough so that there is no deleterious effect upon the heating conditions in the lower part of the wall.

As a result of this practice, we have had no trouble from introducing the gas through the secondary gas ducts, and, by the arrangement used, it requires very little of the heater's time, the only important thing being that this operation is carried on regularly at stated intervals.

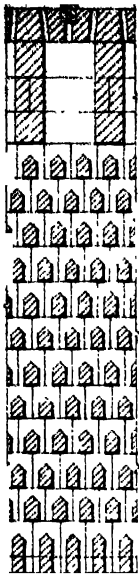
The benzol equipment has not yet been installed at this plant, and we are using the lean gas for fuel without the benzol being taken out. Our experience showed at Dover that, when the gas was debenzolized, it was not necessary to decarbonize these ducts more than once every two or three days. So the question that

would localize the heat at the point of combustion. This is not entirely true, according to our practice, because of the fact that only 50 per cent of the gas is introduced at the point where all of the air comes in.

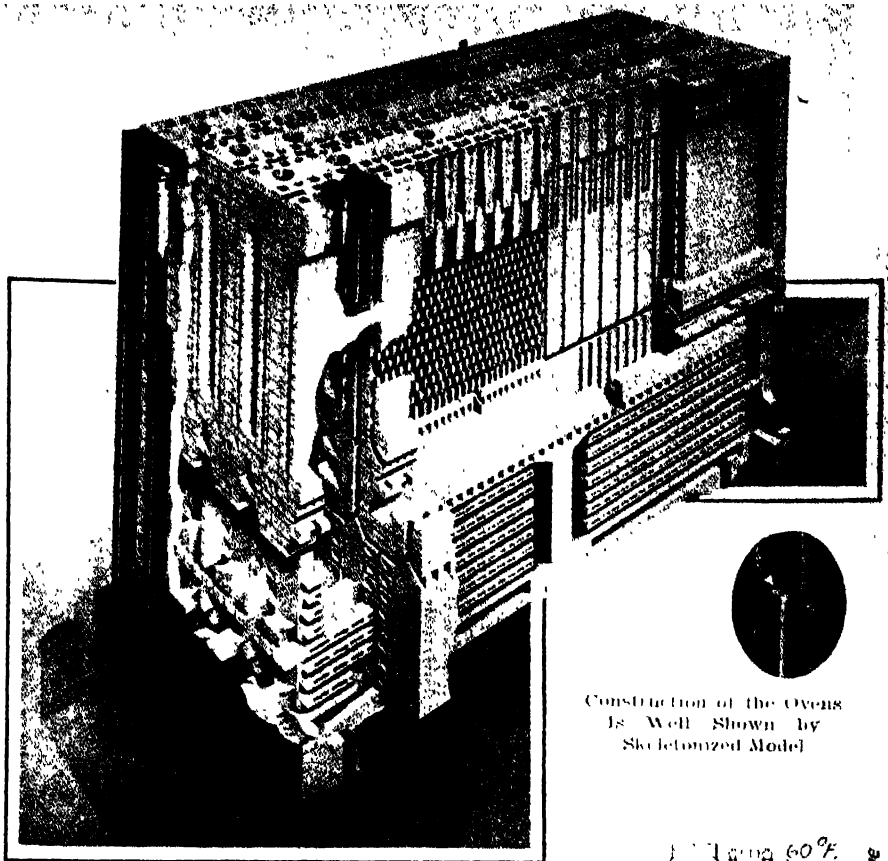
As it is necessary to raise the excess of the 50 per cent of air up to flame temperature, the latter is reduced or tempered by the excess air; and as the point where the air and gas first meet is a mixing chamber, which might be termed a short flue, the rate of heat extraction is lower than it is further down in the wall. There is no question that by interrupting the flow of gas, as in this type of wall, the rate of extraction of heat from the flame is higher than in a flue structure.

When we come to the point where the secondary gas is introduced, it mixes with the products of combustion resulting from the primary introduction, and the air at that point is diluted to such an extent that the rate of combustion is materially slowed down.

All of this gas passes through the section of the wall in which it is being constantly impeded by that part of the brick which crosses the combustion chamber. We have found it to be an arbitrary problem whether either the top or the bottom of the coke oven wall should be carried at a uniform temperature, or hotter or cooler; and it is our practice to carry the bottoms a little hotter than the top, particularly on the fast coking times.



Plan of the Brick Forming the Baffled Structure of the Heating Wall, Being a Section Through the Heating Wall and Combustion Chamber



Construction of the Ovens Is Well Shown by Skeletonized Model

The comparison of the function of this wall with similar problems in heat disposal or absorption is often made with the air cooled gasoline motor. In this instance fins are cast upon the walls of the engine cylinder to dispose more rapidly of the heat, as it is absorbed by the inner surface of the wall. In the Roberts coke oven this condition is reversed, that is, we might say the fins are cast on the inside of a cylinder wall and act as heat absorbing elements instead of heat disposing elements.

By likening the checker brick combustion chamber to the fins on the engine cylinder, with the fins exposed to the heating gases, there is a more rapid absorption of heat than if the walls were smooth. While this analogy is not an entire measure of the function of this type of construction, it is a comparison that is interesting.

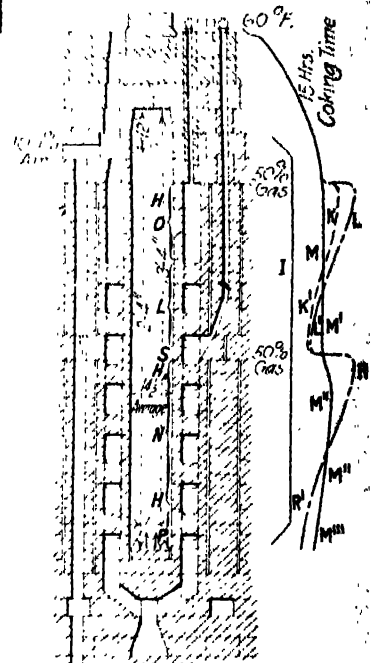
The oven was designed to have a waste gas temperature of 750 deg. Fahr. at the point where it left the lower pass of the recuperator, when operating the ovens at 15 hr. coking time. The operation of the plant has proved the figures on which we based these calculations to be accurate, and when operating at the slower coking time the waste gas temperatures run very much lower; that is, when operating on 18 to 22 hr. coking time, the waste gas temperatures are from 350 to 400 deg. Fahr., and by the same token, when operating at 12 to 13 and 14 hr. coking time, the waste gas temperatures go up to 850 deg. Fahr.

As this was the first installation utilizing a recuperator of this type, it was not our desire to seek the maximum gas economy, as there were some unknown factors that had to be worked out before the design could be adopted as standard. We now have that information, and feel that it will be possible to build an oven according to this design as economical in gas consumption as any regenerative oven that has been designed or put in operation to date.

When operating at the normal coking time of 15 hr., the air leaving the top of the recuperator is heated to a temperature of from 1670 to 2000 deg. Fahr. As this air passes up through the brick work between the two heating walls, it also increases in temperature to that of the brick through which it passes, increasing from 100 to 250 deg. Fahr., depending upon the operating conditions.

This heat is not lost, however, because it is a closed system going back to the heating wall on its re-

In This Section Are Shown Corresponding Curves Representing (I) the Ideal Condition with Heat Transferred to the Coal at Uniform Rate through Entire Height of Oven; (II) the Heat Effect Actually Present in Roberts Wall, (K, L and R) Theoretical Extremes to Which the Gases Would Go if Not Influenced by the Conditions Existing in the Oven



turn with new products of combustion; so that there is a continuous flow of heat of uniform temperature, which is the reversed condition of a reversing type of regenerator, and the average overall efficiency is just as high as could be secured with a regenerative design.

The oven is supported on two 18-in. silica brick walls that are corbelled in at the top to bridge over the top of the recuperator, so that the expansion of the recuperator can be taken care of independently of the oven structure. If, in the future, it is found necessary to reset the brick in this section of the oven, this can be done without interfering with the upper part of the structure.

There are independent buckstays on the bulkheads forming the insulating brick in front of the recuperators, controlled by screws from the main buckstays, so that the position of these small buckstays can be placed at the required point, regardless of where the main buckstays go.

The question of the difference in expansion between

(Continued on page 624)

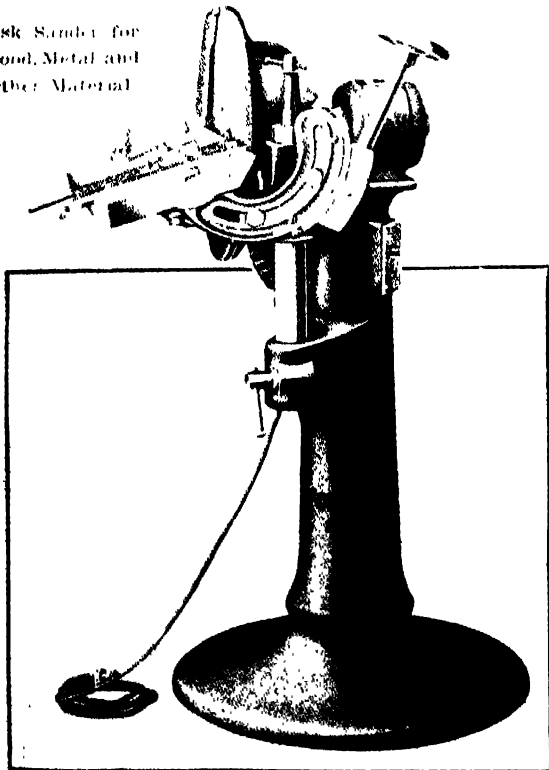
Motor-Driven Portable Disk Sander

A 15-in. motor-driven, portable disk sander for use in pattern shops and wood-working plants in general has been brought out by the Oliver Machinery Co., Grand Rapids, Mich. It is suitable also for sanding hard rubber, fiber, leather, and in machine shops, for medium and light metal work. The machine is designated as the No. 182 and is shown in the illustration.

The disk, is a steel plate 15 in. in diameter and is mounted on a disk shaft hub. It is removable for renewing sand paper. The speed of the disk is 1725 r.p.m. The disk head is a one-piece iron casting, containing the disk, disk shaft, ball-bearing end thrust and exhaust fan and system, forming one complete unit.

The table is 9 1/4 in. wide, 21 in. long and 37 in. from floor. It can be tilted 45 deg. down or 25 deg. up by the

Disk Sander for
Wood, Metal and
Other Material



hand wheel shown, a graduated index being provided to show the exact angle of tilt. The table has a 6-in. vertical adjustment and can be swung to the right to permit taking off of the disk. The angle gage, operating in the table slot, is graduated from 0 to 45 deg., both to right and left, for accurate setting.

The machine is equipped with a combination gage to enable circular, segment and duplicating work to be done. This gage consists of a plate with a hinged strip pivoted to the bottom, which rides in a slot on the table. The plate has a series of holes to take center pins for circular work and the fence part of the angle gage for duplicating work. There is also a stop gage and segment pin for segment sanding which is operated by a handle cast to the plate. An adjusting screw acts as a stop or set for amount of cut to be taken.

The motor is single, 2 or 3 phase, 60 cycle, 110 or 120 volt alternating current or 110 or 220 volts direct current, coupled to the disk shaft. A 25, 30, 40 or 50 cycle motor can be provided at extra cost. The motor runs in ball bearings and rotates the disk shaft, but does not take load of thrust. A plug connector permits of attachment to any light socket. The switch is of the push button type, located as shown.

Circular work up to 15 in. in diameter and duplicating work up to 7 in. wide can be handled. Garnet-paper disks are provided for wood sanding and aloxite or emery-cloth disks for metal grinding and polishing. The exhaust system deposits the dust within the column. The weight crated is 400 lb.

Blast Furnace Activities

Carnegie Steel Co. now is operating 28 of its 5 blast furnaces, 27 on pig iron and one on spiegelheisen. The latest addition to the active list is one of the three stacks at the Clairton works, all of which have been down for about a year, and one at Duquesne works. One of the Lucy furnaces which has been making Bessemer iron will soon go on to ferromanganese. LaBelle Iron Works recently started up its second furnace at Steubenville, Ohio, and the furnace of the Wheeling Steel & Iron Co. at Martins Ferry, Ohio, will be blown in before long. The number of active furnaces in the territory bounded by Johnstown, Pa., Portsmouth, Ohio, and Warren, Ohio, now is 60 out of a total of 140. Only five merchant furnaces and 25 steel stacks are in blast.

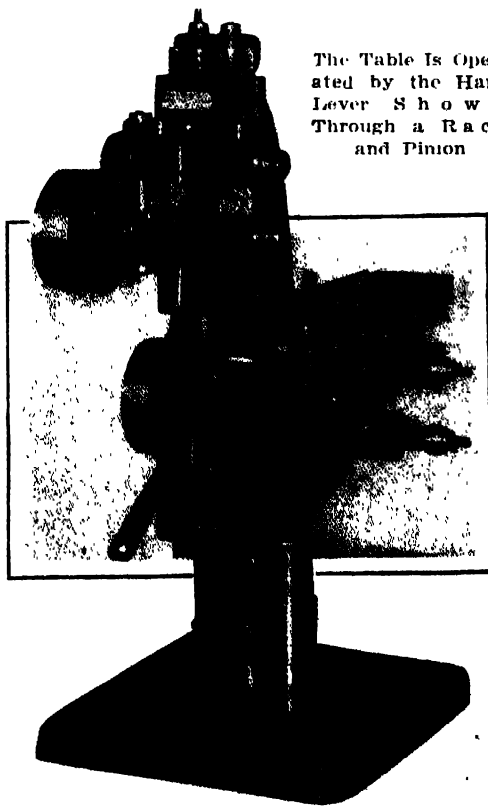
Duplex Hand Milling Machine

A duplex hand milling machine for slitting piston rings of the step type has been placed on the market recently by the Superior Machine & Engineering Co., Detroit. It is also intended for use in sawing apart babbitt-lined bearings for automobile crank shafts and for milling two keyways or slots at the same time or any similar operation.

The grinding surfaces are long in proportion to their width, which enables the slides to move freely without cramping. Sliding members can be clamped in position without disturbing the adjustment of the gibs.

The machine is driven directly from the line shaft, but can be arranged for motor drive, in which case a

The Table Is Oper-
ated by the Hand
Lever Shown.
Through a Rack
and Pinion



1 1/2-hp. motor is mounted on a bracket at the base of the machine. On the end of the main-driving shaft there is a change pulley which is belted to an upper pulley mounted on the lower spindle, as shown in the accompanying illustration. The drive to the upper spindle is through helical gears and a vertical shaft. The helical gears are hardened and run in oil. The spindles are of high-carbon steel and run in bronze bearings.

Graduated dials are provided on all adjusting screws. The table is operated by the hand lever, shown, through a rack and pinion. The machine weighs approximately 900 lb.

Dilworth, Porter & Co., Pittsburgh, maker of and track equipment, plant of which has been in several weeks, resumed

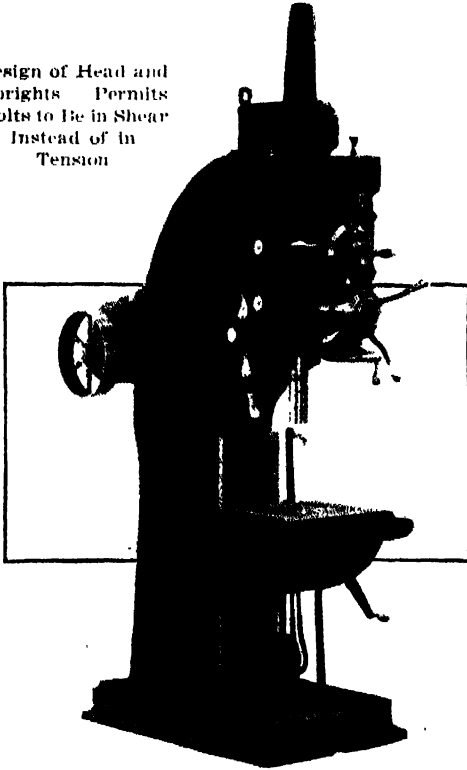
New

Machine

A new 20-in. high-duty drilling machine having a capacity for driving a 1½-in. high-speed drill through steel has been brought out by the Foote-Burt Co., Cleveland. It is designated as the No. 23, and was designed to take the place of the former machine bearing the same number.

The machine is shown in the accompanying illustration. The features include simplicity in general design, there being no loose brackets or other bolted-on

Design of Head and Uprights Permits Bolts to Be in Shear Instead of in Tension



parts, and in the interior mechanism, which has resulted in the elimination of many parts. All parts are readily accessible for inspection and adjustment. The use of a telescoping screw under the table is also eliminated, the single screw provided permitting vertical table adjustment of 12 in. without the necessity of providing a hole in the floor. Control is centralized, all operating levers being within easy reach from the operator's working position in front of the machine.

The design of the head and column permits bolts to be in shear instead of in tension. Bending stresses due to high-drilling pressures are taken up by the rigid upright, which is also reinforced by the head. It is claimed that this method of construction is better suited to the modern practice of using high speeds and heavy feeds than a design in which the upright is split horizontally at the point of maximum stress. The base, upright and jack-screw support are all cast integral, which is intended to add to the rigidity of the machine.

The drive is by a single pulley through a friction clutch, no counter shaft being required. Nine spindle speeds from 75 to 610 r.p.m. are provided, and three geared feeds, 0.006, 0.012 and 0.026 in. per revolution of the spindle. Speed and feed changes are made through sliding gears, no clutches or sliding keys being used. Helical gears are used for driving the spindle, transmitting power to the tool evenly and smoothly. Speed and feed change gears are of heat-treated steel. The machine has the "Footeburt" double rack feed to the spindle intended to eliminate side friction on the spindle sleeve. The spindle is counterbalanced by a weight. The driving-shaft bearings are Hyatt or taper roller bearings, Hyatt bearings being used for radial loads and the taper roller being for the combined radial and thrust load. Heavy ball-bearing takes the thrust of the spindle.

All parts of the feeding and driving mechanism are entirely inclosed. The speed change gears run in an oil

bath and the feed gears are lubricated by a positive splash oil system. The upper driving helical gear and other bearings are packed in grease, a sufficient supply being stored in caps to last several months. gear-driven pump is provided for cutting compound.

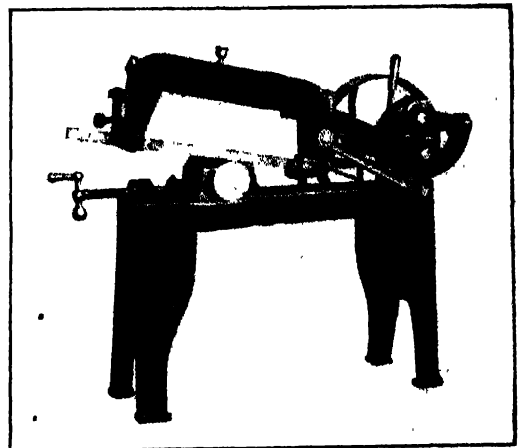
The principal dimensions are as follows: Center spindle to face of column, 10 in.; nose of spindle to top of table, 28½ in.; length of power feed, 12 in.; Morse taper No. 4; working surface of table, 20 x 16 in.; vertical adjustment of table, 12 in.; face of square locking table bearing on column, 10 in.; length of square locking bearing on table, 12 in. The net weight is 2700 lb.

Hacksaw Machine Using Light-Gage Blades at High Speed

A metal-cutting machine for medium-duty work, incorporating the positive draw-cut principle and designed to use light-gage blades at high speeds, has been added to the line of the Racine Tool & Machine Co., Racine, Wis. It is known as the Racine Junior and is a moderately priced machine intended for the average shop. Production approximately double that usually obtained is claimed.

The use of light-gage blades is permitted because of the automatic-lifting device incorporated. The lift is positive and takes place on the non-cutting stroke, giving free clearance to the blade on the back stroke, under all pressures. This is said to eliminate drag back, heating, bending and binding in the cut, effectively preventing quick wearing off of the teeth of the blade.

The feed is by gravity. An automatic knockout is provided to stop the saw when the cut is finished. The saw-frame guide holds itself automatically at any height and adjustment for wear is provided. The frame slides on V-ways, giving maximum bearing surface. The machine is designed to take stock 4 by 4 in., although by simple adjustment stock up to 6 by 6 in. can be handled



Right Hand View, Showing Cutting Position

The speed is given as from 60 to 100 r.p.m. and the stroke 6 in. The floor space occupied is 38 by 12 in. The height to top of the table is 20 in. and overall height 28 in. Blades 10 to 12 in., 21 gage, are used. The weight is 150 lb. net.

"Reducing Power Bills on Mine Fans with Synchronous Motors," is the subject of a paper to be presented before the Association of Iron and Steel Electrical Engineers, by Frank W. Cramer, engineer of tests Cambria Steel Co., and A. A. McDonald, chief engineer Union Coal & Coke Co., at its regular monthly meeting to be held at the Chatham Hotel, Pittsburgh, March 11. The authors will show that with the use of a synchronous motor, together with a magnetic clutch, more than \$500 per month was saved in driving a mine fan which delivered 500,000 cu. ft. of air per minute. Another phase which this paper takes up is the replacement of a steam engine by an electric motor. The meeting is open to all engineers interested in these applications.

Mining and Metallurgical Engineers

Discuss Open-Hearth, Electric and Rolled Steel Problems
at Annual February Meeting—Important Drill Steel
Session—Enthusiastic Non-Ferrous Meetings

AN attendance which ranks among the largest was a feature of the one hundred and twenty-fifth meeting of the American Institute of Mining and Metallurgical Engineers last week, Feb. 20 to 23, in New York, at its headquarters in the Engineering Societies Building. The symposiums on mining, on foreign oil possibilities, on petroleum and gas were unusually well attended. The iron and steel section held two meetings generally regarded as some of the best; a feature was the unannounced appearance on the floor of the eminent British metallurgist, Harry Brearley. The sessions of the Institute of Metals Division were characterized by liberal attendance and marked enthusiasm. A meeting of the committee on breakage and heat treatment of drill steel recorded important progress in this field. The report covering the activities and business condition of the institute revealed a large increase in membership, the largest except in 1920, and a financial condition decidedly more satisfactory than in some years.

The Sessions on Iron and Steel

THE first of the two sessions on iron and steel, held Wednesday morning, Feb. 22, was in memory of Prof. Joseph W. Richards, who died last October. The chairman, Bradley Stoughton, spoke of Doctor Richards as for many years chairman of the iron and steel committee and as one of the chief authors of the institute's constitution and by-laws. The iron and steel committee of the institute had therefore decided to designate this session as one in memory of him as an old friend and benefactor. Due to the fact that several memorial meetings had been held and biographies printed, it was suggested that the testimonial at this meeting consist of those present standing in silent tribute to the memory of Doctor Richards.

Acid Open-Hearth Practice

The most important paper on the iron and steel program was entitled "Acid Open-Hearth Process for the Manufacture of Gun Steels and Fine Steels," by Col. W. P. Barba and Dr. Henry M. Howe. The paper, which covers 39 printed pages, is of large importance as a contribution to the literature of this subject and discusses the details of all phases of the process. It was presented in abstract by Colonel Barba.

The chief cause leading up to the formulation of this paper, which is essentially a committee report growing out of the war, was pointed out by Mr. Barba as the sore need of finding some way to stop the rejections of finished gun and other material, which developed in 1918. These conditions are clearly presented by an introduction to the paper by Prof. Comfort A. Adams, chairman of the engineering division of the National Research Council, which is in part as follows:

When this country went into the war, but two companies, the Bethlehem Steel Co. and the Midvale Steel & Ordnance Co., knew how to make steel fit for great cannons and at these concerns there were relatively few men who knew the whole art. Fortunately, certain of these men put their knowledge at the service of the Government, and proceeded to instruct the metallurgists at the arsenals and at various steel works.

The then chairman of the engineering division of the National Research Council, Doctor Howe, suggested that this work might be facilitated, and the number of effective gun-steel makers thereby increased, if a detailed description of the best practice could be written, giving the reasons for the various steps, and issued with the indorsement of a committee composed of those who were evidently the most competent authorities. It was thought that something would be gained by a clarification of the subject, and something by the eminent authority of the members of the committee. To that end, the engineering division appointed a committee, consisting of the gentlemen whose names follow, to mention only those who retained their connection with it.

At this time there were serious difficulties in the manufacture for the Government, of aircraft and high-speed engine crankshafts, of certain ordnance forgings and of shells for both the Army and Navy. This committee was asked to study and report upon these, with a view to betterment of them. There were indications that the source of some of

the difficulties went back to the melting of the steel and the production of the ingot. Hence, the committee first studied steel melting and ingot production, in order to guide the war-time manufacturers to an even larger percentage of useful production from the steel initially melted. The committee referred to above was as follows:

W. P. Barba, chairman, ordnance dept., U. S. Army (formerly vice-president and general manager Midvale Steel Co., Philadelphia).

George K. Burgess, division of metallurgy U. S. Bureau of Standards, Washington.

Henry M. Howe, then chairman engineering division National Research Council.

H. E. Kenney, metallurgical engineer Midvale Steel & Ordnance Co., Philadelphia.

Dorsey A. Lyon, Bureau of Mines, Pittsburgh.

Theodore W. Robinson, vice-president Illinois Steel Co., Chicago.

A. A. Stevenson, Standard Steel Works Co., Philadelphia.

Bradley Stoughton, then secretary American Institute of Mining and Metallurgical Engineers, New York.

W. R. Walker, assistant to the president, U. S. Steel Corporation, New York.

Frank D. Carney, Carney & Lindemuth, consulting engineers, New York.

The committee deputed the authors of the paper to prepare the proposed report, which they did forthwith. This was a few weeks before the armistice in 1918. The paper was completed soon after, so that it represents the work of the authors in the autumn and winter of 1918, but its publication has been delayed by several causes.

Anything like an adequate presentation of the contents of this paper is not possible in these columns. It embodies the results of a research into all phases of the metallurgy of acid open-hearth practice and the best opinions of the authorities on the committee. In his presentation of it Colonel Barba declared that it is impossible to transmit this metallurgical practice into the spoken word or the printed page. A broad idea of the paper in his opinion was comprised in the statement that adequacy of melting equipment was essential—an equipment which will insure the completion of all necessary reactions. With such equipment as a starting point, the following essentials must be observed: Selection of material; melt hot; refine hot; pour cold; use mold of a shape and design suited to the size of ingots best adapted to the finished product. Mr. Barba stated that Doctor Howe had worked prodigiously over this paper. It was also his opinion that American steel-makers are capable of producing as good steel as any foreign maker but there is necessary a program of education as to what grade or kind of steel is suitable for certain purposes. When this is appreciated, the consumer can obtain what he wants; at present in many cases he does not know this.

Discussion by Harry Brearley

Bradley Stoughton, in commenting on the paper, said that so much detailed information had been brought out it would be necessary to revise every text book at present dealing with the

The feature of the discussion was the appearance on the floor, unannounced, of Harry Brearley of Sheffield, England, the eminent British metallurgist whose name is so widely identified with the giving to the world of stainless steels. When his identity was realized, he was given a hearty reception.

Mr. Brearley laid special emphasis on the role which the casting temperature plays, pointing out that this temperature is not the temperature of the steel in the ladle but is determined by the temperature of the metal in the ingot mold. He was of the opinion that very hot Bessemer steel could be poured into good ingots if the temperature is not above the casting temperature in the molds and that the control of the casting temperature is accomplished by observing the temperature in the mold.

He affirmed his preference for the bottom cast ingot molds and explained his reasons by sketches on the blackboard. He acknowledged as one of the disadvantages the possible presence of certain dirt but affirmed that steel making is not a clean operation; in fact his practice, he said, was to clean all molds thoroughly with compressed air before pouring. As another advantage of bottom poured ingots, Mr. Brearley cited the fact that the interior of the mold shapes the ingot. He also recited what he regarded as a splendid measure of the cleanness of a steel and related his experience with a comparison of notched bar impact tests with ordinary tensile tests, the former being at once sensitive to any "dirt" when a progressive series of test bars is cut at various angles from a bar or plate of steel.

Electric Steel for Guns

Another paper along similar lines was that of W. J. Priestley, steel superintendent U. S. Naval Ordnance Plant, Charleston, W. Va., entitled "Sulphur and Oxides in Ordnance Steel." This was presented in abstract by the author but unfortunately was postponed from the morning session to the end of the afternoon, much to the disadvantage of securing discussion. The paper was published substantially in full in THE IRON AGE, Dec. 29, 1921, and commented on editorially. The author, in presenting the paper, gave his views on some of the points brought out in the discussion of the two steel papers presented at the morning session and displayed test bars of some German steel, which showed excellent physical properties from longitudinal tests and very poor ones from tests at right angles to these bars. It was brought out, however, by Colonel Barba that in material such as armor plate, there is a third dimension test which is equally important and the results of which mean much as to the quality of the material for certain purposes.

Chemical and Mechanical Properties of Rolled Steel

A paper, originally scheduled for the meeting of the institute at Wilkes-Barre, Pa., last September, entitled "Application in Rolling Effects of Carbon, Phosphorus and Manganese on Mechanical Properties of Steel," by William R. Webster, Philadelphia, was presented in abstract by A. A. Stevenson. A résumé of the paper was published in THE IRON AGE, April 14, 1921. It is a discussion of the relation between chemical and physical specifications for rolled material, and the question as to whether both are necessary to insure steel of desirable qualities.

In opening the discussion Bradley Stoughton characterized the results in the paper as a triumph for the author, who has maintained the possibility of producing steel of desirable qualities, made to specification, if one has enough data.

Dr. George B. Waterhouse, Lackawanna Steel Co., Buffalo, N. Y., was called upon and in response said he recognized it as a practical paper of wide interest and that his company would be glad to put at the disposal of Mr. Webster any formula or data they possess.

Ralph E. Sweeter, assistant to vice-president, American Rolling Mill Co., Columbus, Ohio, speaking from the blast furnace viewpoint, raised the question of dirty steel due to some peculiar quality of the pig iron; that in rolling steel some of it possessed good and some of it poor properties, although made from batches of pig iron of the same chemical analysis. The presence of oxide of iron had been suggested as the cause.

A. A. Stevenson, speaking on this point, said that it had been his experience that certain qualities in certain pig iron had seemed to persist throughout the making and rolling of the steel, poor qualities which could not be removed.

H. T. Morris, consulting engineer Bethlehem Steel Co., Bethlehem, Pa., cited the fact that analyses of the same steel from different laboratories did not always agree and declared the specification of physical properties and not chemical to be sound. It was his experience that the same chemical composition does not always give the same results in some cases.

Dr. George K. Burgess, Bureau of Standards, Washington, called attention to the great number of variables at work when attempting to make steel to both chemical and physical specifications and to formula, but that an important point

to be considered was the gas content of the steel. There should be suitable temperature control of operating conditions.

Quality of Steel and Case-Carbonizing

The afternoon session of the steel program was presided over by C. P. Perin, of Perin & Marshall, New York. "The Effect of Quality of Steel on Case-Carbonizing Results," by H. W. McQuaid and E. W. Ehn, metallurgists Timken Roller Bearing Co., Canton, Ohio, was presented in abstract by Mr. McQuaid. The paper presents the experience of the authors in their use of basic open hearth steel of the same analysis as their own electric steel and that the latter would not produce as good results. The authors concluded that, as a result of many experiments, the segregation of solims in the ghost lines was a contributing cause.

An interesting discussion of the paper was presented by H. J. French, Bureau of Standards, Washington, and illustrated with lantern slides. It was a comparison of open hearth and electric steel under various heat treatments, showing particularly the highest content of nitrogen in the electric steel.

"The Electrolytic Deposition of Iron for Building Up Worn or Undersized Parts" was presented by the author, David R. Kellogg, research engineer Westinghouse Electric & Mfg. Co., Pittsburgh. It is a recital of that company's experience in applying this practice in its own shops and many successful results are outlined. A paper, "Effect of Time in Reheating Quenched Medium Carbon Steel Below the Critical Range," was read by one of the authors, Prof. C. R. Hayward, but not discussed.

New Iron and Steel Committee

At this session the new committee of the iron and steel section was elected as follows:

Bradley Stoughton, chairman, John H. Hall secretary; Dr. G. K. Burgess and Enrique Tomico, vice-chairmen.

Since the death of Doctor Richards, the chairmanship has been filled by J. V. W. Reynders, but his election as first vice-president of the institute prevented his continuing in this capacity.

Session on Drill Steel Breakage

A meeting of considerable importance was held on Monday morning, Feb. 20, on the drill steel problem. It was a public session of the committee on breakage and heat treatment and drill steel with B. F. Tillson,

(Continued on page 623)



ARTHUR S. DWIGHT

Machine for Threading Large Pipe

The 12-in. pipe threading and cutting machine shown in the accompanying illustration is a recent addition to the line of the Landis Machine Co., Waynesboro, Pa.

The new machine can be used for threading oil-well casing and hydraulic pipe, in addition to ordinary line pipe. It has a range from 4 to 12 in. and can be equipped to thread and cut pipe as small as 2½ in. Two die heads are employed, a 6-in. head for pipe from 4 in. or 2½ in. to 6 in., and a 12-in. head for pipe from 6 to 12 in. The entire range of each of these heads is covered by one set of chasers. The length of the machine is 11 ft. and the width, 5 ft. It weighs 13,000 lb.

The carriage which supports the die head, the cutting-off tool, and the reaming tool is moved either by power or by hand, the power traverse being controlled by a lever on the operating side of the carriage. Automatic stops prevent the die head from coming in contact with the chuck in the forward movement, and the carriage from running off the guides in the backward movement. The reaming tool is set

to position and locked by a lever and the reamer fed to the pipe by rotating the cutting-off feed hand wheel in a counter clock-wise direction.

The drive is from a single pulley. Eight variations in speed are provided, and are obtained by shifting the levers on the side of the gear box, which is located under the main spindle. The machine is started and stopped through a friction clutch, levers for this purpose being placed at each end of the head stock, permitting convenient starting and stopping when threading or when fitting up flanges. The chucks for gripping the pipe have three jaws, which are geared and have universal adjustment. They are also self-centering to the pipe. The rear chuck is equipped with flange grips for fitting up flanges.

All gears are fully inclosed, and with the exception of the main drive gear and pinion all gears run in an oil bath. The main bearings are lubricated with flat link chains which run in oil contained in large reservoirs. The driving-pinion shaft and the reverse shaft are lubricated by sight feed oilers. In converting to motor drive a sprocket is substituted for the driving pulley and a plate fitted to the side of the machine for mounting the motor. The company's stationary pipe die heads are employed, as well as the Landis long life chaser. A silent chain is used to drive from the motor.

Stainless Non-Ferrous Alloys

The commercial development of stainless steel and iron appears to be causing perturbation among firms (British) interested in non-ferrous metals and alloys, which are perforce beginning to recognize that the new material threatens to supersede copper, brass, nickel, and aluminum for a number of purposes, says the *London Ironmonger*. A good deal of research work has been carried out lately with the object of evolving a stainless non-ferrous alloy, and is already bearing fruit in the shape of the introduction of improved forms of nickel-silver, containing a much larger percentage of nickel than ordinary nickel-silver, and being therefore harder, more durable, and of a color more nearly approaching that of silver. To assert that these metals are untarnishable and stainless may be to claim more

than the facts justify, but they undoubtedly represent a distinct advance in that direction, and, in the price should be about one-third less than that of stainless steel and iron. The additional percentage of nickel employed in these metals necessarily increases their cost, but as it gives extra strength it is possible to save expense by using sheets of thinner gage than are supplied in nickel-silver.

Apart from the question of stainlessness, the research has resulted in the production of a more homogeneous metal than formerly, and as this means greater ductility it will now be possible, for the first time, to make deep stampings and pressings from sheets of alloys with a high nickel content.

It is anticipated that the new metals will, to a considerable and increasing extent, supersede electro

silver plate for spoons, forks, cruets, table hollowware, wire, and numerous other purposes. The color may not be equal to that of silver, but restaurant-keepers and others whose table furniture gets rough treatment, and costs much money to keep in repair, may consider the appearance quite good enough for their purposes. The new metal certainly has solid advantages. Owing to

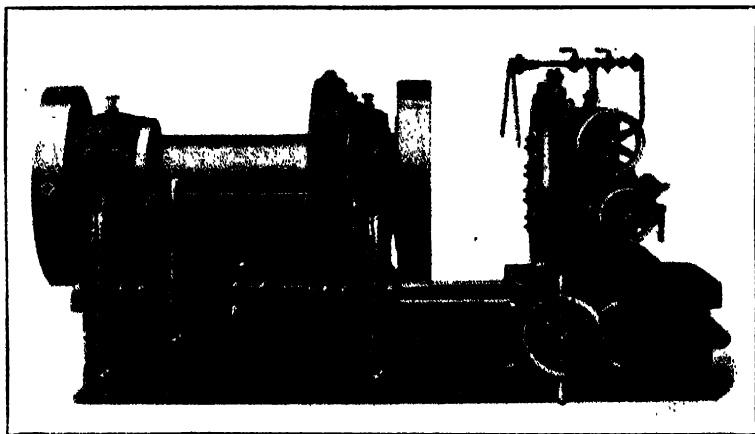
its strength, goods made of it are not easily damaged, they carry no surface of silver liable to wear off, and can be repaired without necessitating the costly operation of replating. Spoons and forks made of these alloys can be produced at less than half the cost of such goods made of stainless steel or iron.

Ore-Carrying Corporation a Common Carrier

WASHINGTON, Feb. 28.—The Interstate Commerce Commission has handed down a decision finding the Ore Carrying Corporation to be a common carrier which may lawfully receive from its trunk line connections divisions of joint interstate rates. The opinion is the result of a complaint filed by the Ore Carrying Corporation against the Central Railroad Co. of New Jersey, in which the complainant contended that it participates in tariffs published by the defendant, containing joint rates for the continuous carriage of iron ore by water and rail from Port Henry, N. Y., to interstate destinations. It was also contended that formerly the complainant received agreed divisions of the joint rates which were fair and reasonable in amount, but that since the increase of 40 per cent in those joint rates authorized on July 29, 1920, the defendant has refused to grant the complainant a corresponding increase in its division. In finding that the Ore Carrying Corporation is entitled to divisions of joint interstate rates, the commission points out that if the complainant and defendant cannot agree upon proper divisions, the matter may be brought to the commission for determination.

Opposed to Bonus

WASHINGTON, Feb. 28.—Seventy-two per cent of the membership of the Chamber of Commerce of the United States oppose a cash bonus for soldiers, according to the result of the referendum vote recently taken. The vote was intended to put the chamber's membership definitely on record and to supplement a declaration by resolutions adopted previously at two annual meetings. The decision represents the opinions of business organizations in 375 cities throughout the country.

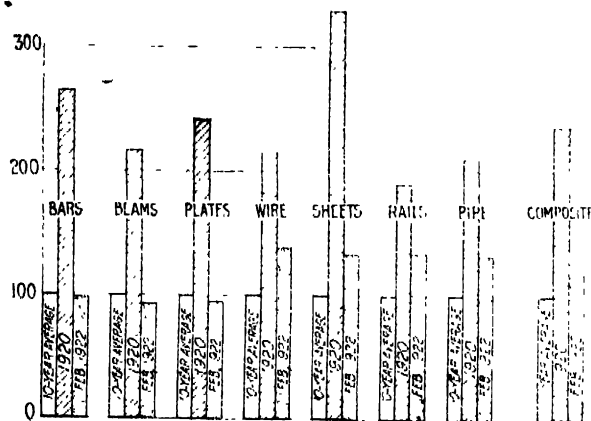


Travel of the Carriage Is by Hand Power. To advance the lever is pulled and held. To reverse, the lever is pushed forward and held. Releasing the lever stops the carriage.

Liquidation of Iron and Steel Prices

About 90 Per Cent of 1920 Excess Wiped Out—No Principal Product Now More Than 35 Per Cent Above the Average of Ten Pre-War Years

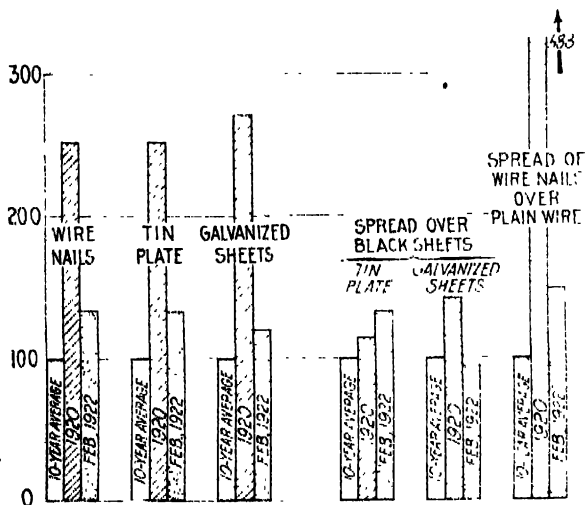
AS THE IRON AGE composite for finished steel is now lower than at any time since the last month of 1915, and the composite for pig iron lower than at any time since September, 1916, a study of the course of prices of the component elements, out of which these composites are made up, should be interesting. The basis for this study represents the average price



Course of Prices of Finished Steel Items

of the individual product, and of the composite, during the ten years from July 1, 1904, to June 30, 1914. This covers a period long enough to evaluate the ups and downs of varying financial conditions. It covers the panic of 1907-08 and the intense activity of 1905, 1906, the early part of 1907 and all of 1910, 1912 and 1913—all of these latter being years of high production. Analyses based on such data therefore stand on a firm foundation.

The high spot shown in each diagram represents the maximum reached during any part of the business boom of 1920. Most of these came in April to September,



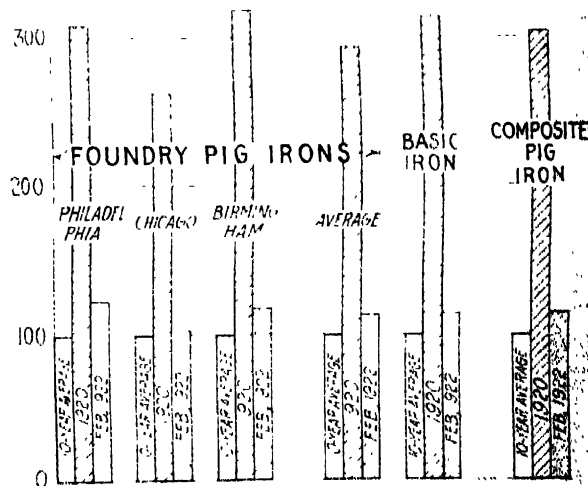
Course of Prices of Steel Specialties, with Spread Over Intermediate Products

but wire nails were high in January and February. No account is taken in this study of the fantastic figures reached by some products in the summer and early fall of 1917, during the first flush of the war period, and before governmental regulation called a halt to the sky-rocketing tendencies of prices. The third point of interest is the price to-day of each of the

Each of the three units of measurement is shown on the charts. The first chart shows the relationship of these various prices for the seven separate items making up the finished steel composite, and shows at the right the composite itself. The pre-war average is taken as 100 per cent in each case; the other two figures being related to that, as shown graphically. It will be noted that steel bars, beams and plates are now lower than before the war, and that the composite is above the pre-war average by only 18.7 per cent.

Similarly, in the second chart are shown the items of pig iron making up the pig iron composite, which is also shown. The first three items are the Philadelphia, Chicago and Birmingham foundry irons, the next being the average of the three. Next is the basic iron which averaged with the foundry average, gives the composite.

In the third chart are shown figures for subsidiary products not included in either composite, these including wire nails, tin plate and galvanized sheets. In addition to the products enumerated are shown the spread of tin plate over black sheets, the spread of galvanized sheets over black sheets and the spread of



Course of Prices of Pig Iron Items

wire nails over plain wire. It will here be noted that, at present prices, the spread of galvanized sheets over black sheets is less than it was before the war.

A comparison of the diagrams shows at once that pig iron was more responsive and more sensitive to local trade conditions than was the case with finished steel. The highest composite figure for pig iron in 1920 was 3.043 times the average before the war, while the corresponding average for steel was 2.353 times the pre-war period. Consequently a smaller percentage recession from 1920 peak prices on the part of steel products than that covered by pig iron will produce a return of pre-war conditions. As a matter of fact, the present recession of finished steel is 49.55 per cent, and the corresponding figure for pig iron 62.3 per cent. This leaves finished steel 18.7 per cent above pre-war and pig iron 14.6 per cent "up."

As a direct measure of liquidation of the 1920 peak excess over the pre-war average, it is found that in finished steel 86.2 per cent of the excess has been wiped off. Similarly, for pig iron, 92.85 per cent of the excess has been wiped out. Taking the two together, therefore, the progress of liquidation in the iron and steel industry may be stated roughly at 80 per cent. Aside from agricultural products, it is doubt-

ful if any other major industry can show a liquidation even approaching this.

There is a remarkable uniformity in the liquidation of various grades of pig iron. Chicago foundry leads with 98.3 per cent; Philadelphia foundry iron shows the least liquidation of any of the four grades covered in our composite. But even here it is 89.1 per cent. With finished steel the items of bars, beams and plates

have shown a liquidation in excess of 100 per cent, because their prices are now below those of the ten pre-war years. Of the other items, black sheets show 88.1 per cent; wire and black pipe about 71 per cent and open-hearth rails 63 per cent. Of the subsidiary items, galvanized sheets have liquidated 88.2 per cent, while tin plate and wire nails have liquidated about 78 per cent each.

Welding as Applied to Boilers and Other Pressure Vessels*

Mutually Antagonistic Attitudes of Proponents of Various Types of Welding - Lack of Confidence in Welds

BY E. R. FISH

AFTER several years' experience with the boiler code itself, the Boiler Code Committee of the American Society of Mechanical Engineers found that there was beginning to be a demand for a code covering unfired pressure vessels, of which there are a great variety. We did not know there were so many until we came to look into it. Many of these vessels are made by boiler manufacturers, and a great many of them are made, not by boiler manufacturers, but by tank builders as such. It also became apparent that the States were gradually tending toward improving such tanks in their rules, bringing such pressure containers under their jurisdiction, making them subject to inspection, and that if the great chaos that existed in the boiler trade was to be avoided in the case of tanks, it was desirable to have a code covering the construction of such pressure vessels.

It was with that idea in mind that the Boiler Code Committee appointed a sub-committee on unfired vessels, to look into the question and, if possible, draw up a code. The inspectors of many of the States expressed a very definite desire for a specific code of that sort which, if drawn up, would tend to become the uniform basis of construction, just as the boiler code has become a uniform basis of construction for boilers. That sub-committee was appointed almost three years ago, and gradually it got under way. A code was suggested and a hearing was held at the spring meeting of the society in St. Louis in May, 1920.

At that meeting it developed that the question of welding was really the paramount one. It was the crucial point on which the code really depended. I was not aware myself that so much welding was done on pressure vessels. Everyone knows, of course, that there have been many failures of pressure vessels, particularly of the welded type, and it was the failure of these that stimulated the activity on the part of many municipalities and States to include such vessels in their inspection requirements.

The question was finally referred to a sort of a coalition committee of the American Welding Society, the Welding Committee of the Boiler Code Committee and the Unfired Pressure Vessel Committee. The matter dragged along it developed that there was great difficulty in getting the interests together. The electric welding fellows were tremendously antagonistic to the oxy-acetylene men, and vice versa, and the forge welding people came into it, and finally the people who make brazed tanks, so that it got to be exceedingly complicated; and it was with great difficulty that any sort of an agreement or understanding of any kind could be arrived at as to what specifications, what limitations, should be imposed upon welded construction.

The final upshot of it was that we had another hearing at the annual meeting of the society in New York, last December, and the code as it had been submitted was published, and some tentative requirements for covering welding were written out. It was all put in pamphlet form and put in circulation and

distributed as widely as possible. The hearing drew the largest audience of any of the hearings that were held, indicating the tremendous interest that people had in it. Incidentally, I might say that it provoked, perhaps, the greatest difference of opinion and discussion of any of the hearings that were held.

My information on welding is not at all that of an expert. But I have heard enough to know that those who think they know all about it do not themselves know very much about it. It is entirely in a formative state. There is going to continue to be a great deal of it; there is going to be more of it; it is going to be improved, and one of these days we shall be using it to a much greater extent than now.

So far as boilers are concerned, the code committee at present shows no disposition to permit welding in the construction of boilers, where the pressure is not carried by some other means than the welding itself. It is not at all likely that the committee will change that position for some little time to come.

One of the principal considerations in connection with welded work, it seems to me, is that the welded part is not homogeneous. It has not the same physical characteristics as the plate. In the case of any pressure vessel in which there are changes in temperature, changes in pressure, or weaving actions of any sort, in the course of time the weld is bound to fail, not because of lack of inherent strength under a constant tension, but because of the fatigue of metal that is concentrated at that point.

That, perhaps, may give you a general idea of what the committee has been up against in trying to evolve a code for the unfired pressure vessels. It is easy enough, outside of welding, but unfortunately welding seems to be the principal stumbling block that is holding back the final promulgation of the code.

Farm Machinery Reduced

A reduction of approximately 40 per cent on all lines of farm machinery is announced by the United Grain Growers, Ltd., Winnipeg, Man. In making the announcement, C. Jones, general manager of the company said: "These new prices are not based on manufacturers' prices, but on what we consider a reasonable price for machinery compared with the price of farm products. Manufacturers' prices have not come down yet to a corresponding extent, but the United Grain Growers believe that by next year such a level for farm machinery prices generally will be established. We have based the spring price on the price prevailing in 1915. Generally speaking the prices of farm products are down to the 1915 level."

The United States Hoffman Machine Co., Inc., 101 Fourth Avenue, New York, manufacturer of clothespressing machinery, etc., with plant at Syracuse, has been merged with the United States Hoffman Machinery Co., organized under Delaware laws, with capital of \$11,250,000. E. D. Stocker is president.

*Abstract of paper read at Pittsburgh, Feb. 13, before American Boiler Manufacturers' Association.

NEW FOUNDRY EQUIPMENT

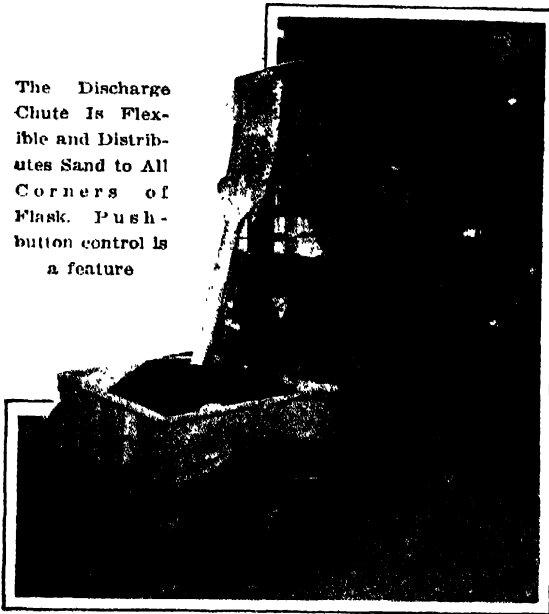
Stationary Machine for Filling Flasks—Five Molds Per Day Increased to Fifteen

A recent addition to foundry labor-saving equipment is a self-contained stationary flask-filling machine being placed on the market by the Osborn Mfg. Co., Cleveland. It is designed to take sand from the floor and place it in the flask on the molding machine.

With the outfit shown in the accompanying illustration it is claimed that it took two men $1\frac{1}{4}$ hr. to shovel sand into the flask, the same work being done by the machine in $1\frac{1}{4}$ min. It is further claimed that tests demonstrated that when the sand was shoveled by hand 5 molds a day were produced against a possible 15 molds with the aid of the flask-filling machine.

The machine is made up of structural shapes with suitable mechanism at each end for supporting sprocket

The Discharge Chute is Flexible and Distributes Sand to All Corners of Flask. Push-button control is a feature



wheels, upon which standard link chains are mounted. Buckets of special design are employed. A flexible discharge chute designed so that sand can be distributed into all corners of the flask is provided, as shown. The entire outfit stands alone without support. The drive is by an electric motor the capacity of which is determined by the amount of sand to be handled, a 15-hp. being required to handle 2 cu. yd. per min.

In addition to its ability to elevate and evenly distribute a large amount of sand in a short time, a feature of the machine is the ease of control. Control is by push buttons located at the end of the discharge chute, and under the operator's thumb. When not in use the machine may be completely shut off.

The machine may be placed either so that the receiving buckets will be at the floor level or below the floor. Placing several feet below the floor with an open grating at the floor level is recommended, and also that an opening be provided between the flask loader and the foundation pit. It is intended that as the sand is being cut by a sand-cutting machine that it be worked gradually into a heap around the loader, where preferably a clam-shell bucket could be used to good advantage. A portable machine is planned.

Electric Brass Furnace Investigation

The electric melting of brass has been studied by the Bureau of Mines for the past 10 years from the points of view of decreasing the losses of the constituent metals in brass, especially zinc; improvement in labor conditions; aiding in the conservation of fuel oil by substituting electric heat generated by water power or by coal; improving the quality of the brass and decreasing the cost of melting. In the course of the work a furnace type was developed by the Bureau

which has found wide use in the industry, both in foundries and rolling mills, more than half of the electric brass kilowattage of the country being connected to furnaces of this type. The Bureau has kept in close touch with makers and users of all other types of electric brass furnaces as well, and a comprehensive bulletin on the design, operation and commercial performance of all the furnaces is awaiting publication. Close contact will be maintained with this problem, but unless developments call for it, no active laboratory work is contemplated because electric melting has already become well established in the brass industry. Contact will also be maintained with developments in the use of electric furnaces for melting aluminum and other non-ferrous metals and alloys, and to a certain extent, with their use for melting gray iron, since some of the furnaces primarily designed for brass melting, including that designed by the Bureau of Mines, are to be tried out in such work.

Improved Specifications for the Composition and Heat Treatment of Gage Steels

An informal meeting was held in New York on Jan. 10 for the purpose of considering improved specifications of composition and the heat treatment of gage steels. The meeting was arranged by the ordnance department of the U. S. Army and was well attended by steel makers, gage makers and gage users. A subcommittee was appointed to arrange and carry out a comprehensive program with a view to determining, first, the physical characteristics required of gage steel and, second, the composition and heat treatment necessary to produce these characteristics. The active co-operative of Government research agencies, standardizing bodies, gage makers and users is contemplated by the committee in the program to be undertaken.

Hearing on Export Bill of Lading

WASHINGTON, Feb. 28.—The Interstate Commerce Commission has reopened proceedings regarding the export bill of lading and assigned March 4 as the date for further hearing. This is due to a communication received by the commission from the Shipping Board, in which the latter recommends that certain amendments which it considers essential be made in the export bill of lading prescribed by the commission on Oct. 21, 1921. Without these amendments the Shipping Board said it is unable to give its approval pursuant to the provisions of Section 19 of the merchant act of 1920, for the reason, among others, that the Shipping Board intends to promulgate a port bill of lading in the near future and believes that there should be no variance in essential particulars between the bills.

Allowances for Switching Not Required

WASHINGTON, Feb. 28.—Independent iron and steel manufacturers in Alabama have been unsuccessful in their efforts to compel trunk line railroads to make allowances for the performance by the former of switching services on inbound and outbound carload traffic to and from steel plants. The Interstate Commerce Commission in a decision made public last Friday held that failure of the railroads to move cars between interchange tracks and points within the steel plants, or to compensate the steel companies, does not result in payment by the steel companies of transportation charges which were or are unreasonable, unjustly discriminatory or unduly prejudicial. As a result, the complaint was dismissed. The case, entitled Gulf States Steel Co. et al. vs. Director General as agent, Louisville & Nashville Railroad Co. et al., included practically all of the larger independent iron and steel manufacturers in the northern part of Alabama, excepting the Woodward Iron Co.

Most of the inbound traffic moves under intrastate rates, and therefore the jurisdiction of the commission as to such rates and allowances was limited to cases falling within the provisions of Section 206 (C) of the transportation act of 1920. The commission held that the question before it was not the measure of the line

haul rates, but the character of the movement of inbound and outbound cars between the interchange tracks and points within the plants. Contention was made by the steel companies that the movement is a part of the transportation service and entitled them to allowances from the trunk lines. The commission said

that the steel companies have always made the movement at their own convenience and cost and were satisfied to do so without allowance until the rates were increased on June 25, 1918, and were willing to forego compensation if the rates in effect June 24, 1918, were restored.

Develops Multiple Shaper for Internal Gears

Down-Stroke Model Supplements Previous Machine of Stevenson Company Essential Features Retained

A DOWN-STROKE model of the multiple-shaper described in THE IRON AGE of July 28, 1921, page 197, has been brought out by the Stevenson Gear Co., Indianapolis. The machine previously described was of the up-stroke type, for plain external spur gears which can be passed through the tool head. The down-stroke machine is for use on internal gears, internal splines, external cluster and other gears, which cannot be passed through the tool head.

The new machine is known as model 6-A and resembles a vertical shaper or slotting machine in general appearance and principle of operation. Like the up-stroke model, the principal unit of mechanism is a special tool head which consists of a series of radially disposed tools spaced about the blank to be cut. Operation is the same as an ordinary vertical shaper except that the tools are held stationary and the work reciprocated past them. The ram carries a blank-supporting arbor. Other units are a mechanism for feeding the tools in to depth gradually to take successive cuts, as in a shaper, and a mechanism for indexing the gears being cut, a space equal to one tooth at every stroke of the ram.

Arbor Changed at Completion of Cutting

The advantages afforded by the new machine, as well as the up-stroke type previously described, lie in the changing of the work arbor at the completion of each arbor full of gears, which is said to be an exclusive feature of these machines. As the actual cutting time of the average arbor of gears is from 1 to 2 min., every second spent in changing blanks and in other non-productive operation, constitutes a considerable per cent of the operating time. To reduce non-productive time to a minimum a hardened and ground spindle and arbor are provided, which permit of quick and accurate removal and replacement. The design of the entire machine is said to be arranged to facilitate this operation. It takes about $\frac{1}{2}$ min. longer to change arbors on the down-stroke machine and therefore whenever possible the up-stroke machine is recommended. There are certain classes of work, however, that can only be handled by the down-stroke machine.

In cutting a gear the blanks are first placed on an arbor. The ram is then elevated to a distance sufficient to permit the tapered shank of the arbor to be inserted in the socket of the ram spindle. The operator then engages a power clutch by means of a lever, which causes a draw bolt, passing through the center of the spindle, to revolve, thereby drawing the arbor securely into the socket. The draw-bolt clutch has an automatic over-load throw-out for disengaging it as soon as the arbor has been tightened. The ram is then lowered by power to the cutting position, automatically stopping in the proper place. The machine is then started by an electric push-button switch. The entire cycle of motions in the tooth-cutting operation is automatic, permitting the operator to load a second arbor while the machine is cutting. When the cutting is finished the machine is stopped by the push-button switch, which operates an electric brake. The ram is then elevated to the position shown and the draw-bolt lever reversed, which ejects the arbor. The arbor of uncut blanks is then inserted and a new cycle of operation begins.

The tool head used is almost identical with that on the up-stroke machine, the tool bits and important parts

being said to be completely interchangeable. Two tool-heads are provided, one in use and one in reserve. The tools of the latter may be sharpened and reset to be in readiness to replace the one in use when the tools in operation become dull. The work arbor is interchangeable with those of the up-stroke machine.

Successive feeding movements are imparted to the tools by an annular sectional cam ring. As in the

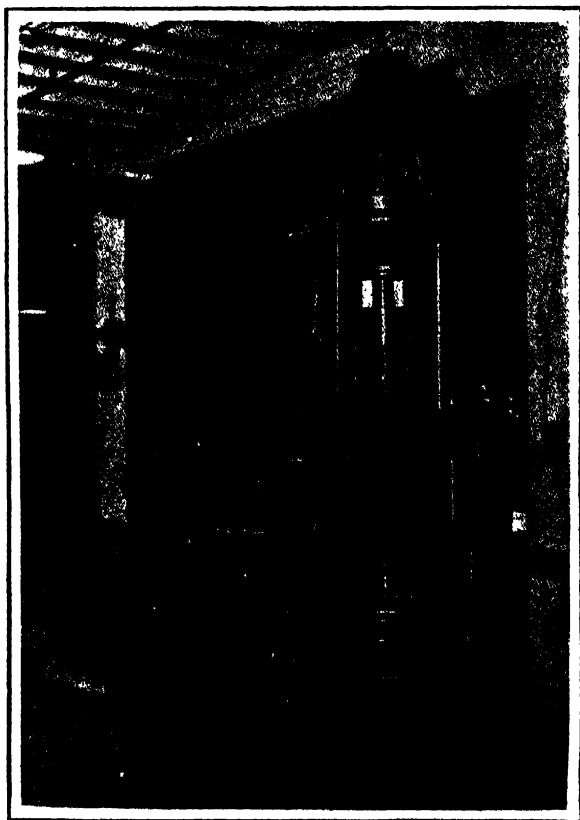


Fig. 1 Up-Stroke Multiple Shaper for Internal Gears

model previously described the individual cam lugs are mounted on a large ring which surrounds the tool bits and spacing plates. The tool bits are adjusted individually along the T-slot relative to the cam ring and each other. Rotary feeding movements are given the cam ring through a gear train, seen at the left side of the tool head in Fig. 1, and are produced by a feed mechanism located on the left side of the machine, as shown. The final depth to which the tools are fed is determined by a micrometer stop, which limits the rotary feed movement of the cam ring.

A reverse feeding movement is imparted to the cam ring to provide relief to prevent the tools from dragging on the back stroke of the ram. The cover plate on top of the tool plate intermittently clamps and releases the tool bits during the cutting. The clamping is by means of an eccentric which is oscillated by a cam on the main crankshaft.

The feed mechanism is shown in Fig. 1 and Fig. 2 consists of the cams and levers for producing the feeding and relief movements. The spiral cam seen

near the center is rotated slowly and intermittently by a ratchet through a worm and wheel connection. The rotary movements of this cam gradually forces the fulcrum stud of the feed arm forward, which in turn produces a longitudinal movement of a sort of rack slide which is connected by a gear train to the

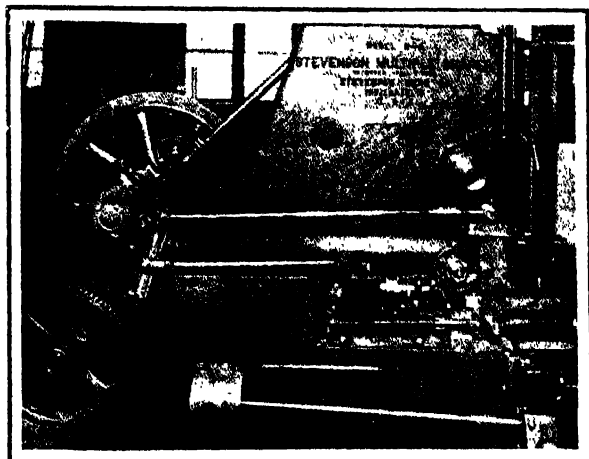


Fig. 2. Relief of Tools Is from Cam on Crankshaft, at Left

feed-cam gear on the tool head. This feed rack is made in the form of a worm engaging a worm wheel so that adjustments may be made by rotating the worm, thus advancing or withdrawing the position of the tool bits without change in the longitudinal position of the feed rack itself.

The relief movement of the tools is derived from a cam on the crankshaft and a rocker arm, seen at left of Fig. 2. This movement is transmitted by a connecting rod to a stud at the upper end of the feed rocker arm. The relief-cam rocker arm has a T-slotted extension which actuates the feed ratchet through a bevel gear segment and pinion. By adjusting the feed connecting-rod stud along the T-slot, any desired fineness of feeding may be obtained. A strong spring attached to the relief rocker arm serves to hold the follower roller in contact with the relief cam on the crankshaft.

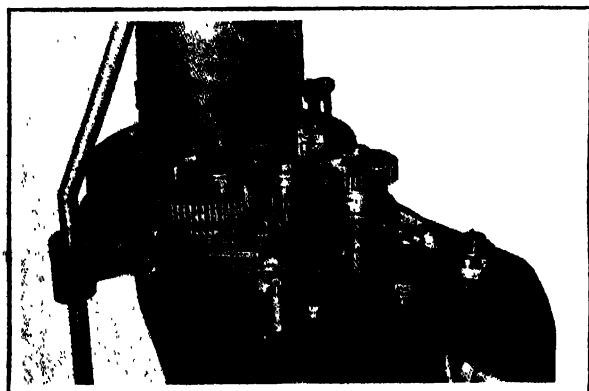


Fig. 3. Details of Indexing Mechanism

Another spring, somewhat weaker, is attached to the feed rack slide and serves to hold the feed rocker arm in contact with the spiral feed cam.

The indexing mechanism—Fig. 1 and 3—consists of two semi-cylindrical guides, one of which is attached to the ram spindle, the other to a revolving drum on which is mounted a large spur gear. This is driven through change gears by a pair of intermittent Geneva gears, encased in an oil-tight housing, which are driven in turn from the crankshaft by a long connecting shaft—Figs. 4 and 2. The intermittent shaft driven gear and the compound gear shaft driven gear are used as change gears, and by varying their ratio any number of divisions desired may be indexed. A differential washer is incorporated as a driving member between the intermittent shaft and its gear, to provide an angular adjustment for cutting gears which have keyways, etc.

The ram mechanism consists of a crank which

drives a reciprocating rack slide which in turn transmits its motion to the ram through two gears on a rock shaft. The rack slide is in the form of a worm and engages one of the gears on the rock shaft which is made in the form of a worm wheel. When elevating the ram for changing arbors the rack slide is held stationary and given a rotary movement which rotates the worm wheel and rock shaft and moves the ram. This rotary movement is obtained through a gear train seen in Fig. 4, and derived from a small motor which also furnished the power for actuating the draw bolt. The elevating and lowering motion of the ram is limited by stop collars on the shifting rod which engage and disengage the driving clutches. The crank head is slotted and the crank pin made in the form of a T-bolt. It may be adjusted for any length of stroke from 0 to 6½ in., graduations on the crank head indicating the various lengths of the cutting stroke. The graduations provide for the extra length of stroke needed to give the necessary over travel before and after the cut begins, for indexing, feeding, etc.

To set the ram and work in proper relative vertical

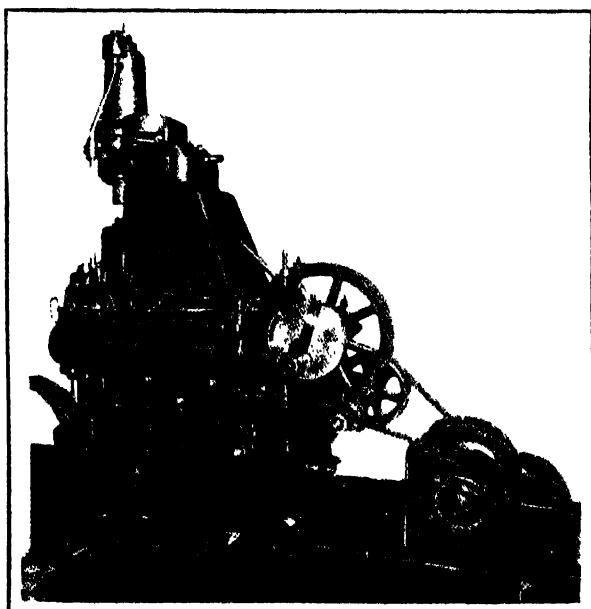


Fig. 4. Side View Showing Drive and Part of Indexing and Ram Mechanisms

position to the tools, a stationary pointer is attached to the machine frame. A corresponding mark is made on the crank head in such an angular position to the crank pin that when the mark on the crank head is set opposite the pointer the ram may be adjusted downward until the lower side of the blanks is even with the cutting edge of the tools. The elevating control stops are then set to correspond. This feature is a great convenience to the operator.

These machines will be built in various sizes and models according to the size and nature of the product, from the smallest watch pinion to large circular saws. Where the number of pieces of one kind is great enough to warrant it, special machines or standard machines with special attachments will be built.

Insufficient attention has been given to the role which standardization is playing in German industrial reconstruction, it is declared by E. C. Peck, general superintendent Cleveland Twist Drill Co., chairman of the standardization committee of the American Society of Mechanical Engineers. "In no other country, except Great Britain," says he, "is standardization work being carried on upon a scale, or with an intensity, comparable to that in Germany." He points out that mass production is no longer primarily an American development, but that the lesson of the war has brought home to European countries realization of its significance. The mechanical engineers will also take up the question of standardization and research at the Atlanta meeting.

Four-Way Drilling Machine

The four-way drilling machine shown in the accompanying illustrations was developed by the Reed-Prentice Co., Worcester, for drilling the four holes in the rear-axle housing of a well-known tractor. Several of these machines are said to be in operation in various classes of automotive work, the makers claiming large output and high standard in quality of work produced.

There are four spindles, operated simultaneously by a feed mechanism inside the base, and engaged by the movement of lever A. When the drills have been fed through the work, an automatic trip releases the feed to the four spindles simultaneously. The trip cam is shown at B on the drum C. The cam comes in contact with the plunger D, thereby automatically tripping the feed.

The drive to the spindles is by belt. The spindles are advanced or withdrawn by turning hand wheel E, which controls the action of all the spindles. When the drills become short, the inner spindle, F, may be adjusted longitudinally and finally clamped to the main spindle by means of the closer, G. Forced lubrication is provided for all bearings inside of the machine, sight feed oilers being used for the main-spindle bear-

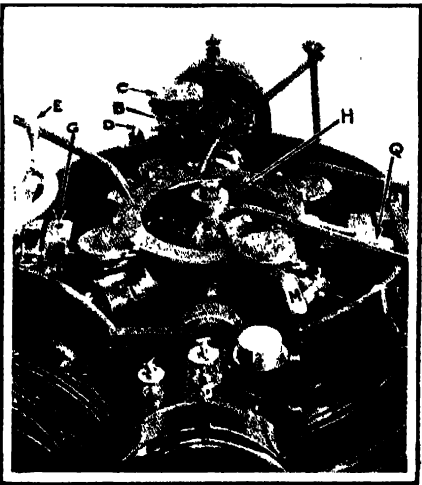
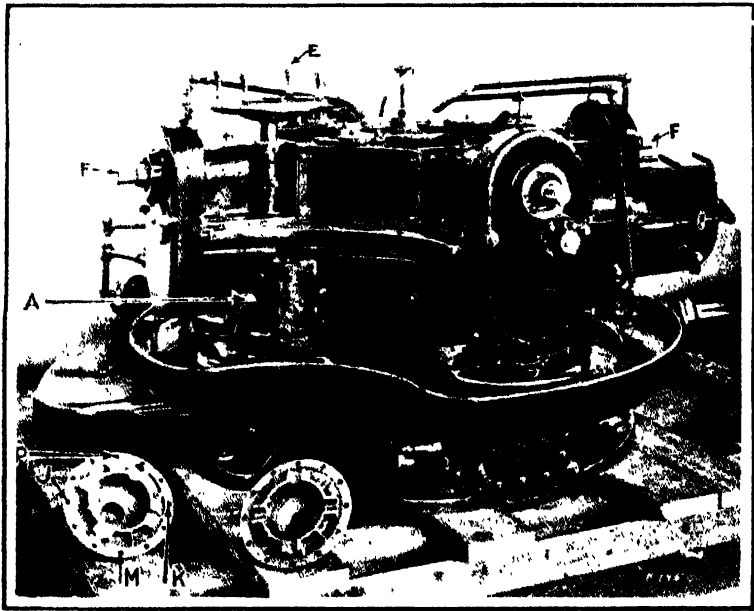
guide the drills, assuring close accuracy as to the plane of the holes and their angularity.

The machine is 96 in. long, 85 in. wide and 49½ in. high, overall. The maximum spindle travel is 3¼ in. The distance between opposing spindle chucks is 26 in. maximum, and from the flat of the table to the spindle center is 6 in. The weight is approximately 7560 lb. Motor drive can be incorporated when desired.

Another machine of somewhat smaller proportions covers lighter classes of work such as universal-joint rings and differential spiders; drilling the four holes simultaneously in the ring or turning the four arms simultaneously on the crosses. The smaller machines are not as heavy as the one described, although embodying the same features.

Cost of Living Slightly Lower

Monthly figures of the Bureau of Labor Statistics show the wholesale prices of all commodities during January to be 48 per cent above the average for 1913, compared with 49 per cent in both December and November. Only one of the nine individual groups showed a rise in January compared to December, this being farm products, with 8 points. All of the others showed



Four Spindles Are Operated Simultaneously by a Feed Mechanism in the Base. Detail view above shows the holding fixture

ings. The force system is also supplied for furnishing cutting compound to each drill.

The holding fixture is an outstanding feature, several novel arrangements being necessary to enable quick handling of the work, as well as properly locating it relative to the four working spindles. The fixture is clearly shown in the separate illustration. For guiding the work centrally four hardened steel strips, H, are located inside the fixture. Guiding pins in the lower part of the fixture engage two of the holes in the housings, as at J and K; these holes locating the bearings in the proper position for the drills.

The lower half of the housing is dropped into position first, after which four plungers in the bearings, 90 deg. apart, as at L, are forced toward the center by means of the lever M. The upper half of the housing is then dropped into position and set by means of the guide pins on the plunger, which are now in proper position, controlling the position of the housing by four holes in the flanges, as J, K, N and P. By means of the center bolt which passes through both of the housings, the work is clamped tight to the slatted portion of the plungers. This rigidly supports the work during the drilling operation.

After drilling, the upper part of the housing is removed and after withdrawing the four main plungers, the lower is raised by lever Q. This actuates four vertically-operated plungers, and brings the lower half into position for lifting out of the fixture. Hardened-steel bushings in the main body of the fixture serve to

decreases of from 1 to 5 points. In metals and metal products, which now stand at 17 per cent above the 1913 average, the decrease was 2 points. This item is only 1 point above farm products, and is far below any of the others. The highest item on the list still continues to be housefurnishing goods, which, together with building materials, are more than double their 1913 prices.

Our table shows the figures for the two most recent months and for January, 1921, and the peak in 1920. It shows also the amount of liquidation, between the 1920 peak prices and the present, of the excess of the peak prices over the average of 1913. Metals have been liquidated to a greater extent than any other group, except the farm products.

Index Numbers of Wholesale Prices, by Groups of Commodities					
	(1913 equals 100)				Liquidation, Per Cent
	1920 Peak	January	Decem- ber	1922 January	
Farm products	246	136	113	116	89.0
Food, etc.	287	162	139	134	81.8
Cloths and clothing. .	356	208	185	183	67.6
Fuel and lighting.....	284	228	187	183	54.9
Metals and metal prod- ucts	195	152	119	117	82.1
Building materials ...	341	239	203	202	57.7
Chemicals and drugs...	222	182	161	159	51.6
House-furnishing goods.	371	283	218	214	57.9
Miscellaneous	247	190	148	146	68.7
All commodities	272	177	149	148	72.1

CONTENTS

March 2, 1922

Open-Hearth Furnace Design	577
Calculations for Hearth Area, Depth of Metal, Incline of Ports and Velocity of Gases	

Roberts Type of By-Product Coke Ovens	580
Granite City Batteries Produce Metallurgical Coke from Illinois and Indiana Coals—Design and Operation	

Mining and Metallurgical Engineers Meet	586
Discuss Open-Hearth, Electric and Rolled Steel Problems at Annual February Meeting	

Liquidation of Iron and Steel Prices	589
About 90 Per Cent of 1920 Excess Wiped Out—No Principal Product Now More Than 35 Per Cent Above the Average of Ten Pre War Years	

Welding of Boilers and Other Pressure Vessels	590
Mutually Antagonistic Attitudes of Proponents of Various Types of Welding—Lack of Confidence in Welds	

Industrial Conditions in Belgium.....	579	Correspondence	599
Motor-Driven Portable Disk Sander.....	584	Mr. Peters Replies to Mr. Roberts	
Duplex Hand Milling Machine.....	584	Casting Steel Pipe Centrifugally	
New High-Duty Drilling Machine.....	585	Coming Meetings	599
Hacksaw Machine Using Light-Gage Blades		Higher Tariff Rates Asked on Pig Iron..	600
at High Speed.....	585	New Blast Furnace Records.....	600
Machine for Threading Large Pipe....	588	Labor Notes	600, 625, 626
Stainless Non-Ferrous Alloys.....	588	Legal Points of Pittsburgh Base	601
New Foundry Machine for Filling Flasks	591	Strength of Alloy Steels at High Temper-	
Electric Brass Furnace Investigation....	591	atures	601
Switching Allowances Not Required.	591	Boiler Sales in 1921.....	612
Multiple Shaper for Internal Gears.....	592	Foreign* Trade Conditions	615, 616
Four-Way Drilling Machine.....	594	Puddlers' Wage Scales.....	616
Cost of Living Slightly Lower.	594	Waste in Foundries.....	618
Editorials	596	Hog Island Surplus Steel Sold.....	618
A Railroad Reservoir—Employment in		Nitrogen in Oxyacetylene Weld.....	619
Coal Mining—Again a Stainless Metal		Thermal Expansion of Metals and Alloys.	621
—Sound Principles Opposed—Steel Ships		Taylor Society Meeting.....	621
Offered for Sale.		Vehicular Tunnel Contract.....	622
		American Incomes, Farmer and Otherwise	625
		Refractories Market	626
		Industrial Finance	633
		Office Changes	635

Iron and Steel Markets	602
Comparison of Prices	603
Prices Finished Iron and Steel f. o. b. Pittsburgh	617
Non-Ferrous Metal Market	619
Personal Notes	620
Obituary Notes	621
Machinery Markets and News of the Works	627
New York Jobbers' Prices	636

ESTABLISHED 1855

THE IRON AGE

EDITORS:

A. I. FINDLEY

WILLIAM W. MACON

GEORGE SMART

CHARLES S. BAUR, *Advertising Manager*

Member of the Audit Bureau of Circulations and of
Associated Business Papers, Inc.

Published every Thursday by the IRON AGE PUBLISHING CO., 239 West 39th Street, New York

Editor in Chief

PRINTED IN U. S. A.

George H. Griffiths, *Secretary*

Owned by the United Publishing Corporation, 214 West 39th
Street, New York. H. M. Crawford, *Pres.*; Charles G. Phillips,
Vice Pres.; A. C. Pearson, *Treas.*; F. J. Frank, *Secy.*

BRANCH OFFICES: Chicago: Old Building; Pittsburgh:
Park Building; Boston: 139 State Building; Philadelphia:
1111 Walnut Building; Cleveland: Guardian Building

Detroit: 317 West Fort St.; Cincinnati: Mercantile Library
Bldg.; Buffalo: Ellicott Square Building; Washington: 816
Fifteenth St., N. W.; San Francisco: 320 Market St.
London, Eng.: 11 Haymarket, S.W. 1.

Subscription Price: United States and Possessions, Mexico,
Cuba, Shanghai: \$6.00; Canada, \$8.50; Foreign, \$12.00 per
year. Single copy 50 cents.

Entered as second-class matter June 18, 1879, at the Post Office at New York, New York, under the Act
of March 3, 1879.

A Railroad Reservoir

Remote though a collapse of the railroads may seem, close students of transportation do contend that it will not take a great expansion of shipments to produce paralysis, more or less partial. A way out is suggested and this will probably interest business in general, as it involves buying of equipment. The drawback is that it is not clear that the power to help the situation will be exercised.

The proposal is to establish what may be called a national reserve of rolling stock and motive power to carry any or all of the railroads over a peak demand. The Esch-Cummins act provides the finances, as it is believed that the excess earnings over the 5½ per cent belonging to each road could be diverted toward establishing the reserve. It is estimated that on the 1921 account \$12,000,000 of excess earnings will accrue to the Government, as even under the adverse conditions of 1921, some railroads were capable of surpassing the 5½ per cent minimum.

The argument for the national reserve is, of course, that providing for the peak load burden should not be the concern of a few of the large railroads, and it follows that none of the large 100 nor of the 3000 large and small railroads is expected to provide the emergency capacity. It remains for railroad executives to ascertain just how under the transportation act they may establish, if they choose, railroad equipment to be used for the common good, so to speak; it seems clear that Government agencies are not likely to take the initiative.

If the railroads are left to drift, a car shortage will by that fact be surer. There will then be the renewed cry for Government ownership. Should the shippers put the onus on the private managements and should they turn an ear to the Government ownership propagandists, it would be difficult to save the railroads. The national reservoir of transportation facilities certainly looks theoretically attractive; indeed it appears as essential. The demand is for railroad leadership, which can now undoubtedly count on Gov-

ernment assistance in the executive departments, assuming no special legislation is necessary.

Employment in Coal Mining

It is a deplorable condition when the public is required to pay an excessive price for an article because there is an excess of capacity for producing the article. We are often told that the great law of supply and demand controls prices and this "law," as commonly interpreted, means, if it has any practical meaning at all, that the greater the productive capacity the more likely is the thing produced to be cheap.

What is the condition in coal mining that coal must be sold at a higher price, on account of the great productive capacity in existence, than would be requisite if the industry were efficiently aligned, with a smaller capacity?

Discussion is now rife as to conditions that will obtain at the union bituminous coal mines after April 1. The discussion is as to whether the United Mine Workers will negotiate with part of the former central competitive field, now that it is established that operators in certain districts, including the Pittsburgh district, refuse to take part in such negotiations, as to whether the miners individually will be disposed to strike to maintain the check-off, and as to various similar matters. The discussion takes no thought in the direction of the economic problem involved.

Yet there is a great economic problem. The miners demand a relatively high mining rate per ton because, as they say, they are not fully employed. They deny that citations of high earnings by certain miners furnish reason for reducing the tonnage rate, because those miners worked nearly if not quite full time, and the average miner is not permitted to do that.

No one denies that the miner should be paid a higher rate per ton than it would be fair and equitable to pay him if he worked full time. Thus we are as a matter of bare fact recognizing the principle of the minimum wage, however objectionable that principle may be. Surely we all know that the principle of the minimum wage

cannot be universally applied without producing confusion, disorganization and eventually a much worse condition than the one it would be aimed to improve. In general, the total amount of money received for goods sold or services rendered is divided 70 to 80 per cent for wages and salaries and 30 to 20 per cent for capital and direction.

If it were decreed that all wages and salaries should be raised to certain amounts, one of two things or a combination of the two would occur. Prices would advance so that the new income of the individual would buy no more than before, or part of the adjustment would be made by capital receiving less, whereupon a readjustment would begin through expansion in industry being stopped and the share of the capital already invested would increase, through buyers competing for the product of that capital. The scheme, generally applied, simply would not work. If applied to a small group of workers it could be made to work by laying the cost upon the other workers. That idea is repugnant. Why do we consider the practice natural and tolerable because coal mining is the field in which it prevails?

The inefficiency of the coal mining industry has been universally recognized and some little abortive attempts have been made to find means for improving the situation, such as the seasonal coal freight rate suggestion. There were very practical objections to that proposal, and at best it could not have done much good. It aimed to distribute employment of coal miners over the year, but that would leave the difficulty that the total employment in a year is not enough. Even if there were what by the common concept is considered full employment, there would be only one-third employment of the capital investment, for the highest objective is an eight-hour day. The crux of the matter, of course, is simply that the time of the miner is not efficiently employed. In recent years the miner has been indisposed to seek other employment for his spare time, the operators are indisposed to engage in new lines of business that could employ him, and the very thought is abhorrent to the labor leaders.

An extreme case of post-war liquidation is afforded by the market for 50 per cent ferrosilicon. While deflation in most materials playing a rôle in the iron and steel industry has been marked, there has been no parallel to that in ferrosilicon. In 1913 and 1914 this ferroalloy, so important in basic open-hearth practice, was selling at \$73 to \$75 per ton and at \$71 to \$73 per ton, delivered, in the two years respectively. During the war the price gradually advanced until in 1917 as high as \$250 was obtained for prompt delivery. Since 1920 there has been a gradual decline from a delivered selling price around \$80 to one ranging at present from \$55 to \$60 per ton, or a liquidation of over 25 per cent from the 1920 level and of about 22 per cent from the pre-war price. War demand was an incentive to the installation of new plants to make this alloy and the stocks left over after the 1920 boom have been one factor in the severe price recessions. It is a fact, however, that uses have been developed for the alloy in

other lines than in basic open-hearth steel making, and post-war conditions find it, if anything, a raw material of increased importance.

Again a Stainless Metal

Developments in stainless metals are following fast, one upon another, in Great Britain. The appearance of the so-called "stainless iron," and its possibilities, have spurred the non-ferrous producers to new achievements. If all reports are to be given credence, important results to industry may be the outcome.

The production of "stainless iron" and its properties were called attention to in these columns, Sept. 22, 1921. It is really low-carbon stainless steel which can be rolled and forged into sheets, wire and other products, a property not characteristic of the regular stainless steel. The principal drawback is its cost because of the expensive low-carbon ferrochromium necessary to its production. According to the latest reports, however, a new process has been discovered by an Englishman whereby this important low-carbon ferroalloy can be produced at around 20c. per pound and with a carbon content of about 0.25 per cent as compared to about 55c. to 60c. for the present product made here. The inventor has recently been in the United States looking after the rights in this country. Wide interest, amounting to enthusiasm, prevails in England because the possibility of cheap commercial production of a low-carbon, stainless steel is believed to open up wide uses for it as sheets, wire and many other materials, the results of which are obvious.

In the non-ferrous field, British research is reported to have developed a stainless alloy which threatens to supersede copper, brass, nickel and aluminum for many purposes. More details of this appear elsewhere in this issue. It is an improved form of nickel-silver containing a much larger percentage of nickel than ordinary nickel-silver and therefore harder, more durable and more nearly approaching silver in color, with the added claim that its price can be reduced to about one-third that of stainless steel or iron as now made.

These developments, and other similar ones more familiar, may not lead to the general use of stainless products but they bring visions of a possible "stainless metal age," when these or similar materials will find a thousand and one uses where rusting products now cause untold expense and trouble. The enthusiasts in England are predicting just such happenings, largely as a result of the recent discovery referred to. It is not wise to throw cold water on this belief, for only a few years ago stainless steel was unknown. One may safely take the position of watching developments, as sooner or later, each new thing, heralded and unheralded, finds its proper place in the scheme of things.

For an illustration of drastic slumping in American exports in 1921, one needs only to look to zinc statistics. It was probably without a parallel in that or any other metal. Foreign de-

mand for American zinc as pig, slabs, etc., in 1913 was 15,565,324 pounds. This totaled 243,830,248 pounds in 1919 and over 204,000,000 pounds in 1920, exceeding any of the war years. But in 1921 only 4,785,653 pounds were exported, less than one-third of the 1913 outgo and less than 2 per cent of the peak year. Were it not for the unprecedented demand last year from Japan, amounting to 2,645,355 pounds or over one-half of the total, American zinc exports would have reached almost the vanishing point. While the American zinc industry has never depended on foreign demand in normal times, the conditions last year of poor domestic demand, coupled with small exports, set down 1921 as one of the lean years in the industry.

Sound Principles Opposed

The recent decree agreed upon by representatives of the National Government and of the Bricklayers', Masons' and Plasterers' International Union of America is an indication of what a labor union will do under compulsion. Members of the union were facing prosecution and the evidence apparently was very strong against them. Under these conditions, it is not surprising that the decree proposed by the attorney general was agreed upon. But it should be noted that the ink on the decree had hardly dried when the executive council of the American Federation of Labor at a regular session at Washington adopted resolutions reaffirming its opposition to injunctions as a weapon against labor strikes and calling upon organized labor to ignore such orders when issued by the court. The resolution is militant in tone and calls upon organized labor to make a flat refusal "to recognize or abide by the terms of the injunction which seems to prohibit the doing of actions which the workers have a lawful right to do or which seeks to compel workers to do those things which they have a lawful right to refuse to do."

The principles laid down by Attorney General Daugherty to which the union agreed provided that there should be no limit to the productive capacity of the individual workman; that the right of the employer to purchase his material wherever and whenever and from whomever he may choose whether these materials be union made or otherwise should not be restricted; that there should be no favoritism shown by organized labor toward employers or trade associations or contractors' associations and no discriminations indulged in against the independent employer who may not be a member of such an association; and finally that the labor organization is not to be used as an instrument for the collection of debts or enforcement of the payment of alleged claims. All of these principles and particularly the first named are in direct conflict with the practices of many labor unions, and the statement of the Department of Justice set forth very clearly the abuses which have assumed various forms under the domination of the unions, often in co-operation or in conspiracy with contractors' associations. It would seem that a fair labor union would not

hesitate to adopt the principles, but it is too much to hope that this will become the case generally. On the contrary, the action of the executive committee above referred to indicates that a fight for the old abuses may confidently be expected.

Something, however, has been accomplished in fixing sound principles to govern, for a time at least, over 100,000 members of a prominent union, and courts have been furnished a fine example of what can be done toward the regulation of obstreperous union labor leaders.

Steel Ships Offered for Sale

Advertisements of the United States Shipping Board, published in papers in New York and elsewhere, list for sale a total of 1490 vessels, varying from 100-ft. tugs to ocean liners of 20,765 deadweight tons. The magnitude of this sales effort may be appreciated from the fact that the total deadweight tonnage of the 1406 ships listed by tonnage amounts to 9,972,195. This is greater than the total tonnage in 1914 of the German mercantile marine—then the second largest merchant fleet in the world. It is heavier than the combined tonnage to-day of the three largest merchant fleets outside those of Great Britain and the United States.

The principal group consists of 1294 steel cargo ships, varying from 2625 tons to 13,312 tons. More than 5,000,000 tons represent steel cargo ships of 8000 tons each and upward—a magnificent fleet of heavy duty cargo carriers which alone is far in advance, in point of tonnage and capacity, of the entire American merchant fleet of 1917. Steel tankers numbering 83, together with eight concrete tankers, account for a total of more than 800,000 tons additional. There are also 23 of the new 13,000-ton passenger and cargo liners designed for service to South American ports, and 20 steel passenger and cargo vessels seized from enemy nations at the beginning of the war. What will be the effect of the realignment of ownership of these ships, assuming that few will be bought for destruction or for use as monuments, is difficult to suggest, but the thought of the volume involved begets thought on the distribution.

Claims Board Dissolves

WASHINGTON, Feb. 28.—Its work having been practically completed, the War Claims Board of the War Department will be dissolved to-morrow. More than 30,000 claims against the Government in connection with war-time contracts, many of them made with iron and steel manufacturers, were recorded, only 31 of which remain undisposed of by the board, according to Acting Secretary Wainwright. The latter are of such a nature that they can be disposed of through the regular legal machinery of the War Department.

The Automatic Machine Co., Bridgeport, Conn., machinery manufacturer, held its annual meeting recently and elected the following officers for 1922: President, Frederick J. Kingsbury, New Haven; vice-president, James Coulter; treasurer and general manager, Norman Leeds; secretary, A. J. Porter. The directors are: Henry A. Bishop, M. F. Burns, William E. Burnham, James Coulter, Stiles E. Goodsell, F. J. Kingsbury, Norman Leeds and William R. Webster.

CORRESPONDENCE

Mr. Peters Replies to Mr. Roberts

To the Editor: I have read with interest the open letter by Frank C. Roberts, C. E., of this city, on pages 538-539 of your issue of Feb. 23, in which he criticises certain statements in the article on the Warwick Furnaces which appeared in THE IRON AGE of Feb. 2. As I happened to prepare the article in question, I deem it proper to ask that I may be permitted to point out to Mr. Roberts through your columns that he is hardly justified in definitely asserting that my statement "is incorrect" wherein I said that "the lines of the new (No. 2) furnace were obtained by proportionate enlargement of those of the older stack."

This information was given to me by the late Edward B. Cook, son of Edgar Cook, and as the procedure was rather unique to me, I made a note of it at the time. Fortunately for the defense of my statement and my memory, the facts are confirmed by Mr. Cook himself in his discussion of the paper on "Modern American Blast Furnace Practice" presented by H. A. Brassert at the May, 1914, meeting of the American Iron and Steel Institute.

Mr. Cook's remarks were confined to the practice at the Warwick furnaces and may be found on pages 102-113 of the year book of the institute for 1914, from which I quote as follows, the italics being mine: "First blast, 1901 to 1904.—*The lines of the first blast were obtained by practically making an enlarged photograph of the No. 1 furnace 70 ft. high, which had done satisfactory work on merchant pig iron of various grades, using the usual materials commonly employed in the East. The records show that the first blast was extremely unsatisfactory. Passing through the period of organization on a new plant would account for some of the trouble, but the management felt that there were serious difficulties with the furnace itself.* * * * The lines of the second blast were copied from the Edgar Thompson standard at that time."

I believe that a careful study of the records of the several blasts as shown on pages 112 and 113 of the publication above mentioned will to a degree substantiate my statement that "these lines did not give the desired results" as the change from the first lines resulted in marked improvement in daily output, fuel and stone consumption with a noticeable reduction in top heats.

I heartily subscribe to what Mr. Roberts has to say concerning Mr. Cook's ability as a furnace manager, and endeavored to convey this thought in the story as I wrote it, at the same time giving facts which seem to be a matter of record.

RICHARD PETERS, JR.

1008 Real Estate Trust Building,
Philadelphia, Feb. 25, 1922.

Casting Steel Pipe Centrifugally

To the Editor:—I have read with great interest your editorial in THE IRON AGE, Feb. 9, on the subject, "Progress in Centrifugal Casting."

I note that you mention, as still somewhat unsettled, the subjects of temperature control of the metal and proper speed for centrifugal casting. As a matter of fact, however, both of these have been pretty well determined, experimentally and proper rules for the temperature control have been established. The matter of speed is controlled by a simple formula of the type K/Vr , where K is a constant that varies for different metals, and r the radius of the casting in inches. The full derivation of this formula, together with the rest of the mathematics of centrifugal casting will be given in my paper before the American Society of Mechanical Engineers, at Atlanta, Ga., in May.

L. CAMMEN.

New York, Feb. 14.

The Berwick Car Works, Berwick, Pa., has received an order to repair 500 cars for the Delaware, Lackawanna & Western Railroad.

Mechanical Engineers' Spring Meeting

The program of the meeting which the American Society of Mechanical Engineers is to hold in May in Atlanta, Ga., is planned to put special emphasis on engineering phases of Southern industries. Incidentally there will be excursions to Birmingham, Greenville, S. C., Mussel Shoals, Ala., and Pensacola, Fla. The society held a spring meeting in 1916 in New Orleans and it is emphasized that in the interval the increase in industrial activities promises especial interest in the meeting.

A business session will be held on the morning of May 8 and on the morning of May 9 will be held a session on machine shops, one on material handling in the steel industry, and one on the power test code.

On the morning of May 10 the subject of machine shops will be continued and the matter of fuels will be discussed. On Thursday, May 11, the sessions will cover management, power and welding.

Officers of American Engineering Standards Committee

At the adjourned annual meeting of the American Engineering Standards Committee held in New York on Feb. 9, Albert W. Whitney, a representative of the National Safety Council, was elected chairman, and George C. Stone, a representative of the American Institute of Mining and Metallurgical Engineers, was re-elected vice-chairman. Mr. Whitney is associate general manager of the National Bureau of Casualty and Surety Underwriters. A. A. Stevenson, the retiring chairman, is a representative of the American Society for Testing Materials.

COMING MEETINGS

March

American Society for Steel Treating. March 3. Sectional meeting, Hotel McAlpin, New York. Secretary, W. H. Eisenman, 1600 Prospect Avenue, Cleveland.

Refractories Manufacturers' Association. March 15, 16 and 17. Annual meeting, Chicago. Secretary, F. W. Donahoe.

Taylor Society. March 16 to 18. Midwinter meeting, City Club, Philadelphia. Managing director, Dr. H. S. Person, 29 West Thirty-ninth Street, New York.

April

National Metal Trades Association. April 19 and 20. Annual meeting, Hotel Astor, New York. Secretary, Louis W. Fischer, Peoples Gas Building, Chicago.

American Supply and Machinery Manufacturers' Association and Southern Supply & Machinery Dealers' Association. Joint Meeting, April 24 to 26, Birmingham. F. D. Mitchell, 233 Broadway, New York, is secretary of the American Association and A. M. Smith, Smith-Courtney Co., Richmond, Va., is secretary of the Southern Association.

Society of Industrial Engineers. April 26 to 28. Spring meeting, Hotel Statler, Detroit. George C. Dent, business manager, 327 S. La Salle Street, Chicago.

American Electrochemical Society. April 27 to 29. Spring meeting, Baltimore. Acting secretary, Dr. Colin G. Park, 119 Park Avenue, New York.

May

Iron and Steel Institute. May 4 and 5. Annual Meeting, Quarters of Institution of Civil Engineers, London, England. Secretary, George C. Lloyd, 28 Victoria Street, S. W., London.

American Society of Mechanical Engineers. May 8 to 10. Spring meeting, Atlanta, Ga. Secretary, Calvin W. Rice, 29 West Thirty-ninth Street, New York.

National Foreign Trade Council. May 10 to 12. Convention, Philadelphia. Secretary, O. K. Davis, 1 Hanover Square, New York.

National Sheet Metal Contractors' Association. May 15 to 19. Convention and exposition, Cadle Tabernacle, Indianapolis.

National Association of Purchasing Agents. May 15 to 20. Annual convention and exposition, Exposition Park, Rochester, N. Y. Secretary, H. R. Heydon, 19 Park Place, New York.

American Iron, Steel & Heavy Hardware Association. May 23 to 25. Annual meeting, Hotel Washington, Washington. Secretary, A. H. Chamberlain, Marbridge Building, New York.

HIGHER RATE ASKED

More Protection for Pig Iron Proposed—Slow Progress in Tariff Bill

WASHINGTON, Feb. 28.—Greater tariff protection for the American pig iron industry than is afforded in the Fordney bill, which carries the rate of \$1.25 per ton, was urged before the Senate Committee on Finance last week by a delegation of manufacturers. The rate asked was not made known. At present pig iron is free. Under the Payne-Aldrich tariff it carried a duty of \$2.50 per ton.

In asking that the rate in the House bill be increased, it was contended that the increased cost of labor and fuel, together with foreign competition, made a higher tariff rate necessary. It was further contended that if the bill is enacted as it now stands, the existence of the merchant iron industry in this country is endangered. It was stated that there is no probability of excessive prices because of a higher tariff rate, for domestic competition would take care of that phase. In order to keep the industry intact, pig iron must have the same degree of protection as that which is given to steel articles, it was stated.

The delegation was presented to the Finance Committee by Senator George Wharton Pepper and was accompanied by Harry S. McDevitt, Secretary to Gov. William C. Sproul, of Pennsylvania. The delegation consisted of Felton Bent of the Lebanon Iron Co.; Frank G. Kennery, of Philadelphia; John Milligan, of Dover; David Thomas of the Logan Iron Works, Philadelphia; Frank Richardson of Pittsburgh and William Clarke Mason of Philadelphia, counsel for the Philadelphia & Reading Coal & Iron Co.

Two Valuation Plans

The House Committee on Ways and Means and the Senate Committee on Finance have held conferences during the past week in an effort to wipe out their differences regarding the determination of a basis for tariff valuation. According to a tentative agreement, the Ways and Means Committee has scored a victory over the Finance Committee. This is contrary to the usual legislative history, for it is traditional that the Finance Committee does the disposing after letting the Committee on Ways and Means of the House do the proposing. The present success of the Committee on Ways and Means is attributed largely to the firm insistence of Chairman Fordney for an American valuation plan. Whether his attitude will prevail in the end

or not, is a question, but sentiment in Congress seems to be supporting him.

The plan as now worked out calls for the basing of duties on the American wholesale selling price of imported articles where there are no comparable domestic articles and on the straight American valuation plan where there are comparable articles. In view of the fact that iron and steel products made in this country are comparable with practically all of those manufactured abroad, the straight American valuation plan would apply to iron and steel imports if the tentative agreement as to a valuation plan is made permanent.

The agreement is said not to be relished by Senator Smoot, of the Finance Committee, whose proposal to base duties upon a foreign valuation had been tentatively determined upon by the committee through a vote of 5 to 4. The Smoot proposal also took into account depreciated exchange and the idea of flexible tariffs, the latter providing that the President might proclaim minimum decreases of not less than, and maximum increases of not more than, 50 per cent. The idea of flexible tariffs might still be adopted, as the Administration has gone on record in favor of this plan.

Switching of One Vote

The change in the attitude of the Finance Committee in favor of the American valuation plan or its equivalent, for Chairman Fordney considers that the basing of duties on American wholesale selling prices is American valuation, was due to the switching of one vote in the Finance Committee. The result has been that while the first vote was 5 to 4 in favor of the foreign valuation plan, the latest test vote was 5 to 4 in favor of the American valuation plan. There still is said to be considerable feeling between some of the Republican Senators of the Finance Committee and the Republican Representatives of the Ways and Means Committee.

Members of Congress are hoping to adjourn in June and that is one reason why the Finance Committee cannot hold out as firmly as it would otherwise, for it recognizes that if the bill is to be passed by that time there would be a great deal of work to be done in the way of rewriting rates if the foreign valuation basis were adopted. On the other hand, if the House American valuation plan is continued, the rewriting of rates would be a much simpler matter. There is no assurance, however, that Congress will be able to adjourn in June and many seriously doubt that the tariff can be enacted by that time. Undoubtedly, it will be the object of heated and prolonged discussion in the Senate.

Gompers Plan Not Practical

WASHINGTON, Feb. 28.—Secretary of the Navy Denby, in a letter addressed to President Samuel Gompers of the American Federation of Labor, says that the Navy Department, upon investigation, has found it impossible to comply with suggestions recently made by a committee headed by Mr. Gompers for the relief of employees "furloughed" from the Navy Yard as a result of stopping work upon ships, effected by the Conference on the Limitation of Armaments. Secretary Denby points out that the Navy Department has no funds available for the scrapping of vessels and also that it has neither funds nor authority to proceed with an auxiliary building program to provide employment for the employees who have been dismissed.

Passing upon the proposal that the Government yards be used to supply the needs of other Government departments, Secretary Denby said that should such a plan be adopted and the yards converted into industrial instead of Government plants, "it is difficult to see how the national unemployment situation will be in any way alleviated, even if it is found feasible to compete in the open market with industrial plants on the outside. As to this I have very serious doubt, for I know of no industrial plant in private life where such liberality is shown employees thereby increasing the overhead, as in the Government yards of the United States."

The Secretary said, however, that the suggestions made by Mr. Gompers would be presented to President Harding, as suggested.

Making New Records

Production records are being established by the new 600-ton blast furnace of the Trumbull-Cliffs Iron Co., joint subsidiary of the Trumbull Steel Co., Warren, Ohio, and the Cleveland-Cliffs Iron Co., Cleveland. For the first 15 days of February, the average output was over 600 tons on an average of 1850 lb. of coke per ton of iron.

The stack was lighted Jan. 16 and in 36-hr. produced its first run of iron. In one week it was averaging over 500 tons each 24-hr. period. One day subsequently it produced 711 tons of iron on an average of 1675 lb. of coke per ton of iron, this production being attained without use of borings—on iron ore only.

The furnace supplies hot metal to the open hearth department of the Trumbull Steel Co., directly across the Mahoning river at Warren.

The Charter Oak Machine Co., 438 Asylum Street, Hartford, Conn., on or about April 1 will move into its new plant in East Hartford.

LEGAL POINTS DECIDED

Federal Trade Commission Makes Rulings in Basing Point Case

WASHINGTON, Feb. 28.—Denial was made last Saturday by the Federal Trade Commission of all of the motions presented by the counsel for the United States Steel Corporation with regard to the procedure of hearings in the so-called Pittsburgh base case. The motions were argued by the Steel Corporation through its general solicitor, W. W. Corlett, and Counsel Charles A. Severance. At the same time, the commission granted a motion by its own counsel, H. K. Steinhauer, to amend the complaint by including a statement that the Pittsburgh base practice is used by the steel producers other than the Steel Corporation and also to make one or two other minor changes, the object of which, it was stated, was to clarify the record. The commission directed John W. Bennett, before whom the hearings are being held, to admit all evidences such as the Steel Corporation asked to be excluded, but to note on the record all objections made by the Steel Corporation's counsel. Arguments were made on the motion before the commission last Friday.

The motions argued on behalf of the Steel Corporation which the commission denied were as follows:

1. For the commission to specifically instruct Examiner Bennett to exclude the introduction by the Federal Trade Commission of contracts, invoices, correspondence or other evidences of purchases, agreements as to purchases, quotations or offers to sell, made by corporations or individuals other than the respondents to purchasers and prospective purchasers of any of the rolled steel products involved; and further that all evidences of the same heretofore introduced be stricken from the record.

2. That the examiner exclude admission of testimonials, resolutions, etc., to State legislatures, chambers of commerce and other public bodies as to the method of marketing steel through the Pittsburgh base system.

3. That the Federal Trade Commission direct the examiner to admit evidences from the commission's witnesses regarding cost figures, etc.

The ruling of the commission means that Examiner Bennett will admit evidences such as has been heretofore put into the record but will be required to use discretion in the matter of permitting questions by the respondents directed to commission's witnesses as to cost figures, etc., of the steel consumers.

The noting of exceptions by the examiner is required evidently in anticipation of the well-known fact that the case before coming to final conclusion will be contested through the courts and perhaps will finally reach the Supreme Court of the United States.

While the ruling by the commission makes it clear that the past procedure in the hearings can be continued but in a sense may clarify the record as suggested, it is plain that the record will be made extremely cumbersome because of the large volume of testimony that may be introduced, but to which exceptions may be noted by counsel for the Steel Corporation. The ruling of the commission also is interesting in view of the argument made by its general counsel, W. H. Fuller, that the commission did not have jurisdiction to rule on the motion. He contended that jurisdiction rests with Circuit Court of Appeals and therefore that the commission to attempt to pass on the motion would be to usurp the authority of the courts. This argument, however, was combatted by Mr. Severance.

The hearing will be resumed at Minneapolis this week.

Tensile Properties of Some Structural Alloy Steels at High Temperatures

In Technologic Paper No. 205 of the Bureau of Standards, the results are given of a number of determinations of tensile strength, proportional limit, elongation, reduction of area, and strength at fracture throughout the range 20 to 500 deg. C for four steels containing about 0.38 per cent carbon as follows: (a) Plain carbon steel; (b) 3.50 per cent nickel steel; (c) 3 per cent nickel and 1 per cent chromium steel, and (d) one per cent chromium 0.2 per cent vanadium steel. Brief reference is made to the types of fractures made in testing steels at various temperatures, and particular attention is paid to comparison of the tensile properties of these alloys at 550 deg. C. Of the four steels tested in normalized conditions, it appears that the two alloys containing chromium show greater resistance to weakening by increase in temperature to about 550 deg. C than either the plain carbon or 3.50 per cent nickel steels, and at this high temperature the chromium-vanadium steel is to be preferred from the standpoint of high tensile strength and limit of proportionality. The carbon and 3.50 per cent nickel steels behaved alike with rise in temperature above that of the room and at about 550 deg. C the addition of 3.50 per cent nickel appears to have but little effect upon the strength of the carbon steel.

Glenwood Motor Car Co.'s Plans

The Glenwood Motor Car Co., organized by Cleveland interests, has purchased a 15-acre tract along the Youngstown & Austintown Railroad in Youngstown, Ohio, where it plans to build a plant in the spring for production of a six-cylinder automobile. Initial unit will be a standard structural steel factory building 90 x 750 ft. During the first year of production, the company plans to turn out 500 cars, and at the end of the first 12 months to go on a five-car-a-day basis.

The company, organized under the laws of the State of Delaware, has an authorized capitalization of \$5,000,000 preferred stock and 200,000 shares of non-par

value common. Officers are: B. J. Cline, president and general manager; Capt. R. L. Quiesser, president of the R. L. Quiesser Co., Cleveland, secretary, and T. D. Lamb, president of the Hess Body Co., Cleveland, treasurer. Mr. Cline has had 22 years' experience in the automobile industry, and was formerly identified with the Chandler and Chalmers interests.

Railroad Operation in 1921

According to figures issued by the Association of Railway Executives, the total operating revenue of the 201 Class I roads for 1921 was \$5,569,888,000, or 10.6 per cent less than for 1920. The corresponding operating expenses are given as \$4,602,425,000, or 21.1 per cent less than in 1920. The operating ratio works out at 82.63 per cent, compared with approximately 70 per cent normal in pre-war times.

After taking care of various fixed charges, the net operating income available for interest, dividends, rentals and surplus amounted to \$615,625,619, or 3.31 per cent of the \$18,600,000,000 tentative valuation of the roads. Returns became better throughout the year, the December estimate being at the rate of 3.44 per cent.

Frey, Brassert & Co.'s Foreign Connections

In the interview with H. J. Freyn, president Freyn, Brassert & Co., Chicago, in THE IRON AGE, Feb. 16, it should have been made clear that the Chicago company has a working agreement with the German steel company, Gutehoffnungs Hütte, to represent its interests in Germany and other Central European countries; that the American rights to the McKune open-hearth furnace belong to the Miami Metals Co., Chicago, and not to Freyn, Brassert & Co., but that the latter company has secured an option on certain foreign rights to this invention. An error was made in stating that the cost of living and wages in Germany are respectively 25 and 30 per cent higher than before the war; they are 25 and 30 times higher respectively. Also German combinations are now becoming vertical instead of horizontal as before the war.

Iron and Steel Markets

OPERATIONS EXPANDED

Industry at 55 Per Cent Basis

Backlogs Obtained at Expense of Prices — Railroad Purchases Notable

Further expansion of steel making activities marked the last days of February. The gradual increase in production has been larger than tonnage sales would have indicated and shows how pressing are the necessities of the stock-bare consumers.

The increase of bookings has been accompanied by fresh weaknesses in price. The resultant unsettlement is thus still holding back a large volume awaiting evidence of price stabilization.

The United States Steel Corporation is making between 60 and 65 per cent of its capacity in steel; the independent makers, as a whole, are operating at nearly 50 per cent, and March opens at a 55 per cent rate for the whole country.

There is practically no contracting for future needs; there is little extension of delivery dates, and business is chiefly for prompt shipment, about the only buying for second quarter needs being in sheets and in pig iron.

Attempts are being made to stiffen prices, partly by refusal to bid at current quotations. In the case of wire a 10c. advance is general, reducing the spread between plain wire and wire nails.

Current activities of wire plants are not fully accounted for by mill bookings. Pipe mills, likewise well engaged, are in some cases stocking production. There is an unusually full engagement of tin plate mills, largely on old contracts. About 75 per cent of the sheet mill capacity of the country is in operation and sheet prices are among the few remaining firm, though buyers are not overlooking the weakness in other products.

The considerable number of price reductions with the broadening in consumption are accounted for in part by the concern shown by mills over building up backlogs. In the heavy tonnage products 1.35c., Pittsburgh, for bars, plates and shapes has been established. Tin plate is obtainable at \$4.50 and \$4.60 per box, against recent quotations of \$4.75. Frequent steep price concessions in steel pipe point to the possibility of a new card of discounts to bridge the difference between quoted and actual selling prices.

An inquiry of the New York Central for 40,000 to 50,000 spikes brought out a price of \$2 per 100 lb., against \$2.15 recently obtaining. Heavy rivets have been done at \$2 and \$2.10, though quoted 10c. higher. Cold-finished bars are now readily obtained at 1.90c., and \$2 concessions are noted on hoops and \$3 on bands.

The pig iron market in the East has shown a decided increase in activity. Sales of foundry iron in the Philadelphia district have amounted to fully 40,000 tons, largely to cast iron pipe and soil pipe manufacturers, while in New York the sales were about 25,000 tons of foundry grades to cast iron pipe and other consumers. Concessions of about \$1 a ton were made, but the prices

have since recovered. Charcoal iron has declined about \$4 per ton in the Chicago district, and owing to strong competition between Northern and Southern foundry grades, the recently named price of \$20 has been shaded 50c.

Increased melting has been an important factor in the pig iron buying, but so has the fear of a coal strike, with an upward tendency in the price of furnace coke and an actual advance in foundry coke.

In the large tonnage business the railroads are still conspicuous. Fresh rail purchases total 65,000 tons, including 20,000 for the Reading, 10,000 for the Atlantic Coast Line, 10,000 for the Santa Fe and 5000 for the Northern Pacific, and releases on existing contracts have been increasingly liberal. Upward of 15,000 tons of tie plates and splice bars, mostly for the Burlington, was bought in the West.

New car orders total 5300, again all business for Western car builders. Included are 500 more for the Burlington (completing its purchases of 7300 cars), 3300 for the Pacific Fruit Express and 1000 for the Great Northern. Of new business in locomotives the Burlington bought 55 of the 60 placed.

In the broadening market in which freer buying is noted from the automobile industry and even from the agricultural implement manufacturers, alloy steel is in notably better demand.

Pittsburgh

PITTSBURGH, Feb. 28.

Business in steel is better, but seemingly there is more anxiety on the part of manufacturers for orders than there is urgency about the demand, because the larger bookings have been accompanied by fresh weakness in prices in which few products have escaped, and which is really pronounced in the heavy tonnage lines. Some describe the price situation as more unsettled now than it has been at any time since the reaction began late in 1920.

Most of the recent developments of a character affecting the demand for steel have been favorable and there has been some actual broadening in the demand, but some mills evidently have been more concerned about the building up of a back log than in maintaining prices and have not hesitated about naming figures that would bring the orders. It is reported that a large tonnage of structural steel recently was placed in the East, at less than 1.30c., Pittsburgh, while a Pittsburgh maker of bolts and nuts is mentioned as having closed for a substantial tonnage of bars at 1.30c., base and 1.35c. has come to be regarded as a maximum instead of a minimum price on plates, shapes and bars.

Price concessions in steel pipe have been so frequent and so steep lately as to give rise to expectation of the issuance of a new card bridging the differences which now exist between quoted and actual selling prices. Tin plate prices are weaker and increased orders for most other finished products have been accompanied by weakness in prices. There is a firmer stand by wire manufacturers who, however, have given public recognition to a base of \$2.40 per keg for nails, and to the lower prices they recently were quietly accepting on other products from preferred customers. No important price cutting is noted in sheets, but it is not

A Comparison of Prices

Advances Over the Previous Week in Heavy Type; Declines in Italics

At date, one week, one month, and one year previous

For Early Delivery

Pig Iron, Per Gross Ton:	Feb. 28, 1922	Feb. 21, 1922	Jan. 31, 1922	Mar. 1, 1921
No. 2X, Philadelphia.....	\$20.34	\$21.34	\$21.34	\$28.34
No. 2, Valley furnace.....	19.00	18.75	19.00	26.50
No. 2, Southern, Cin'ti't.....	20.00	20.00	20.50	31.00
No. 2, Birmingham, Ala. f.....	15.50	15.50	16.00	26.50
No. 2 foundry, Chicago.....	19.50	20.00	18.50	27.00
Basic, del'd, eastern Pa.....	19.84	19.84	19.84	27.26
Basic, Valley furnace.....	17.75	17.75	18.00	25.00
Bessemer, Pittsburgh.....	21.46	21.46	21.46	28.96
Malleable, Chicago.....	20.00	20.00	18.50	26.50
Malleable, Valley.....	19.00	19.00	19.50	27.90
Gray forge, Pittsburgh.....	20.71	20.71	20.96	27.46
L. S. charcoal, Chicago.....	26.00	30.50	30.50	38.50
Ferromanganese, seaboard	62.50	62.50	58.35	90.00

Rails, Billets, etc., Per Gross Ton:

O.-h. rails, heavy, at mill.....	\$40.00	\$40.00	\$40.00	\$47.00
Bess. billets, Pittsburgh.....	28.00	28.00	28.00	38.50
O.-h. billets, Pittsburgh.....	28.00	28.00	28.00	38.50
O.-h. sheet bars P'gh.....	29.00	29.00	29.00	42.00
Forging billets, base, P'gh.....	32.00	32.00	32.00	43.50
O.-h. billets, Phila.....	33.74	33.74	33.74	49.24
Wire rods, Pittsburgh.....	36.00	35.00	36.00	52.00
Skelp, gr. steel, P'gh, lb.....	1.40	1.50	1.50	2.35
Light rails at mill.....	1.40	1.40	1.50	2.45

Finished Iron and Steel,

Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Iron bars, Philadelphia.....	1.76	1.76	1.81	2.70
Iron bars, Chicago.....	1.55	1.55	1.60	2.60
Steel bars, Pittsburgh.....	1.35	1.40	1.50	2.00
Steel bars, Chicago.....	1.50	1.50	1.60	2.38
Steel bars, New York.....	1.74	1.78	1.83	2.38
Tank plates, Pittsburgh.....	1.35	1.40	1.40	2.10
Tank plates, Chicago.....	1.50	1.50	1.60	2.48
Tank plates, New York.....	1.73	1.78	1.78	2.48
Beams, Pittsburgh.....	1.35	1.40	1.50	2.10
Beams, Chicago.....	1.50	1.50	1.60	2.48
Beams, New York.....	1.73	1.78	1.83	2.48
Steel hoops, Pittsburgh.....	1.80	1.90	1.90	2.80

*The average switching charge for delivery to foundries in the Chicago district is 70c. per ton.

†Silicon, 1.75 to 2.25. ‡Silicon, 2.25 to 2.75.

The prices in the above table are for domestic delivery and do not necessarily apply to export business.

Sheets, Nails and Wire, Per Lb. to Large Buyers:	Feb. 28, 1922	Feb. 21, 1922	Jan. 31, 1922	Mar. 1, 1921
Sheets, black, No. 28, P'gh.....	3.00	3.00	3.00	4.00
Sheets, galv., No. 28, P'gh.....	4.00	4.00	4.00	5.25
Sheets, blue an'Td, 9 & 10.....	2.25	2.25	2.25	3.20
Wire nails, Pittsburgh.....	2.40	2.40	2.50	3.10
Plain wire, Pittsburgh.....	2.25	2.15	2.25	3.00
Barbed wire, galv., P'gh.....	3.05	3.05	3.15	3.85
Tin plate, 100-lb. box, P'gh.....	\$4.60	\$4.75	\$4.75	\$7.00

Old Material, Per Gross Ton:

Carwheels, Chicago.....	\$15.00	\$15.00	\$15.00	\$19.00
Carwheels, Philadelphia.....	16.50	16.50	16.50	20.00
Heavy steel scrap, P'gh.....	15.00	14.00	14.00	18.00
Heavy steel scrap, Phila.....	12.00	12.00	12.00	15.50
Heavy steel scrap, Chicago.....	11.50	11.50	11.25	14.00
No. 1 cast, Pittsburgh.....	16.00	16.00	16.00	22.00
No. 1 cast, Philadelphia.....	16.50	16.50	16.50	22.00
No. 1 cast, Ch'go (net ton).....	13.50	13.50	13.00	16.75
No. 1 R.R. wrot, Phila.....	15.00	14.50	14.50	18.00
No. 1 R.R. wrot, Ch'go (net).....	10.75	10.50	10.50	13.00

Coke, Connellsville,

Per Net Ton at Oven:				
Furnace coke, prompt.....	\$3.25	\$3.25	\$2.75	\$4.50
Foundry coke, prompt.....	4.25	4.00	3.75	5.80

Metals,

Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Lake copper, New York.....	12.75	13.00	13.62½	13.00
Electrolytic copper, refinery.....	12.50	12.75	13.37½	12.50
Zinc, St. Louis.....	4.55	4.50	4.50	4.75
Zinc, New York.....	4.90	4.85	4.85	5.10
Lead, St. Louis.....	4.40	4.40	4.40	3.90
Lead, New York.....	4.70	4.70	4.70	4.00
Tin (Strait), New York.....	29.75	29.62½	32.00	30.00
Antimony (Asiatic), N. Y.....	4.35	4.40	4.40	5.20

Composite Price, Feb. 28, 1922, Finished Steel, 1.998c. Per Lb.

Based on prices of steel bars, beams, tank plates, plain wire, open-hearth rails, black pipe and black sheets.....	These products constitute 88 per cent of the United States output of finished steel.	Feb. 21, 1922, 2.005c. Jan. 31, 1922, 2.048c. Mar. 1, 1921, 2.793c. 10-year pre-war average, 1.689c.
--	--	---

Composite Price, Feb. 28, 1922, Pig Iron, \$18.10 Per Gross Ton

Based on average of basic and foundry irons, the basic being Valley quotation, the foundry an average of Chicago, Philadelphia and Birmingham.....	Feb. 21, 1922, \$18.36 Jan. 31, 1922, 18.31 Mar. 1, 1921, 26.14 10-year pre-war average, 15.72
--	---

denied that the weakness in other lines constitutes a menace to the sheet price structure.

Plant activities still are on a rising scale in this and nearby districts, but the gain has been greatest among the independent units, it being noted that some of the Steel Corporation subsidiaries have not done so well in the past week as in the week before. Independent plants as a whole easily are operating 50 per cent and some are running practically full, among the latter being the Weirton Steel Co., and the Trumbull Steel Co., while the Republic Iron & Steel Co. has 10 of its open-hearth furnaces on, and to-morrow will light another one. The Carnegie Steel Co. has turned the blast on two furnaces and now is operating 28 out of a total of 59 stacks. Sheet mill operations are close to 75 per cent of capacity, taking the industry as a whole, and there is unusual full engagement of tin plate mills, in this and nearby districts. Pipe mills also are well engaged, but there is some stocking of this product and current activities of wire plants are not fully accounted for by the mill booking.

The threatened strike of union coal miners also is something of a factor in present operations.

This market has grown slightly firmer on foundry pig iron, but there has not been enough done to establish changes in other grades. The coke market finds support from the fact that there is a market for coal at slightly better returns than are netted by coke at current prices. The market distinctly is stronger on the steel works grades of scrap, largely as a result of purchases by mills outside Pittsburgh which have not been adding to pig iron production.

Pig Iron.—There is a fair amount of activity in foundry iron, sales by one furnace interest over the past week having amounted to about 4000 tons, and prices have stiffened slightly. Practically all of the business placed has been at \$19, furnace, for No. 2 grade, and seemingly no more iron is available at a lower figure. It develops that the recent purchase of 1000 tons of basic by a Pittsburgh district sheet maker was from a Valley steel works furnace and that the price was \$17.75. Most producers now are quoting \$18 as a minimum, but there has been no business up

to determine whether that price can be obtained. Furnance interests generally are holding Bessemer iron at \$19.50, but this price is merely nominal and it is doubtful if it could be obtained on sizable tonnages. Stocks of this grade, however, are pretty light and since production is nil, there is not much pressure to sell. Carlond lot sales have been done anywhere from \$19 to \$19.50. W. P. Snyder & Co. make the average price of basic iron from Valley furnaces for February \$17.75 as compared with \$18.1875 in January, and of Bessemer \$19.50, as against \$19.594 in January.

We quote Valley furnace, the freight rate for delivery to the Cleveland or Pittsburgh district being \$1.56 per gross ton.

Basic	\$17.75 to \$18.00
Bessemer	19.00 to 19.50
Gray to iron	18.75
No. 2 foundry	19.00
No. 3 foundry	18.75
Middle	19.00

Ferroalloys.—Principal activity centers in spiegelisen. The purchase of a Valley steel maker turns out to be 600 tons instead of 100 tons as first reported. This was 16 to 19 per cent material and the price was approximately \$30 delivered, Youngstown. The source of the supply is not disclosed. A central Ohio steel maker has closed for about 1000 tons of the same grade, but this interest paid \$30 furnace, or slightly more than \$37 delivered, the seller being a commercial producer. Both sales were spot tonnages for prompt delivery, and because of meager stocks, the market is stronger for early than future deliveries. It is currently reported that an Eastern maker has booked a considerable tonnage of 20 per cent material for future shipment around \$25 furnace, and will start up a furnace shortly. A central Ohio consumer has an inquiry out for 500 tons of 80 per cent ferromanganese, and claims to have a quotation of \$2 per ton below the price now quoted by American and English producers. It is hard to establish \$62.50 seaboard, for this material because so many consumers were covered prior to the advance. German makers have not yet advised sales agents of any change in prices and we continue the quotation of \$58.35 seaboard, for 80 per cent. The market for 50 per cent ferrosilicon is quiet. A requirement contract covering the remainder of this year is said to have been made by a Pittsburgh consumer at \$57 furnace, freight allowed. Spot tonnages are available at \$55 to \$56 for domestic material.

We quote 78 to 82 per cent ferromanganese, \$62.50 c. f. Atlantic seaboard for domestic and English and \$58.35 for German. Average 20 per cent spiegelisen, nominal; 16 to 18 per cent, \$30 to \$35, delivered Pittsburgh or Valleys; 50 per cent ferrosilicon, domestic, \$55 to \$60 furnace, freight allowed. Bessemer ferrosilicon is quoted f. o. b. Jackson and New Stratsville, Ohio, furnaces as follows: 10 per cent, \$36.50; 11 per cent, \$39.80; 12 per cent, \$43.10; 13 per cent, \$47.10; 14 per cent, \$52.10; silvery iron, 6 per cent, \$25.7 per cent, \$26.8 per cent, \$27.50; 8 per cent, \$29.50; 10 per cent, \$31.50; 11 per cent, \$31.12 per cent, \$36.50. The present freight rate from Jackson and New Stratsville, Ohio, into the Pittsburgh district is \$1.06 per gross ton.

Billets, Sheet Bars and Slabs.—There is a larger movement against contracts but open market transactions still are few and small. The market is not quotable above \$28, Pittsburgh or Youngstown, with freight equalized to point of consumption, for large billets. The last reported business in sheet bars was at \$29, Pittsburgh, but the difference in freight between Pittsburgh and Youngstown to destination was absorbed by the seller. There is an impression that on a sizable tonnage \$28 could be done on billets, sheet bars and slabs.

We quote 4 x 4-in. soft Bessemer and open-hearth billets at \$28; 2 x 2-in. billets, \$29; Bessemer and open-hearth sheet bars, \$29; slabs, \$28; forging billets, ordinary carbons, \$32, all f. o. b. Youngstown or Pittsburgh mills.

Wire Rods.—Makers who recently went as low as \$35 for the base size of soft rods appear to be unwilling to longer entertain that price and now are quoting \$36, while some claim to have turned down business at the latter figure. There is little business and the market is interested at the new price. Prices are given on page 617.

Steel Skelp.—Hardly enough is being done to establish prices, but it is admitted by some makers that an order carrying a price of 1.40c. would not be declined. Indeed, that price has been named on some recent in-

quiries and there seems to be no justification for quoting a higher price with plates readily available at 1.40c. and most makers in a position to roll skelp.

Wire Products.—Recent developments in connection with prices have been along the line of setting up double quotations, with the result that there now is one list for the quantity buyers and another and higher one for the small or intermittent purchaser. Nails are quoted publicly at \$2.40 base per 100-lb. keg, to the large buyer, while to those buying only occasional carloads an effort is being made to hold to \$2.50. There is a like spread in other products. Business is better than it was earlier in the year, but by comparison with other years, even prewar years, it makes a rather poor showing for this season, unusually marked by heavy orders and by the mills being several weeks behind in their deliveries. Today's situation is that the mills are well abreast of their orders and some actually could anticipate the needs of their customers.

We quote wire nails at \$2.40 base per keg, Pittsburgh, and bright basic and Bessemer wire at \$2.25 base per 100 lb., Pittsburgh.

Steel Rails.—There is more activity in light rails, due to the fact that the union coal mine operators, anxious to get out as much coal and to do as much development work as possible prior to April 1, are buying. Orders run small individually, but reach a fair aggregate. There has been no betterment in prices, because business is not sufficient to give all a share and competition between makers still is sharp. Light sections rolled from billets are quoted at 1.40c. to 1.45c. base, but the lower figure is more common, because re-rolled rails can be bought at 1.35c. base or less, and frequently from mills having favorable freight rates to destination.

We quote 25 to 45-lb. sections, rolled from new steel, 1.40c. to 1.45c. base; rolled from old rails, 1.35c. base; standard rails, \$40 per gross ton mill for Bessemer and open-hearth sections.

Iron and Steel Bars.—Demand for steel bars is better and includes some tonnages of fair size, one being for 300 tons from a Pittsburgh maker of railroad track tools, but accompanying the revival of interest on the part of buyers has been an effort on the part of some makers to accumulate a back log and considerably lower prices than recently prevailed have been named. An unconfirmed report has it that a Pittsburgh maker of bolts and nuts was able to place a fair sized tonnage at 1.30c., Pittsburgh. This appears to be below the average price idea of most makers, although in conjunction with plates and shapes that price is known to have been made on bars. There still is talk of 1.40c., but it is regarded as a negotiation quotation and applicable only on resale lots. The going market is 1.35c. base on both mild and reinforcing bars, but is weak and less can be done on large lots. Makers of iron bars here have made no change in prices.

We quote steel bars rolled from billets at 1.30c. to 1.40c.; reinforcing bars, rolled from billets, 1.30c. to 1.40c. base; reinforcing bars, rolled from old rails, 1.25c. to 1.30c.; refined iron bars, 2c. to 2.10c. in carloads, f. o. b. mill, Pittsburgh.

Structural Material.—Fabricating interests in this district continue to report a good inquiry, it being the experience of one that inquiries over the past week have been most numerous of any week in fully a year. Awards, however, are not in keeping with the inquiry, as there have been only a few involving more than 100 tons. The Pittsburgh-Des Moines Steel Co. has taken 150 tons for a school in Stowe township, Pa., while the Jones & Laughlin Steel Co. has the order for 125 tons for a shop building for the Columbus Mill & Mine Supply Co., Columbus, Ohio, and will fabricate 100 tons for the National Brick Co., Chicago. As intimated in these columns a few weeks ago, the Mellon-Stuart Co., Pittsburgh, has been awarded the general contract for the construction of a new four-story building for the Mellon National Bank, Pittsburgh, and the order for the steel aggregating between 1600 and 1700 tons is expected to be let shortly. On the bulk of current business in plain material, this market is quotable 1.35c. to 1.40c., but there is an impression that sizable projects will bring out a lower price. Prices are given on page 617.

Sheets.—Business continues to gain and there is a better engagement of mill capacity than before since last fall. The great bulk of the orders are for early shipment, but some second quarter deliveries are requested in the orders recently received by the Steel Corporation sheet making subsidiaries. Galvanized sheets figure prominently in the orders, and there also have been some good bookings of blue annealed sheets. In the main, there is pretty close observance of regular quotations, and it is claimed that even on the heavier gages of blue annealed sheets the regular base of 2.25c. is obtained more frequently than recently was the case. Buyers, however, are not overlooking the weakness in other products and continue their efforts to depress sheet prices. Quotations are given on page 617.

Plates.—Fair demand is coming out from tank builders, but competition among mills for a share of the business is resulting in low prices. We note one sale of 750 tons at about 1.35c., Pittsburgh, but on account of the milling and transit privilege the net cost to the buyer will fall well under that figure. Makers still are quoting 1.40c., Pittsburgh, for tank quality plates, but 1.35c. is the more common price against inquiry involving fair sized tonnages.

We quote sheared plates, $\frac{1}{4}$ in. and heavier, tank quality, at 1.35c. to 1.40c., f.o.b. Pittsburgh.

Iron and Steel Pipe.—There is a gradual, but steady improvement in orders for steel pipe, but the gain seems to go hand-in-hand with lower prices than recently have prevailed. The usual supplementary discounts on merchant pipe of one point and 5 and 2½ per cent have been extended by additional concessions of 2½ to 5 per cent. In oil country goods and line pipe, the competition for orders is even keener than in merchant pipe and prices are largely in favor of buyers. It will be no surprise if a new card naming lower prices soon is issued. Lower prices seem immediately ahead for wrought iron pipe as the present great spread between it and steel pipe retards business. Card discounts are given on page 617.

Boiler Tubes.—Business is better but not good and as far as prices of steel tubes are concerned the market is very unsatisfactory. Competition is so sharp that quotations have only a remote relationship to actual selling prices. Card discounts are given on page 617.

Tin Plate.—Independent mills in this and nearby districts are running at an extremely high rate. Full engagement is noted of the mills of the Jones & Laughlin Steel Co., the Weirton Steel Co., the McKeesport Tin Plate Co., the Standard Tin Plate Co., the Trumbull Steel Co. and almost full occupation of some of the smaller units. Specifications on old contracts rather than new business account for this condition. There has not been much foundation in recent important sales for a quotation of \$4.75, this being an "official" or basing quotation, and the large tonnage orders having been placed at around \$4.60. Even less than this is reported to have been done on Pacific Coast Business, while the export market lately has been around \$4.

We quote standard production coke tin plate, \$4.60 per base box f.o.b. Pittsburgh for carload lots.

Cold-Finished Steel Bars and Shafting.—The market is holding fairly well at around 1.90c. base, Pittsburgh, despite the fresh weakness in hot-rolled bars, and the fact that demand for cold-finished bars is of moderate proportions. Buyers merely are replacing stocks sold and no very large orders are coming out. Ground shafting is unchanged at 2.25c. base, mill, for carload.

Hoops and Bands.—Business is slightly better, but by no means good, buyers still being cautious on account of the uncertainty of prices. Makers are asking 1.90c. on both hoops and bands, but concessions of \$2 per ton on hoops and of \$3 on bands are not hard to obtain.

Hot-Rolled and Cold-Rolled Strips.—Cold-rolled strips still are fairly firm at \$3.50 base, Pittsburgh, but the market in hot-rolled strips leans in buyers' favor. The official quotation on the latter is 2c. base, Pittsburgh, but the bulk of the business is carrying prices, of from 1.80c. to 1.90c., and preferred buyers are able to place their orders below the lower figure. Business as a whole shows improvement.

Nuts and Bolts.—Makers in this district fail to

detect any appreciable improvement in either the demand or orders. Buyers still are taking on only their actual needs. Discounts are given on page 617.

Rivets.—The market still is dull and weak. Large makers still are holding to \$2.25 to \$2.35 for heavy rivets, but this seems to be solely for the purpose of protecting outstanding contracts, for business recently has been done as low as \$2 and \$2.10. A full range of prices now is \$2 to \$2.25 on large structural rivets and \$2.10 to \$2.35 on large boiler rivets. Some still are quoting small rivets at 70, 10 and 10 off list. Prices and discounts are given on page 617.

Spikes.—The recent inquiry of the New York Central Lines for 40,000 to 50,000 kegs of standard spikes brought out a quotation of \$2 per base 100 lb., and this now is regarded as the market for large lots. On smaller tonnages the common quotation is \$2.10 base per 100 lb. Small spikes also are weaker by about \$2 per ton. Prices are given on page 617.

Coke and Coal.—Stocking of coal in anticipation of a strike of the union miners on April 1 continues, and while prices have not advanced materially as a result, it is more profitable for Connellsville operators to ship coal than coke. Since a number of Connellsville ovens which started up on the recent flurry in coke prices have been put out, there is a dearth of spot tonnages of coke, and prices show considerable firmness. Little furnace coke now is obtainable as low as \$3.25 per net ton, oven, and the more common price range is from \$3.40 to \$3.50. The New Jersey Zinc Co. recently closed for 6000 to 9000 tons a month for the remainder of this year. This company is about to start up one of its furnaces at Hazard, Pa., on spiegeleisen. Spot tonnages of foundry coke now range from \$4.25 to \$4.50 per net ton, ovens, with the demand good and offerings light. The coal market now is quotable from \$1.50 to \$1.85, and mine run non-union steam coal from \$2 to \$2.10 for union coal of this grade and \$1.65 to \$2 for mine run by-product coal, and from \$2.25 to \$2.40 for mine run gas coal.

Old Material.—Prices of open-hearth grades have moved up sharply in the past week. Valley steel makers, in receipt of larger orders, have not been adding to their pig iron output, but rather have been increasing their melt of scrap and lately have been rather free buyers, paying up to \$5.50 for heavy melting grade. Other mills outside of Pittsburgh also have been buying and paying prices well above the Pittsburgh levels. The result is that little material has been coming through and the entrance of a Pittsburgh independent into the market for a round tonnage developed that nothing was available at less than \$15. Sales actually have been made at \$15.50 and the advance in this grade has sympathetically strengthened other open hearth material. Machine shop turnings are up slightly with some business noted at \$10.25 this district. Compressed sheets of the Westinghouse Electric & Mfg. Co. for shipment next month, are reported to have been sold at \$11.75, East Pittsburgh.

We quote for delivery to consumers' mills in the Pittsburgh and other districts taking the Pittsburgh freight rate, as follows:

Heavy melting steel, Steubenville, Follansbee, Brackebridge, Monessen, Midland and Pittsburgh.....	\$15.00 to \$15.50
No. 1 case, cupola size.....	16.00 to 16.50
Re-rolling mills, Newark and Cambridge, Ohio; Cumberland, Md.; Huntington, W. Va., and Franklin, Pa.....	15.00 to 15.50
Compressed sheet steel.....	12.50 to 13.00
Bundled sheets, sides and ends.....	11.50 to 12.00
Railroad knuckles and couplers.....	15.50 to 16.00
Railroad coil and leaf springs.....	15.50 to 16.00
Low phosphorus standard bloom and billet ends.....	17.00 to 17.50
Low phosphorus plates and other grades.....	16.50 to 17.00
Railroad malleable.....	13.00 to 13.50
Iron car axles.....	23.00 to 24.00
Locomotive axles, steel.....	21.00 to 22.00
Steel car axles.....	15.50 to 16.00
Cast iron wheels.....	15.50 to 16.00
Rolled steel wheels.....	15.50 to 16.00
Machine shop turnings.....	9.75 to 10.25
Sheet bar crop ends.....	14.50 to 15.00
Heavy steel axle turnings.....	11.50 to 12.00
Short shoveling turnings.....	11.00 to 11.50
Heavy breakable cast.....	14.50 to 15.00
Stove plate.....	12.50 to 13.00
Cast iron borings.....	11.00 to 11.50
No. 1 railroad wrought.....	11.50 to 12.00

Chicago

CHICAGO, Feb. 28.

A slow but steady betterment in demand is dissipating the gloom which has hung over the steel market for many months, and is causing the trade to look forward to the future with confidence. Purchases by railroads and industries serving the railroads such as car builders and various supply manufacturers show no signs of letting up. New orders for cars placed with Western shops within the past fortnight total 5300. Heavy purchases of track materials are being made and rail specifications are increasingly liberal. New orders for rails include 10,000 tons for the Santa Fe and 5000 tons for the Northern Pacific, both of which were placed with the Colorado mill. A number of the carriers are in the market for bridge steel and a current inquiry from the Great Northern calls for 1000 tons of reinforcing bars.

Demand from other consumers of steel is also broadening, indicating increasing industrial activity and greater confidence in current prices. While most of this buying is for replenishment purposes, it is to be noted that mill deliveries are not quite so prompt as heretofore and some users are buying as far as 60 days ahead. Manufacturers serving the automobile industry are buying more freely and even farm implement makers are placing some orders, although they still have hang-over stock of raw material. The latter are in a much more cheerful mood because of the advance in the grain market.

The mills have maintained the gains in operation reported last week and further improvement is looked for. The Illinois Steel Co. has 12 active blast furnaces and is producing steel at 55 per cent of ingot capacity. The Inland Steel Co. is on a 60 per cent basis, but will increase its active capacity this week when its rail mill starts.

Pig Iron.—The market is on an uncertain footing. On the one hand, a number of orders have been taken at the new local price of \$20, base, furnace, notable among them being 300 tons of foundry for a Fox River Valley melter and 500 tons of foundry for second quarter shipment to a Michigan plant. On the other hand, Northern iron has come into competition with the Southern furnace which is now shipping by water and rail, and in a few instances concessions below the local price have resulted. Thus a local melter bought 150 tons of foundry at \$19.50, base, or \$20.20 delivered, estimating the switching charge at 70c. On this same inquiry the Southern furnace quoted \$20.27, delivered. The latter producer, however, has since advanced its price 50c., bringing the Chicago delivered price up to \$20.77, delivered. On 300 tons of foundry for delivery at Omaha, the delivered price figured back to \$18.50, base, Chicago furnace. This sale also was made in competition with Southern iron. Even those Southern furnaces which do not enjoy the benefit of a combination water and rail rate are making sales in certain parts of Chicago territory, notably Indiana and Michigan. One producer took four orders in Indiana during the past week, totaling 900 tons, at \$15.50, base, Birmingham. Inquiry is rather liberal, but buying is on the whole limited. Some melters who have put out inquiries are apparently unconvinced that the recent advance in local iron will hold and are therefore delaying their purchases. The Chain Belt Co., Milwaukee, wants 2000 tons of malleable and the Manufacturers' Foundry Co. and the Koehring Machine Co. of the same city are inquiring for 2000 tons and 500 tons of foundry respectively. The Walworth Mfg. Co. is in the market for 1600 to 2400 tons of foundry, and a Chicago company with plants at various points wants 3500 tons of foundry and malleable. A sale of 500 tons of resale, copper free low phosphorus was made at \$34.50, delivered. Furnace prices on low phosphorus, however, are firm. Charcoal iron has receded to \$22.50, base, furnace, a large producer having named this price. This reduction puts the charcoal product on a strictly competitive basis with coke iron at numerous consuming points.

Quotations on Northern foundry, high phosphorus malleable and basic irons are f.o.b. local furnace and do not include a switching charge averaging 70c. per ton. Other

prices are for iron delivered at consumers' yards, or when so indicated, f.o.b. furnace other than local.

Lake Superior charcoal, averaging	
sil. 1.50, delivered at Chicago	\$26.00
Northern coke, No. 1, sil. 2.25 to 2.75	\$20.00 to 20.50
Northern coke, foundry, No. 2, sil.	
1.75 to 2.25	19.50 to 20.00
Northern high phos.	20.00
Southern foundry, sil. 1.75 to 2.25	20.77
Malleable, not over 2.25 sil.	20.00
Basic	20.00
Low phos., Valley furnace, sil. 1 to 2	
per cent copper free	30.00
Silvery, sil. 8 per cent	32.82

Ferroalloys.—Except for a few carload sales the market is inactive.

We quote 78 to 82 per cent ferromanganese, \$70.90, delivered; 50 per cent ferrosilicon, \$56 to \$57.50, delivered; spiegelisen, 16 to 18 per cent, \$40.10, delivered.

Railroad Equipment.—The Pacific Fruit Express has placed orders for 2600 refrigerator cars with the Standard Steel Car Co., and 700 cars of the same type with the General American Car Co. The Great Northern has made the following additional purchase: 500 gondola cars from the Western Steel Car & Foundry Co., and 500 stock cars from the Pullman Co. The Chicago & North Western is expected to issue a formal inquiry this week for 3000 or more cars, including box, flat, gondola and refrigerator cars. The Burlington has placed 500 automobile cars with the Pullman Co., this being the last purchase against its inquiry for 7300 cars. This road has also ordered 47 locomotives from the Baldwin Locomotive Works and eight from the Lima Locomotive Co. A formal inquiry for 1000 box cars has been put out by the St. Paul.

Steel Castings.—The placing of 3300 cars by the Pacific Fruit Express and 1500 cars by the Great Northern will result in considerable business for castings manufacturers. The steel castings for the Burlington cars have not yet been placed. Outside of railroad car business, there is little castings work in prospect. An Eastern steel foundry owned by a shipbuilding concern has shut down. Although some instances of shading on the Eastern seaboard are reported, prices are rather generally on a parity with those published on pages 348 and 350 of THE IRON AGE of Feb. 2.

Bars.—Demand continues to broaden, embracing a greater diversity of manufacturing consumers. This buying is still largely for replenishment purposes, although in some cases 60-day contracts have been closed. It is to be noted that railroad equipment manufacturers are buying more freely and that plants serving the automobile industry are taking an active interest in the market. Even the farm implement makers are in a more cheerful mood and are placing a few orders, although they still have considerable stocks of raw material. Reinforcing projects continue to call for round tonnages. The Concrete Steel Co. will furnish 300 tons for the Popular Mechanics Building, Chicago, and 120 tons for highway work in Bureau County, Ill. The Concrete Engineering Co. has the contract for 300 tons for the Churchill Hotel, Chicago. Pending projects include a viaduct at Ironwood, Mich., for the Chicago & Northwestern and the Soo Line, 300 tons, on which bids are due March 1, the Indianapolis Athletic Club, 180 tons, and two junior high schools, Dubuque, Iowa, 120 tons. No material change is to be noted in going prices on mild steel bars and it is significant that prompt deliveries are not so easily obtainable as heretofore. Demand for bar iron is still subnormal and mill operations are intermittent. The Great Northern divided an order for 150 tons among several mills.

Mill prices are: Mild steel bars, 1.50c. to 1.60c., Chicago; common bar iron, 1.55c. to 1.60c., Chicago; rail carbon, 1.50c., mill or Chicago.

Jobbers quote 2.53c. for steel bars out of warehouse. The warehouse quotation on cold-rolled steel bars and shafting is 3.40c. for rounds and 3.90c. for flats, squares and hexagons. Jobbers quote hard and medium deformed steel bars at 1.90c. base. Hoops and bands, 3.13c.

Sheets.—Domestic demand is picking up and prices appear firm.

Mill quotations are 8c. for No. 28 black, 2.25c. for No. 10 blue annealed and 4c. for No. 28 galvanized, all being Pittsburgh prices, subject to a freight rate to Chicago of 88c. per 100 lb.

Jobbers quote: Chicago delivery out of stock, No. 10 blue annealed, 3.38c.; No. 28 black, 4.15c.; No. 28 galvanized, 5.15c.

Wire Products.—Mills emphatically deny that rumored purchases of nails at \$2.25 and plain wire at \$2.15 have any foundation in fact. So far as this district is concerned at any rate, the minimum going price on nails appears to be \$2.40 while plain wire is firm at \$2.25. Demand has appreciably improved and while jobbers still hesitate to pile up stocks, they are placing orders more frequently. Manufacturers also are buying more freely. Inquiries for 1000 tons of rods are in the market. For mill prices see finished iron and steel, f.o.b. Pittsburgh, page 617.

We quote warehouse prices f.o.b. Chicago: No. 9 and heavier black annealed wire, \$3.13 per 100 lb.; No. 9 and heavier bright basic wire, \$3.28 per 100 lb.; common wire nails, \$3.25 per 100 lb.; cement coated nails, \$2.65 per keg.

Rails and Track Supplies.—The Railroads continue to make heavy purchases of track supplies. The Burlington has bought 10,500 tons of tie plates, of which 3500 tons each went to the Illinois and Inland mills and the remaining 3500 tons were divided between the Interstate and other mills. This road also divided an order for splice bars between two local mills, one of which got 2400 tons and the other a smaller amount. The Union Pacific has placed 1500 tons of tie plates with the Colorado mill, 350 tons of track spikes with Inland, and 200 tons of track bolts with the Kansas City Bolt & Nut Co. Tie plates, spikes and bolts are slightly weaker as reflected in the quotations below. The Gary mill has booked 3000 tons more in rail orders and continues to receive liberal specifications against old contracts. The Inland rail mill will start operations this week.

Standard Bessemer and open-hearth rails, \$40; light rails rolled from new steel, 1.50c. to 1.60c., f.o.b. makers' mills.

Standard railroad spikes, 2.05c. to 2.10c., Pittsburgh; track bolts with square nuts, 3.05 to 3.10c., Pittsburgh; tie plates, steel and iron, 1.65c. to 1.75c., f.o.b. mill; angle bars, 2.40c., f.o.b. mill.

Plates.—Railroad car construction continues to account for the major part of the demand for plates. Recent orders for cars by the Pacific Fruit Express and the Great Northern, together with an additional purchase of 500 cars by the Burlington, will result in the placing of fully 53,000 tons of steel on mill books. From general sources also, the demand for plates has improved, orders from boiler manufacturers being particularly encouraging. Although tank fabricators are not buying as heavily as some time ago, local mills are figuring on 2500 tons of plates for storage tanks to be built for the Sinclair Oil Co. in the Southwest. No material change is to be noted in the price situation.

The ruling mill quotations range from 1.50c. to 1.60c., Chicago. Jobbers quote 2.63c. for plates out of stock.

Bolts and Nuts.—Demand has improved and discounts are no weaker. Jobbers are placing some orders and automobile manufacturers are buying on a broader scale as their operations improve.

Jobbers quote structural rivets, 3.43c.; boiler rivets, 3.53c.; machine bolts up to $\frac{3}{4}$ x 4 in., 60, 10 and 10 per cent off; larger sizes, 60 to 10 off; carriage bolts up to $\frac{3}{4}$ x 6 in., 60 and 10 off; larger sizes, 55 and 5 off; hot pressed nuts, square and hexagon tapped, \$3.75 off; blank nuts, \$4 off; coach or lag screws, gimlet points, square heads, 65 and 5 per cent off. Quantity extras are unchanged.

Cast Iron Pipe.—Demand is active and prices are strengthening. The United State Cast Iron Pipe & Foundry Co. is low bidder on 1350 tons for Chicago. Moulton, Iowa, has let 250 tons of the National Cast Iron Pipe Co. and Stratton, Col., has awarded 200 tons to the American Cast Iron Pipe Co.

Toledo, Ohio, 1500 tons, bids in March 15.

Elyria, Ohio, 300 tons, March 1.

Ottumwa, Iowa, 250 tons, March 8.

Fremont, Neb., 330 tons, March 2.

Lucas County Commissioners, Toledo, Ohio, 1500 ft. of 6-in. and larger, April 8.

Detroit, 75 tons of 6-in., March 7.

We quote per net ton, f.o.b. Chicago, as follows: Water pipe, 4-in., \$45.60 to \$46.60; 6-in. and above, \$41.60 to \$42.60; class A and gas pipe, \$3 extra.

Coke.—Demand for foundry coke is steadily improving, with spot purchases more liberal and contracting ahead less infrequent. Connellsville prices continue to advance, but the local by-product price remains unchanged at \$10.75, delivered in Chicago switching district.

Structural Material.—Building prospects are improving, but it is to be noted that much more work is being figured on than is actually let. As spring approaches, it is hoped that the propensity to delay action on pending projects will diminish and fabricators will accumulate enough bookings to put their plants on an efficient operating basis. Prices on plain material are no weaker; in fact, the backlogs which railroad car orders have enabled the mills to build up have given the market some semblance of firmness. Fabricating awards include:

Kansas City Power & Light Co., power plant addition, Kansas City, Mo., 1700 tons, to Kansas City Structural Steel Co.

Diocesan Seminary for Catholic Church, New Orleans, 664 tons, to Ingalls Iron Works, Birmingham.

First National Bank, Albuquerque, N. M., 527 tons, reinforced construction substituted for structural steel.

Henderson Public School, Chicago, 500 tons, to Morava Construction Co.

Murat Shrine Auditorium, Indianapolis, 350 tons, to Rochester Bridge Co.

Milwaukee Electric Railway & Light Co., Milwaukee, addition to Lakeside Steam Generating plant, 160 tons, to Worden-Allen Co.

State highway span, Tomahawk, Wis., 300 tons, to Worden-Allen Co.

Standard Oil Co., 50 horizontal tanks, Whiting, Ind., 268 tons, to unnamed fabricator.

Klamath River Bridge, Hornbrook, Siskiyou County, Cal., 243 tons, to Minneapolis Steel & Machinery Co.

Biltmore Hotel, Los Angeles, 7000 tons.

Detroit Medical Building, Detroit, 1250 tons, bids in March 1.

Snowden Building, a 22-story structure, Memphis, Tenn., to be part reinforced and part structural steel, tonnages not yet estimated.

The mill quotation on plain material ranges from 1.50c. to 1.60c., Chicago. Jobbers quote 2.63c. for plain material out of warehouse.

Old Material.—Consumers are buying more freely and sellers are absorbing railroad offerings at advancing prices. While the change in the market situation is by no means pronounced, prices are generally firmer and sentiment is more optimistic. In addition to the recent orders placed by steel mills, an iron mill has bought 1000 tons of No. 1 wrought at from \$11 to \$11.25 per net ton delivered. The smaller gray iron foundries are placing orders for cast scrap. Railroad offerings include the Grand Trunk, American Lines, 4000 tons; the Pennsylvania Northwestern Region, 2000 tons; the Monon, 500 tons, and the New York Central, the Big Four, the Erie and the Michigan Central, blank lists.

We quote delivery in consumers' yards, Chicago and vicinity, all freight and transfer charges paid, as follows:

Per Gross Ton	
Iron rails	\$16.00 to \$16.50
Relaying rails	20.00 to 25.00
Cast iron car wheels	15.00 to 15.50
Rolled or forged steel car wheels	13.25 to 13.75
Steel rails, rerolling	12.00 to 12.50
Steel rails, less than 3 ft.	13.00 to 13.50
Heavy melting steel	11.50 to 12.00
Frogs, switches and guards cut apart	11.50 to 12.00
Shoveling steel	11.00 to 11.50
Low phos., heavy melting steel	13.50 to 14.00
Drop forge flashings	7.50 to 8.00
Hydraulic compressed sheet	8.00 to 8.50
Axle turnings	8.50 to 9.00

Per Net Ton	
Iron angles and splice bars	14.25 to 14.75
Steel angle bars	11.00 to 11.50
Iron arch bars and transoms	15.50 to 16.00
Iron car axles	19.50 to 20.00
Steel car axles	13.00 to 13.50
No. 1 busheling	8.50 to 9.00
No. 2 busheling	6.00 to 6.50
Cut forge	10.25 to 10.75
Pipes and flues	7.00 to 7.50
No. 1 railroad wrought	10.75 to 11.25
No. 2 railroad wrought	10.25 to 10.75
Steel knuckles and couplers	11.25 to 11.75
Coil springs	12.75 to 13.25
No. 1 machinery cast	13.50 to 14.00
No. 1 railroad cast	13.00 to 13.50
Low phos. punchings	11.00 to 11.50
Locomotive tires, smooth	10.00 to 10.50
Machine shop turnings	5.00 to 5.50
Cast borings	6.50 to 7.00
Stove plate	12.50 to 13.00
Grate bars	10.50 to 11.00
Brake shoes	10.50 to 11.00
Railroad malleable	11.75 to 12.25
Agricultural malleable	11.75 to 12.25

New York.

NEW YORK, Feb. 28.

Pig Iron.—A larger tonnage of pig iron was sold last week than for many weeks, the total amounting to about 25,000 tons. The principal buyers were the Warren Foundry & Machine Co., 7500 tons for second quarter; the Central Foundry Co., 7700 tons, delivery March to June; Essex Foundry Co., 2500 tons, delivery March to June; a heater company, 1000 tons, second quarter; special iron, 2000 tons; a wheel company 2500 tons, and other buyers small tonnages amounting to about 2000 tons. Some lower railroad prices are understood to have been made, but the market is firmer now and it is difficult to buy at less than \$20, eastern Pennsylvania, or \$18.25, Buffalo, for No. 2 plain. Very little attention is being paid to silicon, and one can buy No. 1 iron at almost the same price as No. 2 plain. No very large tonnages are pending this week, one of the principal inquiries being for 1000 tons of malleable. The pig iron market is no doubt affected by the uncertainty in regard to the coal strike, as no one knows to what extent the cost of manufacturing iron will be increased.

We quote delivered in the New York district as follows, having added to furnace prices \$2.52 freight from eastern Pennsylvania, \$3.46 from Buffalo and \$6.16 from Virginia:

East. Pa. No. 1 fdy., sil. 2.75 to 3.25	\$23.52
East. Pa. No. 2X fdy., sil. 2.25 to 2.75	23.02
East. Pa. No. 2 fdy., sil. 1.75 to 2.25	22.52
Buffalo, sil. 1.75 to 2.25	\$23.46 to 23.71
No. 2 Virginia, sil. 1.75 to 2.25	28.16

Ferrolloys.—The ferromanganese market is quiet, with business confined to the sale of carload lots for early delivery, both British and domestic, at prevailing quotations. There is an inquiry from an Ohio consumer for 500 tons. The scarcity of spiegeleisen of all grades is the feature and it is probable that this situation will result in the blowing in of at least one producer's furnace in the near future; there is also the incentive of fairly large orders for future delivery for both the 20 per cent and the 16 to 19 per cent grades. The 20 per cent grade has been exhausted and one producer has nothing left except some alloy analyzing about 13 per cent manganese. For the 16 to 19 per cent, the quantity available is still low, but the quotation is unchanged. There have been no developments in the manganese ore market and there seems to be no interest on the part of consumers. There is an inquiry for 300 tons of 50 per cent ferrosilicon before the market, and it is stated that Swedish 50 per cent alloy is being offered at \$4.50, delivered, but this is discredited in some quarters, as more than this can be obtained in European markets and also because sales are being made in this market for delivery in Europe. Quotations are as follows:

Ferrolloys

Ferromanganese, domestic, seaboard, per ton	\$62.50
Ferromanganese, British, seaboard, per ton	\$62.50
Spiegeleisen, 16 to 19 per cent, furnace, per ton	\$30.00
Ferrosilicon, 50 per cent, delivered, per ton	\$55.00 to \$60.00
Ferrotungsten, per lb. of contained metal	40c. to 50c.
Ferrochromium, 6 to 8 per cent carbon, 60 to 70 per cent Cr., per lb. Cr., delivered	12c. to 14c.
Ferrovandium, per lb. of contained vanadium	\$4.00
Ferrocobaltititanium, 15 to 18 per cent, net ton	\$200.00
Ferrocobaltititanium, 15 to 18 per cent, 1 ton to carloads, per ton	\$220.00
Ferrocobaltititanium, 15 to 18 per cent, less than 1 ton, per ton f.o.b. Niagara Falls, N. Y.	\$250.00

Ores

Manganese ore, foreign, per unit, seaboard, 25c. to 26c.	
Tungsten ore, per unit, in 60 per cent concentrates	\$2.00 up
Chrome ore, 40 to 45 per cent Cr ₂ O ₃ , crude, per net ton, Atlantic seaboard	\$20.00 to \$25.00
Chrome ore, 45 to 50 per cent Cr ₂ O ₃ , crude, per net ton, Atlantic seaboard	\$25.00 to \$27.00
Molybdenum ore, 85 per cent concentrates, per lb. of MoS ₂ , New York	50c. to 60c.

Cast-Iron Pipe.—The market continues to show improvement, with fair activity maintained by private purchasers. No new municipal contracts are reported, but one, calling for 2000 tons of various sizes for the Newburgh Water Department, was opened March 1. The City of Ilion, N. Y., is reported to have purchased 1000 tons of cast-iron pipe. Prices are unchanged and, if anything, inclined to stiffen. We quote per net ton, f.o.b. New York, carload lots, as follows: 6-in. and larger, \$47.80; 4-in. and 5-in., \$52.80; 3-in., \$62.80, with \$4 additional for Class A and gas pipe.

High-Speed Steel.—This market continues extremely weak and prices, which are difficult to base upon actual transactions, are largely nominal. Resales of various recognized brands have brought low prices, but producers are still quoting 80c. to 85c. per lb. for 18 per cent tungsten high-speed steel, with special brands of some companies bringing up to as high as \$1.05 per lb.

Old Material.—Present activity in the market is confined largely to steel mill buying. Prices during the past week have evidenced a slight stiffening, but the situation is not considered in the light of any distinct improvement over previous weeks. The Midvale Steel & Ordnance Co., which recently bought a small tonnage of No. 1 heavy melting steel for the Cambria Steel Co., at Johnstown, Pa., paying \$13.50, delivered Johnstown, came into the market again last week, purchasing a much heavier tonnage at \$14 per ton, Johnstown, which was probably partly the reason for a slight stiffening in the price of heavy melting steel, now quoted up to \$8.50 per ton, New York. A small tonnage of locomotive grate bars to Warren, Pa., was made at \$13.50 delivered. In general the market is not active.

Buying prices per gross ton, New York, follow:

Heavy melting steel, yard	\$8.00 to \$8.50
Steel rails, short lengths, or equivalent	8.25 to 9.00
Revolving rails	9.25 to 9.75
Relaying rails, nominal	27.00 to 28.00
Steel car axles	10.00 to 10.50
Iron car axles	17.50 to 18.50
No. 1 railroad wrought	9.50 to 10.00
Wrought iron track	8.25 to 9.00
Forge fire	5.25 to 5.75
No. 1 yard wrought, long	9.00 to 9.50
Cast borings (clean)	7.00 to 7.50
Machine-shop turnings	5.25 to 5.75
Mixed borings and turnings	4.50 to 5.00
Iron and steel pipe (1 in. diam. not under 2 ft. long)	7.75 to 8.25
Stove plate	10.00 to 10.50
Locomotive grate bars	9.00 to 9.50
Malleable cast (railroad)	8.00 to 8.50
Cast-iron car wheels	10.50 to 11.00

Prices which dealers in New York and Brooklyn are quoting to local foundries, per gross ton, follow:

No. 1 machinery cast	\$16.50 to \$17.00
No. 1 heavy cast (columns, building materials, etc.), cupola size	15.50 to 16.00
No. 1 heavy cast, not cupola size	14.50 to 15.00
No. 2 cast (radiators, cast boilers, etc.)	10.00 to 10.50

Finished Iron and Steel.—Keen competition for business has established another decline in prices of plates, shapes and bars. They are now to be had from some mills, when the tonnages are fairly attractive, at 1.35c., Pittsburgh. Even this price has been shaded in the case of large buyers, such as the car companies, which are said to be able now to cover their requirements at a 1.30c. basis. The break is ascribed largely to competition for 8000 tons of structural shapes and universal plates for the addition to the Macy department store, New York. The Levering & Garrigues Co., which was the successful bidder on the steel work, is reported to have placed the entire order with a leading independent at 1.275c., Pittsburgh. The effect of the new price situation has been to divert a fairly large amount of business to this same independent but at the same time fabricators which have recently closed contracts for steel buildings are now hesitant about placing orders for steel except at comparative prices. It is stated that the low price on the Macy work may not be duplicated, as the specification was unusually attractive. Some independent steel companies have notified their district sales offices not to go below 1.40c., Pittsburgh, on plates, shapes and bars, but it is reported to be difficult at the moment to close any business of attractive character at above 1.35c. Weakness in prices seems to affect other finished steel products, with the possible exception of sheets, which, considering the general situation, remain quite firm at 2.25c. for blue annealed, 3c. for black and 4c. for galvanized, all f.o.b. Pittsburgh. Wire nails are quoted at \$2.40 per 100 lb. keg, but there has been so much talk of \$2.25 that little business is being done at the higher figure. Some mills which reduced wire nails \$2 a ton did not change the price on plain wire, which they still quote at \$2.25 per 100 lb. Wire nails are active. There is keen competition for orders for cold finished steel bars and shafting, and though the nominal quotation of leading makers is 1.90c., Pittsburgh, this has been shaded as much as \$3 a ton. Some of the weakness in steel prices was in evidence in the export market prior

to the change in domestic prices. Plates, shapes and bars have been sold for export at 1.25c., Pittsburgh, while tin plate for export has gone as low as \$4 per 100 lb. base box. The nominal domestic price is \$4.75, but this is now seldom obtained and \$4.60 is being done on carload lots, while a fairly attractive tonnage can be placed at \$4.50. February sales, with some companies, have surpassed the tonnages booked in January. Export business shows some pick-up, Japan continuing as the leading buyer. Its wants, which had been largely confined to sheets, tin plate and galvanized wire, have extended within the past week or two to small bars and structural shapes. Inquiries for steel buildings are fairly numerous, giving promise of a fairly active building year. Among the new inquiries are the following:

National Academy, Washington, D. C., 500 tons.
Subway construction for the Southern Pacific at Houston, Tex., 650 tons.
Extension to power station at New Bedford, Mass., 400 tons.
Church of Christ Scientist, Park Avenue, New York, 400 tons.
Public School No. 67, Brooklyn, 500 tons.
Lackawanna Railroad, 2000 tons for bridges, of which 1500 tons is optional.
Office building, Sun Oil Co., Philadelphia, 400 tons.
High school building, Philadelphia, steel and reinforced concrete.
New bids to be opened this week on baseball stadium for New York American League club.

Awards which have been made include the following:

Two flats and an apartment building in New York to Hinkle Iron Co., 2400 tons total.
Apartment building in Jersey City to American Bridge Co., 1100 tons.
Union High School in Elizabeth, N. J., to Hedden Iron Construction Co., 600 tons.
Mill building at Holyoke, Mass., to American Bridge Co., 400 tons.
Union Memorial Hospital, Baltimore, Md., to Dietrich Brothers, 750 tons.

Fabricated work continues to go at fairly low figures. A recent large job in New York is reported to have been placed at \$56, erected. Included in construction work now being figured on are several reinforced concrete jobs requiring a total of several thousand tons of bars. For New York State highway work 1700 tons of bars will be required. General contracts were awarded last week. Oil companies are still active in tank work. The Sinclair Consolidated Oil Corporation, New York, is asking bids on 20 tanks for Kansas, requiring about 6500 tons. Railroads are not active, but an inquiry from the Chicago & Northwestern for 3000 new cars will be issued shortly. Distribution of 1500 cars for the Great Northern has been completed. In addition to 500 refrigerator cars placed with the General American Car Co., as reported last week, the Pullman Co. was awarded 500 stock cars and the Pressed Steel Car Co. 500 general service cars. The New York Central Railroad has obtained prices on 5000 to 10,000 tons of tie plates. The Buffalo, Rochester & Pittsburgh Railroad closed bids last Friday at Rochester, N. Y., on 5000 tons of heavy rails, also angle bars, bolts, nuts and spikes. The Pacific Fruit Express has ordered 700 refrigerator cars from the General American Car Co. and 2600 from the Standard Steel Car Co.

We quote for mill shipments, New York, as follows: Soft steel bars, 1.73c. to 1.78c.; plates, 1.73c. to 1.78c.; structural shapes, 1.73c. to 1.78c.; bar iron, 1.78c. to 1.88c. On export shipments the freight rate is 28.5c. per 100 lb. and the domestic rate 38c.

Warehouse Business.—The situation in this district is generally unchanged, although a few warehouses report a continued improvement in business. Price shading on many items is still prevalent, and there is the usual activity in structural material. Cold-rolled bars have been reduced 10c. per 100 lb., which is in the nature of a revision to bring them down proportionate with other steel items. Brass and copper warehouses report transactions as fairly numerous, but extremely small and unprofitable. Prices here have weakened slightly, being off from $\frac{1}{4}$ c. to $\frac{1}{2}$ c. per lb. on most brass and copper products. Wrought iron and steel pipe is being noted noteworthy features, but warehouses expect some revision of prices by mills within

the next few weeks. Prices in general are evidently weaker. We quote prices on page 636.

Coke.—Foundry coke has now advanced to \$4.50 and there is not much available at that figure, as large sales have been made in the past week on account of the fear of a strike of coal miners. Still higher prices are expected on both foundry and furnace grades. The price of by-product coke has not been advanced except that the \$8.59 price is now confined to points on the Pennsylvania, Erie and Lackawanna railroads, while the price delivered in New Jersey points on the Central of New Jersey is \$9.15. Higher prices on all grades are probable.

Cleveland

CLEVELAND, Feb. 28.

Iron Ore.—Figures prepared by the Lake Superior Iron Ore Association show that on Feb. 1 there was 25,257,000 tons of Lake Superior ore at interior and lake front furnaces. On that date there was at furnaces and on docks 33,480,000 tons as compared with 34,445,000 on the same day last year. Lake Superior ore consumption during January amounted to 2,493,000 tons, falling off slightly as compared with December, when the amount consumed was 2,577,000 tons. In January, 1921, the amount consumed was 3,701,000 tons. With stocks in furnace yards generally large, shipments from docks continue very light.

We quote delivered lower lake ports: Old range Bessemer, 55 per cent iron, \$6.45; Old range non-Bessemer, 51½ per cent iron, \$5.70; Mesabi Bessemer, 55 per cent iron, \$6.20; Mesabi non-Bessemer, 51½ per cent iron, \$5.55.

Pig Iron.—The demand showed a further gain during the week and February sales and shipments will aggregate a larger tonnage than during any previous month for some time. There was an increase in the number of small orders the past week and a fair number of large lots up to 800 tons were placed. The firmness that was noted a week ago is still in evidence with \$19 as the usual minimum quotation on foundry grades, although the market is apparently not established at this price for shipment to competitive points. Cleveland and Valley furnaces appear to be holding firmly to \$19. A fair improvement is noticed in the Michigan territory, this evidently being largely due to the increased activity of the automotive industry. One producer during the week sold 9000 tons including two 500-ton lots of malleable iron, one lot to an Indiana melter and another to an Ohio foundry. An Indianapolis consumer is inquiring for 500 tons of malleable iron. One Cleveland selling agency reports sales during February in excess of 35,000 tons and with four out of eight blast furnaces in operation, is now shipping as much iron as it is making. Other producers report a fair gain in shipments over January. Pickands, Mather & Co. blew in their Perry furnace, Erie, Pa., Feb. 25, this being the second merchant stack operated by Cleveland interests to go in blast during the month and the Otis Steel Co. is planning to blow in one of its Cleveland furnaces about April 1. Detroit, Toledo & Ironton Railroad has made a 20 per cent freight rate reduction on pig iron from Toledo to Detroit, or from \$1.54 to \$1.23 per ton.

Quotations below are f.o.b. local furnace for Northern foundry iron, not including a 56c. switching charge. Other quotations are delivered Cleveland, being based on a \$1.96 freight rate from Valley points, a \$3.36 rate from Jackson and a \$6.67 rate from Birmingham:

Basic	\$19.71
Northern No. 2 fdy., sil. 1.75 to 2.25	\$19.00 to 20.00
Southern fdy., sil. 1.75 to 2.25	21.67 to 22.17
Ohio silvery, sil. 8 per cent	30.86
Standard low phos., Valley furnace	32.00

Finished Material.—Orders continue to show an increase both in number and size and the tonnage booked during February represents a fair gain over January. Some of the mills that have been able to make almost immediate deliveries cannot now promise shipments under about two weeks. The improvement applies to about all finished products, although the demand for structural material has not improved as much as other lines. Some of the mills seem inclined to stiffen a little on prices. One Youngstown producer has shut down a plate mill, being unwilling any longer to meet the 1.40c. price and is quoting 1.60c. on the sizes that

are still being made. Ohio tank shops are figuring on a new inquiry for oil tank work requiring 1500 tons of plates. A local mill is adhering to a minimum of 1.40c., Pittsburgh base price on steel bars. The demand for alloy steel has improved as the result of buying by the automotive industries and the United Alloy Steel Corporation, Canton, is now operating 10 open-hearth furnaces or over 50 per cent capacity. Highway work has stimulated the demand for reinforcing bars. Hard steel bars are unchanged at 1.45c. The structural outlook continues to improve. The Austin Co. has taken the sintering plant for the McKinney Steel Co., requiring 950 tons of structural steel and Mt. Vernon Bridge Co. has taken bridge work for the Baltimore & Ohio Railroad requiring 400 tons, which has been placed with a Pittsburgh mill. Bids have been taken for an addition to the Gilsey Hotel, Cleveland, requiring 900 tons, for the Detroit Medical Building, Detroit, 1250 tons and for the Lakewood Market, Cleveland, 200 tons. The Hamilton Furnace Co., Hamilton, Ohio, has an inquiry out for its new blast furnace requiring 1400 tons of plates and structural material. New bids have been taken for the Philadelphia Free Library, requiring 4000 tons. The Lima Locomotive Works has taken five locomotives for the Clover Leaf Railroad and eight for the Burlington Railroad, the remaining 45 for the latter road being taken by the Baldwin Locomotive Works. The Carnegie Steel Co. has taken 1000 tons of rails and splice bars for the Cleveland Railway Co.

Followers quote steel bars, 2.36c.; plates and structural shapes, 2.16c.; No. 9 galvanized wire, 3c.; No. 9, annealed wire, 2.50c.; No. 28 black sheets, 3.75c.; No. 28 galvanized sheets, 4.75c.; No. 10 blue annealed sheets, 3.10c.; hoops and bands, 2.96c.; cold-rolled rounds, 3.25c.; flats, squares and hexagons, 3.75c.

Sheets.—There is an improved demand from the automobile industry for full finished sheets. Some fair size orders have been placed with the Cleveland mill by body builders who are buying only for early requirements. New inquiries have come from Japan for 1500 tons of No. 29 and No. 30 gage sheets. Regular sheet prices are being well maintained.

Steel and Cast Iron Pipe.—The Cleveland Water Works Department will receive alternative bids about April 1 for nine miles of 60-in. pipe for extensions. The work will require 22,500 tons of cast iron pipe or 13,000 tons of steel pipe. Bids for 2100 to 3000 tons of small cast iron pipe will be received about May 1. The department requirements will also include 1200 tons of special cast iron fittings. Seattle will take bids March 10 for 17 miles of 66-in. pipe, requiring 15,000 tons of $\frac{1}{2}$ -in. plates.

Old Material.—The market became more active during the week and also grew firmer, particularly on steel making grades. Youngstown and Warren mills came in the market for fair-sized tonnages and are reported to have purchased heavy melting steel at \$15, compressed steel at \$12.50 and mixed flashings at \$11.50 to \$11.75. Dealers are offering \$14.50 to \$14.75 for heavy melting steel to fill these new orders and it is reported that as high as \$15 has been offered by some dealers. There is some demand for scrap to fill orders for Cleveland delivery and dealers are offering \$13 for heavy melting steel and \$9.50 for borings and turnings, delivered at consumer's plants in Cleveland.

We quote per gross ton, f.o.b. Cleveland, as follows:

Heavy melting steel	\$12.25 to \$12.50
Steel rails, under 3 ft.	12.75 to 13.25
Steel rails, rerolling	14.50 to 15.00
Iron rails	12.00 to 12.50
Iron car axles	18.00 to 19.00
Low phosphorus melting	13.50 to 14.00
Cast borings	9.00 to 9.25
Machine shop turnings	8.75 to 9.00
Mixed borings and short turnings	8.75 to 9.00
Compressed steel	9.25 to 9.75
Railroad wrought	12.00 to 12.50
Railroad malleable	12.50 to 13.00
Light bundled sheet stampings	7.00 to 8.00
Steel axle turnings	9.50 to 10.00
No. 1 cast	15.00 to 16.00
No. 1 bushing	9.00 to 9.25
Drop forge flashings, over 10 in.	9.00 to 9.25
Drop forge flashings, under 10 in.	9.25 to 9.75
Railroad grate bars	12.75 to 13.00
Stove plate	13.00 to 13.25
Pipes and flues	8.50 to 9.00

Bolts, Nuts and Rivets.—The improvement in nut and bolt orders as previously noted, is holding up. Some export business has come out, including a two-car lot

taken by a local maker for shipment to England. Prices on semi-finished hexagon nuts have been established at lower prices than have appeared in recent regular quotations. The demand for rivets continues quiet, the \$3 a ton price reduction noted last week not having stimulated buying.

Coke.—Considerable activity has developed in Wise County foundry coke, the possibility of a coal strike evidently having stimulated the demand. Several sales at \$5.50 are reported, including 1500 tons to a sanitary interest. Connellsville foundry coke is firm at \$4 to \$4.50.

Cincinnati

CINCINNATI, Feb. 28.

Pig Iron.—The market was again quiet during the past week, though a few sales of over 100 tons were reported. A Cleveland district melter took 250 tons of silvery at the schedule, and a Dayton melter closed for a similar amount of Southern iron at a price reported to be on the basis of \$15.10, Birmingham. Several sales of 100-ton lots of both Northern and Southern were made to melters in this district, prices in practically all cases being on the basis of \$18.50, furnace, for Northern and \$15.50 for Southern. A sale made during the previous week is also reported, this being 4000 tons of Southern iron to a radiator company's Western plant. This iron was sold at a delivered price and both river and rail will be used in making shipment. The radiator company making the purchase is reported to have closed on 27,000 tons for its various plants, this being in addition to 15,000 tons placed in January. The market is, if anything, firmer, one lake interest which has been making low prices having advanced its price from 50c. to 75c. a ton. The lowest quotation reported in this market during the week was \$18.50, this being done in strongly competitive territory. Several inquiries are before the trade. The Link-Belt Co. is inquiring for 500 tons of malleable for Indianapolis plants, and the Indiana Reformatory is asking for 400 tons of various grades. The National Cash Register Co. is inquiring for four cars and the Home Stove Co., Indianapolis, for five cars. There is a fair market for alloys and several carload sales are reported. A local agency also reports a sale of 1500 tons of fluorspar. Belfont furnace at Ironton is scheduled to blow in shortly on Bessemer iron.

Based on freight rates of \$4.50 from Birmingham and \$2.52 from Ironton, we quote f.o.b. Cincinnati:

Southern coke, sil. 1.75 to 2.25 (base)	\$19.50 to \$20.00
Southern coke, sil. 2.25 to 2.75 (No. 2 soft)	20.00 to 20.50
Ohio silvery, 8 per cent sil.	30.02
Southern Ohio coke, sil. 1.75 to 2.25 (No. 2)	21.52 to 22.02
Basic, Northern	21.02
Malleable	22.02 to 22.52

Finished Material.—During the past week more orders were received for finished materials than has been the case for many weeks past. While it is true that the larger number of the orders are for single car loads, the fact that they came from many different sources is a source of gratification, as it indicates that more manufacturing plants are in the market for their needs. An inquiry for 1000 tons of bars is current, as are several tentative ones for structural material for buildings, which are expected to be awarded during the next week or so. Some fair sized orders are booked, including one for 300 tons of plates and another for 300 tons of shapes. More orders are also reported for sheets, and while these are all being booked for immediate delivery, the total tonnage is very satisfactory. Orders for wire products, while fairly numerous, show a falling off as compared with previous weeks, this, no doubt, being accounted for by expectations on the parts of buyers that lower prices will shortly develop. Bids will close on Feb. 27 for approximately 100,000 tie plates for the Big Four Railroad, and it is likely an award will be made later in the week. In the structural field, no new projects appeared during the week. Bids will close on March 1 for the Business Men's Club, Cincinnati, and the Athletic Club at Indianapolis, both taking substantial tonnages. A number of projects involving considerable tonnages for reinforcing bars

will likely be awarded this week, the chief of which is a new high school building at Middletown. Samuel Hannaford & Sons, Cincinnati, will receive estimates until May 14 for the construction of a reinforced concrete building for the Y. M. C. A. in Middletown. The building will be of four stories, 90 x 200 ft. Plant operations will show an increase; the American Rolling Mill Co. at Middletown contemplates putting in operation its Central Works in addition to its East Side Works, which has been running full time for some weeks past. This company will also operate its Ashland steel plant full time, although the sheet mills will not be put on at the present time. At the plant of the Newport Rolling Mill Co., where a strike is in progress, conditions are much improved and the company is operating at about 40 per cent in its sheet mill department.

Warehouse Business.—Jobbers continue to report an improved tone to the market and while orders are being taken only for immediate needs, the number is constantly increasing. Local jobbers of wire products have made reductions of approximately \$5 per ton in their prices. Common wire nails are now quoted at \$2.75 per keg base and No. 9 annealed wire at \$2.60 per 100 lb. The old prices were \$2.95 and \$2.85 respectively.

Iron and steel bars, 2.75c. base; hoops and bands, 3.35c. base; shapes and plates, 2.85c. base; reinforcing bars, 2.82½c. base; cold rolled rounds, 1½ in. and larger, 3.50c. base; under 1½ in. and flats, squares and hexagons, 4c. No. 10 blue annealed sheets, 3.60c.; No. 28 black sheets, 4.25c.; No. 28 galvanized sheets, 5.25c.; wire nails, \$2.75 per keg base; No. 9 annealed wire, \$2.60 per 100 lb.

Coke.—February was the heaviest month for coke since the depression set in 18 months ago, according to most sellers, and prospects are equally good for March. The threatened coal strike is responsible for a great many consumers stocking up, although many orders are also being booked for second quarter. Prices while firming are quotably unchanged.

Old Material.—Scrap dealers report a much improved tone to the market. The Cincinnati district is still quiet, but many more inquiries are received from Valley points. While there is a tendency to buy against a threatened coal strike, dealers believe that present low prices are also attracting buyers and are looking for some good business. The Big Four Railroad is ordering 4000 tons. Prices, while unchanged, are much firmer and a moderate buying movement would in the opinion of dealers result in an advance.

We quote dealers' buying prices, f.o.b. cars:

Per Gross Ton	
Bundled sheets	\$3.50 to \$4.00
Iron rails	11.50 to 12.00
Relaying rails, 50 lb. and up	24.50 to 25.00
Revolving steel rails	10.00 to 10.50
Heavy melting steel	8.50 to 9.00
Steel rails for melting	8.50 to 9.00
Car wheels	11.50 to 12.50
Per Net Ton	
No. 1 railroad wrought	8.00 to 8.50
Cast borings	3.00 to 3.50
Steel turnings	2.00 to 2.50
Railroad cast	11.50 to 12.00
No. 1 machinery	13.00 to 13.50
Burnt scrap	7.00 to 7.50
Iron axles	15.00 to 15.50
Locomotive tires (smooth inside)	9.00 to 9.50
Pipes and flues	3.50 to 4.00

Buffalo

BUFFALO, Feb. 28.

Pig Iron.—The price of \$18.50 quoted by several Buffalo furnaces continues to attract inquiry from points outside the district, and the general run of small business is good in consequence. One furnace has sufficient tonnage booked to take all the product of one stack now blowing on foundry iron, and this situation will likely keep it out of the market for a time: Internal needs will not permit changing over the blast of the furnace now engaged in basic iron. Furnace operation is now likely to be changed in the near future and there is no disposition to blow in any additional stacks while the price situation remains where it is. Much of the inquiry is from points in New York State outside Buffalo and the East, particularly New England. An inquiry for 5000 tons from a buyer in Westfield, Mass., though not out, is expected soon, as indications have reached sellers that this interest may consider Buffalo iron. Out of a total of 5500 tons

inquired for at a Buffalo furnace, the largest single request was for 1000 tons. Sales for last week are well inside 5000 tons and \$19 was the exception rather than the rule. Much lower prices are reported in competitive territory, particularly New England, and little attention is being paid to differentials.

We quote f.o.b. per gross ton Buffalo as follows:

No. 1 foundry, 2.75 to 3.25 sil	\$19.00 to \$19.50
No. 2X foundry, 2.25 to 2.7 sil	18.50 to 19.00
No. 2 plain, 1.75 to 2.25 sil	18.00 to 19.00
Basic	18.00 to 18.25
Malleable	19.00 to 19.50
Lake Superior charcoal	27.75

Coke.—Lively demand has developed a stronger market and best grades are now quoted at \$4.50 to \$5 f.o.b. ovens. A number of small buyers are buying ahead, having in mind the strike possibility.

Finished Iron and Steel.—Wire business represents the bulk of trade in finished materials. Bars, plates and shapes are quiet, and in the first named material it is obvious that \$1.40 price is more freely quoted. All materials on which prices are asked carry the additional condition that prompt shipment is a factor in the purchase. One mill has gathered sufficient bar orders to justify the putting in of an additional open-hearth furnace, bringing its total battery up to four. Electric welded fabric, spring wire, wire rope, are up to normal. Inquiry for small quantities of structural shapes for use in the spring is beginning to appear, and on larger operations architects promise some good-sized jobs will be out within the month of March. The Dellwood Elevator Co., which has a branch here, will erect an addition to its present facilities in Buffalo and the general contract has been given to the Pegels Construction Co., Minneapolis, Minn. The structural requirements have not been made known, but the job will require a large tonnage of reinforcing bars.

We quote warehouse prices f.o.b. Buffalo as follows: Structural shapes, 2.65c.; plates, 2.65c.; plates, N. 8 gage, 3.35c.; soft steel bars and shapes, 2.50c.; hoops and bands, 3.15c.; blue annealed sheets, No. 10, 3.40c.; galvanized steel sheets, No. 28, 5.25c.; black sheets, No. 28, 4.25c.; cold-rolled strip steel, 5.90c.; cold-rolled round shafting, 3.40c.

Old Material.—While the demand for all grades is good, expected advances in prices have not developed. Sales of heavy melting steel at \$13.50 have been made but are confined to 500 and 1000 ton lots. Production is far short of demand at the price.

We quote dealers' asking prices per gross ton f.o.b. Buffalo as follows:

Heavy melting steel	\$13.00 to \$14.00
Low phos., 0.01 and under	17.00 to 18.00
No. 1 railroad wrought	15.00 to 16.00
Car wheels	16.50 to 17.50
Machine shop turnings	7.50 to 8.00
Cast iron borings	7.00 to 8.00
Heavy axle turnings	10.50 to 11.50
Grate bars	12.00 to 13.00
No. 1 bushing	10.00 to 11.00
Stove plate	15.00 to 16.00
Bundled sheet stampings	8.00 to 9.00
No. 1 machinery cast	17.00 to 18.00
Hydraulic compressed	10.50 to 11.50
Railroad malleable	13.00 to 14.00

Birmingham

BIRMINGHAM, ALA., Feb. 28.

***Pig Iron.**—At close of February, Birmingham pig iron was stronger than it had been since the price and production slump began more than a year ago. The base was \$15.50, lower than at one time during the month, but demand was decidedly better, in greater volume, from a wider territory and from greater variety of melters than in many weary months. Practically all business was done on a \$15.50 base except under peculiar circumstances with an occasional car lot going at \$16. The strength of the market consists principally of the sold-up condition of more than one interest through March and inability to book more business for prompt delivery. One active interest withdrew from the market for March delivery last week because it was overbooked and had exhausted yard stocks with exception of a small quantity already cared for. Toward the end of the week it turned down a steady influx of orders, as many as a dozen in a day, on account of their being for prompt delivery and the company's inability to make that delivery on additional tonnage. Another maker was booked to capacity for March just about at week's close. The week-end witnessed what might almost be termed a clamor for small

San Francisco

SAN FRANCISCO, Feb. 23.

lots for prompt delivery over the South. One day's bookings by one maker included deliveries for Virginia, Louisiana, Texas, East St. Louis, Indiana and Ohio and involved 900 tons in lots of various sizes. Buying seems to be very general by all kinds of interests. Pipe interests are buying again and are figuring on large tonnages. Iron makers are inclined to look for a stiffening of prices following the healthy state of the demand. Lots of 300 to 500 tons have been sold in St. Louis and Chicago territory at \$15.50. Birmingham iron is once more on a footing in competitive territory.

We quote per gross ton f.o.b. Birmingham district furnaces as follows:

Foundry, silicon 1.75 to 2.25	\$15.50
Base	14.50
Chicago—waste blast	32.00

Finishing Mills. The Tennessee company went to capacity production in its open-hearth department this week. This follows one of 77 per cent for three consecutive weeks and one of 50 to 60 per cent for some time prior to that. The fifth blast furnace at Ensley resumed making basic iron for the ingot mills. The rail mill, which for months produced 6000 tons a week and latterly 8000 tons, went this week on a 10,000-ton schedule. Plate, guide and bar mills are on double turn. Atlantic Coast Line has placed 10,000 tons of rails with the Tennessee company and it is believed Ensley will roll the 10,000 tons booked by the United States Steel Products Co. for the Imperial Japanese Government. A vessel is now headed to Mobile to take rails for Japan. American Steel & Wire and Gulf States Steel companies are credited with 60 per cent of production. Steel sheets are strong in demand in the Southeast owing to structural activity.

Cast Iron Pipe.—The American Cast Iron Pipe Co. and National Cast Iron Pipe Co. are on practically full turn and three plants of the United States Cast Iron Pipe Co. are gradually increasing production. All three interests made sizeable bookings in the past two weeks, especially in the Middle West. Base is \$33. Sanitary pipe was still hanging fire last week, but makers are not worried. Demand seems assured. Cutting below the \$37 base is understood to have about ceased. Shops are averaging four days a week.

Coal and Coke.—Foundry coke makers were borrowing from one another last week to fill the acute spot demand. Toward the end of the week, all were taxed to supply the prompt shipment orders from all around, including Illinois, Kansas and Pacific Coast. The base remains at \$5.

Old Material.—Scrap dealers feel more hopeful than in a long time following the general toning up of the iron and steel markets and are holding rather firmly to the present scale.

We quote per gross ton f.o.b. Birmingham district yards as follows:

Steel rails	\$11.00 to \$12.00
No. 1 steel	10.00 to 11.00
No. 1 cast	14.00 to 15.00
Car wheels	13.00 to 14.00
Tramcar wheels	12.00 to 13.00
No. 1 wrought	12.00 to 13.00
Stove plate	11.00 to 12.00
Cast iron borings	6.00 to 7.00
Machine shop turnings	6.00 to 7.00

Boiler Sales in 1921

At the annual meeting in Pittsburgh, Feb. 13, of the American Boiler Manufacturers' Association, it was announced that 1921 sales of boilers, amounting to 547,505 h.p., represented between 25 and 30 per cent of normal. Sales, by quarters, and expressed in h.p., were as follows:

	Water Tube	Horizontal Return Tubular	Loco- motive	Vertical Tube	Total
1921					
First quarter...	57,987	38,054	10,058	12,258	118,357
Second quarter...	80,982	40,021	4,764	7,811	133,578
Third quarter...	77,771	53,717	7,018	7,953	146,459
Fourth quarter...	93,498	40,432	4,900	10,280	149,111
Year	310,239	172,224	26,740	38,302	547,505

Total January sales will slightly exceed 57,000 h.p. This is the highest total since November, 1920, and is at a rate 25 per cent greater than 1921 sales, and 15 per cent greater than sales during the fourth quarter of that year.

Pig Iron.—Though there has been but little improvement in actual business during the past two weeks, opinion seems to be that the movement of the trade is upward. Foundries have been inquiring more of late, and there has been a little better demand for castings. Interest is now divided between domestic and foreign material, the price basis of the former being a near approximation to that of imported iron. There has been a good deal of offerings for Gulf shipment in this market, but the business consummated has not been large. Perhaps the best deal was that involving 500 of basic domestic pig iron, which sold at a figure something under \$30, delivered San Francisco. Most of the business has been in small lots, and one large handler reports having disposed of about three cars all told at around \$33, ex ship, San Francisco, for foreign.

Coke.—The auxiliary Kobenhavn a few days ago delivered about 5000 tons of mixed coke and pig iron from Newcastle-on-Tyne. The large part of this cargo has already been sold to several of the local consumers, for the most part in small quantities. Business in coke continues steady, although the volume yet is not of great importance.

Finished Iron and Steel.—During the past fortnight there has been a better outlook in manufactured products, although even at present it cannot be said that the market is active; in fact, most makers report a slow condition. Prospects for constructions of various kinds have not been wanting, but so far many do not pass the primary stage, with the result that actual offerings of consequence are not numerous. There is, however, a better feeling, and jobs of smaller dimensions, involving from about 150 to 250 tons, are picking up. This seems to indicate that building construction work is showing some betterment. The most conspicuous prospect in this connection is that of the proposed Biltmore Hotel in Los Angeles, costing in the neighborhood of \$5,000,000. It is estimated that about 3600 tons of steel will be required on this job. Bids open March 8. A notable contract just closing is that for a State building at Sacramento, involving approximately 2750 tons of steel materials. The American Bridge Co. had the lowest bid. There is a prospect of 1000 tons of plates pending, but it has not assumed a very definite shape. The market for plates, shapes and sheets is moderately steady, although in the case of plates, undercutting prevails. One large interest reports having sold around 500 tons of sheets last month, and doing a fair business at present. One of the most active outlets for steel at present is the street railroads. Throughout the State and in those adjoining California, there is good activity in this line, and many are buying special work in better volume than for months past. A contract just awarded involves 2000 tons of 7-in. girder rails for a Southern street line. A traction company of Oakland is in the market for 250 tons of girder rails. A Portland street railway is inquiring for 525 tons of girder rails and for 700 tons of standard section T rails.

Cast Iron Pipe.—Relative quietness prevails in this market, although private business appears to be of good volume, large interests having several hundred tons each on their books. Prices remain about steady at around \$32, base. Practically the only municipal offerings are for 300 tons of 4-in. pipe, Glendale having readvertised; and for 50 tons of 6-in. pipe for Sacramento.

Old Material.—Melting grades continue to move in fair volume at about the standing basis of \$10 a gross ton, delivered at consumers' works. Cast iron scrap is an uninteresting line at from about \$20 to \$22. Owing to the heavy selling of melting steel during the past month, the market at present is congested and lower prices are anticipated. A 2000-ton sale was made recently, and one or two others averaged from about 1000 to 1500 tons. Desire of holders to liquidate seems to be the chief reason for this trading.

St. Louis

St. Louis, Feb. 28.

Pig Iron.—Several large sales of Northern pig iron were made during the last week, including 2000 tons of foundry iron for nearby shipment, 1000 tons of foundry iron for shipment over the next 90 days and 200 tons of malleable for immediate shipment. Sales of carloads and up to 100 tons continue to make up the greater part of the business, and these are for immediate shipment. These smaller orders seem to be on the increase. The Northern market is firm at \$20, Chicago, which price is being followed by the Granite City producer. The market for Southern iron is still at \$15.50, Birmingham. Most of the orders for Southern iron here are going to a producer who is moving it by water and rail from Sheffield. Previous to this week no business was accepted for this movement for less than a barge load, 300 tons, but now orders are being taken for as small amount as 50 tons, with the result that 1200 tons were sold in this market by this producer in the last week. This pig iron is being sold on the basis of \$16, Sheffield, to which is added the all-rail freight to St. Louis from that point, \$4.94, which is 80c. less than from Birmingham, making \$20.94, f.o.b. St. Louis, all rail, with an allowance of \$1.50 for barge shipment, thus reducing the price to \$19.44, f.o.b. St. Louis by barge and rail delivered to customer on railroad cars at his switch. Most of the purchasers were stove foundries, whose business is improving. Inquiries for Northern iron include 2000 tons reported last week and still pending for an Illinois melter, 2000 tons from a Southwestern melter, and several for from 300 to 500 tons for delivery over the next 90 days. The Eighth Federal Reserve bank reports that jobbing foundries are operating at about 22 per cent of capacity, and the larger steel plants at from 18 to 40 per cent. Manufacturers of heating apparatus have been operating at full time, and implement makers report a seasonal increase. There is an inquiry for a car of ferromanganese.

We quote delivered consumers' yards, St. Louis, as follows, having added to furnace prices \$2.80 freight from Chicago and \$5.74 from Birmingham:

Northern foundry, sil. 1.75 to 2.25	\$22.80
Northern malleable, sil. 1.75 to 2.25	22.80
Basic	22.80
Southern foundry, all rail, sil. 1.75 to 2.25	21.24
Southern foundry, sil. 1.75 to 2.25, rail and water	19.44

Finished Iron and Steel.—The market for finished iron and steel is quiet. There is hardly anything being done in structural steel because of the wage situation. All bids for the Jewish Hospital at Memphis, involving 300 tons of reinforcing bars, have been rejected and new bids will be asked for after a year. Owen, Payson & Carswell, Kansas City, are the architects for a new school to be erected at Fort Madison, Iowa, to cost \$265,000. Railroads are putting out no inquiries of consequence.

For stock out of warehouse we quote: Soft steel bars, 2.62½c. per lb.; iron bars, 2.62½c.; structural shapes, 2.72½c.; tank plates, 2.72½c.; No. 10 blue annealed sheets, 3.47½c.; No. 28 black sheets, cold rolled, one pass, 4.15c.; cold drawn rounds, shafting and screw stock, 3.65c.; structural rivets, \$3.52½ per 100 lb.; boiler rivets, \$3.62½; tank rivets 7/16-in. and smaller, 65 and 5 per cent off list; machine bolts, large, 60-10 per cent; small, 60, 10 and 10 per cent; carriage bolts, large, 55-5 per cent; small, 60 and 10 per cent; lag screws, 65-15 per cent; hot pressed nuts, square or hexagon blank, \$4; and tapped, \$3.75 off list.

Coke.—The demand for coke is increasing, although still largely confined to carload orders for immediate shipment. Consumers are content to buy only for immediate needs, and the fear of a coal strike has not as yet developed any desire to stock up. There has been an advance of 25c. to 50c. a ton, and the best brands of Connellsville are selling at from \$4.50 to \$5 a ton.

Old Material.—A decidedly better feeling has prevailed in the old material market during the last few days, owing to the large orders for cars and equipment reported placed by the railroads, but this sentiment has not yet reached the consumers, as they are still out of the market. Owing to the recent advance of \$2 a ton in Northern pig iron prices, cast iron scrap has suddenly become very scarce and the price on this com-

modity has stiffened considerably. Scrap couplers and knuckles and railroad springs are also in demand and these items are much stronger. The only railroad offerings reported is a list from the Louisville & Nashville Railway aggregating about 10,000 tons, and an open list issued by the Big Four, which closes to-day, also an open list issued by the New York Central, which closes on March 2.

We quote dealers' prices f.o.b. consumers' works, St. Louis industrial district and dealers' yards as follows:

Per Gross Ton	
Old iron rails	\$14.00 to \$14.50
Steel rails, retooling	10.50 to 11.00
Steel rails, less than 3 ft.	12.50 to 13.00
Relay iron rails, standard section	25.00 to 28.00
Cast iron car wheels	13.50 to 14.00
No. 1 heavy railroad melting steel	10.00 to 10.50
No. 1 heavy shoveling steel	9.75 to 10.00
Ordinary shoveling steel	9.50 to 10.00
Progs, switches and guards, cut apart	10.00 to 10.50
Ordinary bundle sheet	4.00 to 4.50
Cast steel bolsters	9.50 to 10.00

Per Net Ton	
Heavy axles and tire turnings	6.00 to 6.50
Iron angle bars	13.00 to 13.50
Steel angle bars	9.00 to 9.50
Iron car axles	18.00 to 18.50
Steel car axles	12.50 to 13.00
Wrought iron arch bars and transoms	11.00 to 12.50
No. 1 railroad wrought	9.50 to 10.00
No. 2 railroad wrought	8.50 to 9.00
Railroad springs	11.00 to 11.50
Steel couplers and knuckles	11.00 to 11.50
Locomotive tires, 42 in. and over	
Smooth inside	8.00 to 8.50
No. 1 dealer's forge	8.00 to 8.50
Cast iron borings	3.50 to 6.00
No. 1 busheling	8.00 to 9.00
No. 1 boilers cut in sheets and rings	6.00 to 6.50
No. 1 railroad cast	13.50 to 14.00
Stove plate and light cast	11.50 to 12.00
Railroad malleable	8.50 to 9.00
Agricultural malleable	9.00 to 9.50
Pipes and flues	7.50 to 8.00
Heavy railroad sheet and tank	3.50 to 6.00
Light railroad sheet	3.50 to 4.00
Railroad grate bars	9.50 to 10.00
Machine shop turnings	3.00 to 3.50
Country mixed iron	6.00 to 6.50
Uncut railroad mixed	7.00 to 7.50
Horseshoes	9.50 to 10.00
Railroad brake shoes	9.50 to 10.00

Buys Steel Rails

St. Louis, Feb. 28.—Missouri Pacific Railway bought 200,000 tons of 85 and 90-lb. steel rails, the bulk of the business going to the Colorado Fuel & Iron Co. and the remainder to the Illinois Steel Co. and Inland Steel Co. The same road has an inquiry out for 14,000 angle bars for 90-lb. rails and 39,000 angle bars for 85-lb. rails.

Boston

Boston, Feb. 28.

Pig Iron.—More activity is noted in this territory. The Draper Co., Hopedale, Mass., wants 1000 tons silicon 3.25 to 3.75, 100 tons prompt delivery and the balance as soon as possible, and a car of charcoal iron. The General Fire Extinguisher Co., Providence, R. I., wants 100 tons silicon 2.25 to 2.75, and 200 tons, silicon 2.75 to 3.25, March delivery, and equal amounts, April and May deliveries. The Milford Iron Foundry, Milford, Mass., is inquiring on 200 tons, silicon 2.75 to 3.25; the E. D. Jones & Sons Co., Pittsfield, Mass., for 150 tons No. 2 plain; the Portland Stove Co., Portland, Me., for 50 to 150 tons No. 2X; the Old Colony Foundry Co., Bridgewater, Mass., the Clinton Foundry Co., Clinton, Mass., and other melters for small tonnages, the aggregate active business amounting to 3000 to 4000 tons. The H. B. Smith Co., Westfield, Mass., indicates it shortly will be in the market for 5000 to 7500 tons, and the Gurney Heater Co., Framingham, Mass., 2000-ton inquiry again shows life. Few sales of round tonnages were made this week. They include 400 tons of special analysis eastern Pennsylvania to a Connecticut melter, 300 tons No. 2X Buffalo to a Maine foundry, and three 50-ton lots, one malleable, to the Sullivan Machinery Co., Clairmont, N. H. Eastern Pennsylvania furnaces continue to quote \$20, furnace base, or higher, but are not important factors in this territory due to lower prices quoted by other iron makers. It is still possible to buy No. 2 plain and No. 2X eastern Pennsylvania iron at \$19 furnace. One furnace this

week quoted \$18.75 furnace, or \$22.81 delivered, on silicon 2.75 to 3.25. Buffalo No. 2 plain, No. 2X and No. 1X generally is quoted at \$18 to \$18.50 furnace. One interest this week quoted \$17.75 Buffalo or \$23.21 delivered on No. 1X. The Virginia market consists of small lots of high manganese iron on a \$22.50 furnace base, and the Alabama of a car here and there at \$15.50, furnace base. Lake charcoal iron, heretofore quoted here at \$28 furnace base, is now obtainable at \$23.

We quote delivered at common New England points as follows, having added to furnace prices \$1.06 freight from eastern Pennsylvania, \$3.46 from Buffalo, \$6.58 from Virginia and \$10.66 from Alabama:

East Penn. sil 2.25 to 2.75	\$22.81 to \$24.56
East Penn. sil 1.75 to 2.25	22.81 to 24.06
Buffalo sil 2.25 to 2.75	23.21 to 24.46
Buffalo sil 1.75 to 2.25	23.21 to 23.96
Virginia sil 2.25 to 2.75	23.58
Virginia sil 1.75 to 2.25	23.08
Alabama sil 2.25 to 2.75	26.66
Alabama sil 1.75 to 2.25	26.16

Finished Material.—McClintic-Marshall Co. is awarded 300 tons of structural steel for a coal pocket, Cranston, R. I.; and the New England Structural Co. 100 tons for a Boston theatre addition, and 100 tons for an addition to the Fall River Gas Works Co., Fall River, Mass., plant. Stone & Webster, Boston, this week will award 430 tons for a New Bedford, Mass., lighting plant project. Bids are in on 300 tons for an Edison Co. of Boston, South Boston plant addition. The Boston Elevated Railway, Forest Hills inspection department, 60 x 500 ft. will require a round tonnage of steel, bids for which are being asked. The Lackawanna Steel Co. has closed with the Maine Central Railroad for 5000 tons of 85 lb. rails, and the Bethlehem Steel Co. for a round tonnage of frogs and switches. Mill representatives report a better demand for bars, etc., with 1.40c. Pittsburgh the usual asking price.

Jobbers now quote: Soft steel bars \$25.00 per 100 lb. base, flats, \$10.00; concrete bars, stock lengths \$2.55; structural angles and beams \$2.65; plates \$2.65; to \$2.83; tire steel \$2.83; to \$1.25; open hearth spring steel \$15.00; crucible spring steel \$11.50; bands \$11.00; to \$3.33; hoop steel \$1.10; cold rolled steel \$3.40 to \$3.90; toe cink steel \$5; to \$1.50; per 100 lb. base, but refined iron \$1.25; Wayne iron \$5.50; Norway iron \$5.50; No. 10 blue annealed sheets \$3.18 per 100 lb. base; No. 28 black sheets \$4.50; No. 28 galvanized sheets \$5.50.

Coke.—New England producers of by-product foundry coke announce no change in their price for March. The market is \$10.15 delivered where the local freight does not exceed \$3.40. Further expansion in releases of contract coke is noted. Such releases this week included 1200 tons by a manufacturer of electrical appliances for two plants, 1000 tons by a maker of textile machinery, and 600 tons by an Ansonia, Conn., foundry. Both the New England Coal & Coke Co. and the Providence Gas Co. are barely keeping even with shipping instructions. Coke is taken in, not so much because of increased foundry melts, as because of apprehension over the coal labor outlook.

Old Material.—Were it not for slight activity in turnings and borings, the old material market could be classified as lifeless. Turnings and borings are in light supply due to the low operating ratio of the average machine shop in this territory. It does not take much buying, therefore, to sustain values. Dealers expect higher prices on heavy melting steel within the near future. In the absence of business, quotations on machinery cast, stove plate, railroad malleable, forged scrap, bundled skeleton, axles, shafting, car wheels and rerolling rails sag under their own weight.

The following prices are for gross ton lots delivered consuming points.

No. 1 machinery	\$17.50 to \$18.00
No. 2 machinery	15.50 to 16.00
Stove plate	11.50 to 15.00
Railroad malleable	13.00 to 13.50

The following prices are offered per gross ton lots f.o.b. Boston rate shipping points.

No. 1 heavy melting steel	\$8.00 to \$8.50
No. 1 railroad wrought	10.50 to 11.00
No. 1 yard wrought	9.50 to 10.00
Wrought pipe (1 in. in diam. over 2 ft. long)	7.00 to 7.25
Machine shop turnings	4.50 to 4.75
Cast iron borings, rolling mill	7.50 to 8.00
Cast iron borings, chemical	8.00 to 9.00
Blast furnace borings and turnings	4.50 to 4.75
Forged scrap and bundled skeleton	4.00 to 4.50
Street car axles	11.50 to 12.00
Shafting	12.00 to 13.00
Car wheels	11.00 to 11.50
Rerolling rails	8.50 to 9.00

Philadelphia

PHILADELPHIA, Feb. 28.

Accompanied by a dip of \$1 a ton in prices, the Eastern foundry iron market has had a few days of marked activity, the first real buying flurry since early December. Fully 40,000 tons of iron was sold the latter part of last week by eastern Pennsylvania furnaces to consumers in the Philadelphia and New York districts, very little going to New England. The principal buyers were makers of cast iron pipe and soil pipe. Prices dropped to \$19 for No. 2 plain, \$19.50 for No. 2X and \$20 for No. 1X, f. o. b. furnace, but, after all available tonnage had been closed, were advanced by two or three furnaces to the former basis of \$20, furnace, for No. 2 plain.

In steel products, particularly plates, shapes and bars, there have also been price recessions. A leading Pittsburgh independent is generally credited with setting the pace, with the result that sellers admit it is comparatively easy to place attractive orders for plates, shapes and bars at 1.35c., Pittsburgh, while in exceptional instances the dip has gone as low as 1.30c., Pittsburgh. Sheets and wire products appear to be firm, but in nearly all other steel products there is uncertainty as to prices, with the tendency toward concessions. Extra discounts are reported to have been granted on pipe. Bolts are firmer, but rivets and spikes are weak.

Coke and old material show the only upward price tendencies. Furnace coke is strong at \$3.40 to \$3.50, Connellsville, for prompt shipment, while foundry coke has advanced to a minimum of \$4.50, with some ovens quoting as high as \$5.50. Stimulated by a buying flurry at Pittsburgh, the Eastern scrap market has turned firmer, but without marked changes in prices.

As a whole, the situation looks somewhat brighter, despite price weaknesses, as in some lines consumers are taking more interest and orders are coming from a greater range of industries.

Pig Iron.—Fully 40,000 tons of foundry iron has been booked by eastern Pennsylvania furnaces in the past week or 10 days, the best buying movement since last December, when many of the first quarter contracts were closed. A good part of the above-mentioned tonnage went at \$19, furnace, for No. 2 plain, \$19.50 for No. 2X and \$20 for No. 1X. The first marked recession occurred a little over a week ago when a New Jersey cast-iron pipe maker bought 7500 tons of No. 2 plain at \$20, delivered, or \$19.30, furnace. Other cast iron pipe makers and a few soil pipe manufacturers came into the market late last week and keen competition for the business resulted in concessions averaging \$1 a ton from what had previously been considered the market. At least two or three of the active sellers withdrew all low quotations after having taken substantial orders and again are quoting on the basis of \$20, furnace, for No. 2 plain, but it remains to be seen whether the market is firmly established at that level. In no instance was iron sold for delivery beyond July 1. The buyers are said to have covered for anticipated requirements only, but it is probable that purchasing in this volume was at least partly due to fear of a coal strike April 1. There were several purchases of about 4000 or 5000 tons each, and a fair number of small sales. Two lots of 1000 tons of gray forge iron were sold at about \$20.50, delivered. Steel-making iron is not in demand. It is reported here that the Bethlehem Steel Co. will cast about 60 per cent of the 105,000 tons of cast iron segments for the New York-New Jersey vehicular tunnel and the Davies & Thomas Co. the remaining 40 per cent. The Bethlehem Steel Co. will also furnish the steel castings, about 9000 tons. Approximately 75,000 tons of pig iron will be required.

The following quotations are, with the exception of those on low phosphorus iron, for delivery at Philadelphia, and include freight rates varying from 84 cents to \$1.54 per gross ton:

East. Pa. No. 2 plain, 1.75 to 2.25 sil.	\$19.84 to \$21.26
East. Pa. No. 2X, 2.25 to 2.75 sil.	20.84 to 21.76
Virginia No. 2 plain, 1.75 to 2.25 sil.	26.24 to 26.74
Virginia No. 2X, 2.25 to 2.75 sil.	27.24 to 27.74
Basic delivery eastern Pa.	18.84
Gray forge	20.50 to 21.00
Malleable	22.50 to 24.00
Standard low phos. (f.o.b. furnace)	30.00
Copper bearing low phos. (f.o.b. furnace)	28.00

Plates.—A further break in plate prices has resulted from the efforts of a Pittsburgh independent to obtain a larger share of Eastern business. Orders as small as 200 tons have been taken at 1.35c., Pittsburgh, while it is generally admitted by sellers that buyers would have little difficulty in placing a large tonnage at 1.30c., Pittsburgh. Whether 1.30c. actually has been done has not come to light, but there are strong intimations to that effect. There has been no marked improvement in business, orders continuing at about the rate of the previous two or three weeks. About 1500 tons of plates and 600 tons of shapes required for two boats to be built at the Pusey & Jones shipyard at Wilmington, Del., apparently have not been placed. The Baldwin Locomotive Works will require about 1800 tons of plates for the 47 locomotives it will build for the Chicago, Burlington & Quincy Railroad. We quote sheared and universal plates at 1.35c. to 1.40c., Pittsburgh.

Structural Material.—The P. H. Kelly Construction Co., Philadelphia, was low bidder on the Philadelphia public library. Bids are being taken by the contractor on the steel work, which will require about 4300 tons. Keen competition has developed and low prices are expected. Considerably more building work is being estimated upon by fabricators. Two office buildings for Baltimore are among the new projects. Fabricators having fair-sized tonnages to place are able to cover at 1.35c., Pittsburgh, while there seems little doubt that a very attractive tonnage might be placed as low as 1.30c. Small lots are quoted at 1.40c., Pittsburgh.

Bars.—The demand for steel bars is about keeping pace with that of the past few weeks. Soft steel bars are now available at 1.35c., Pittsburgh, while it is possible that a large tonnage, particularly of reinforcing bars, could be placed at 1.30c., Pittsburgh. Bar iron is unchanged at 1.40c., Pittsburgh, but concessions are reported to have been granted by some mills rolling a limited range of sizes.

Sheets and Tin Plate.—Sheet manufacturers are standing firmly for their prices of 2.25c. on blue annealed, 3c. on black and 4c. on galvanized, Pittsburgh, and in this respect the sheet situation is quite in contrast to other finished steel lines, except possibly wire products, which are also firm. Some of the tin plate manufacturers are making an effort to hold to a minimum of \$4.60 per base box, Pittsburgh, but it is possible for large buyers to obtain quotations of \$4.50. Stock plate is quoted at \$4.25.

Wire Products.—Although the recent reduction on wire products of \$2 a ton was generally supposed to apply to all forms of wire, the mills have raised their prices on plain wire to \$2.25 per 100 lb., Pittsburgh. Wire nails are quoted at \$2.40, galvanized wire at \$2.75 and barbed wire at \$3.05.

Bolts, Nuts and Rivets.—Bolts are somewhat firmer and discounts of 70, 10 and 5 per cent from list are less frequent, 70 and 10 per cent being quoted in most instances. On the other hand, rivets are weak, structural being quoted frequently at 2.10c. and boiler at 2.20c. per lb., Pittsburgh. The Philadelphia & Reading Railroad is expected to buy 300 kegs of button-head rivets this week.

Coke.—Coke prices have stiffened considerably during the week. For prompt shipment it would probably be difficult to obtain furnace coke below \$3.40 Connellsville, while \$3.50 is a more common quotation. Foundry coke is at a minimum of \$4.50, Connellsville, with some ovens asking as high as \$5.50. The coke situation has worried some of the Eastern pig iron producers and at least one stack now in blast may be put out soon if the coke price continues to advance.

Ferrous alloys.—An Eastern maker of ferromanganese has taken orders for about 500 tons in the past week, which is somewhat better than has been done in previous weeks. On both British and domestic alloy the price of \$62.50, seaboard, remains firm. Spiegeleisen, 16 to 19 per cent, is quoted at \$30, furnace. The higher grade is difficult to obtain.

Rails.—Distribution of the Philadelphia & Reading rails for 1922 delivery has been completed as follows: Bethlehem Steel Co., 13,000 tons; Carnegie Steel Co., 5000 tons; Cambria Steel Co., 2000 tons. A fair demand

continues for light rails, which are obtainable at 1.40c., Pittsburgh.

Semi-Finished Steel.—A small tonnage of slabs has been sold at \$28, Pittsburgh, and this also is the ruling price on re-rolling billets. Forging billets are quoted at \$32 Pittsburgh. Wire rods are now quoted at \$36, Pittsburgh, an advance of \$1 a ton.

Old Material.—Buying of steel scrap at Pittsburgh at prices which reached a maximum of \$15.50, delivered, has created a better sentiment in this market, although business has not increased materially in the East. One or two Eastern mills, however, are now permitting shipments on old contracts. The Midvale Steel & Ordnance Co. within the past week has bought 15,000 tons of heavy melting steel, 11,000 tons for Johnstown, 3000 tons or more for Nicetown, and about 1000 tons for Coatesville. Prices paid for Johnstown delivery ranged from \$13 to \$14 and for Coatesville \$11 to \$11.50. A few hundred tons of No. 1 railroad wrought was sold at \$15.50 and pipe has been sold at \$12.50. Chemical borings have been sold at \$15. Machine-shop turnings are slightly higher. We quote for delivery at consuming points in this district as follows:

No. 1 heavy melting steel.....	10.00 to \$12.50
Scrap rail.....	60 c. 50
Steel rails, re-rolling.....	15.00 to 15.50
No. 1 low phos., heavy 0.01 and under.....	18.00 to 19.00
Cast iron car wheels.....	15.00 to 15.50
No. 1 railroad wrought.....	15.00 to 15.50
No. 1 yard wrought.....	12.00 to 12.50
No. 1 forge fire.....	10.00 to 10.50
Bundled sheets (for steel work).....	5.50 to 6.00
No. 1 bushing.....	11.00 to 12.00
No. 2 bushing.....	9.00 to 10.00
Turnings (short shoveling grade for blast furnace use).....	9.50 to 10.00
Mixed borings and turnings (for blast furnace use).....	
Machine-shop turnings (for rolling mill and steel works use).....	
Heavy axle turnings (for equivalent).....	10.00 to 50
Cast borings (for steel works and rolling mills).....	12.00 to 12.50
Cast borings (for chemical plants).....	11.00 to 15.00
No. 1 cast.....	15.50 to 17.00
Railroad grate bars.....	14.00 to 14.50
Stove plate (for steel plant use).....	11.00 to 14.50
Railroad malleable.....	12.50 to 13.50
Wrought iron and soft steel pipes and tubes (new specification).....	50 to 13.00
Iron car axles.....	No market
Steel car axles.....	90 to 18.50

CHINA MORE ACTIVE

Chinese Merchants Inquire But Some Business Goes to Europe Japanese Trade Unchanged

NEW YORK, Feb. 28.—The Japanese trade situation is unchanged. Merchant buying is continuing on a small scale and there is the usual number of Government inquiries. Chinese trade activity, however, is becoming more marked. Small quantities of second-hand structural material, bar crop ends and plate cuttings are in demand from this market. South American markets show an inclination to buy but orders from this source are small. Although prices in European centres still show an upward trend, no immediate possibilities of sales to these markets are reported yet, with the exception of spiegeleisen, for which there have been several small inquiries evidently sent out as price feelers. One exporter and importer in New York believes that he may be able to close on some small quantities of spiegeleisen for European consumption.

A Chinese purchaser, who recently closed on a fairly large tonnage of material, inquiry for which had been current for some time, placed the order in England. Included in this order was about 8000 base boxes of tin plate, reported to have been placed at \$10.50 (Hong Kong dollars) per box, c.i.f. Hong Kong, while the galvanized sheets went for about £28 per ton. These were 5 x 7 ft., packed 50 sheets to the box. A c.i.f. Hong Kong price of \$4.60 per keg was quoted by the British seller on 2640 picule kegs of iron, checker head, countersunk wire nails. This Chinese buyer is now receiving quotations on another inquiry calling for 1790 picule kegs of wire nails and a tonnage of mild steel bars, ranging in size from 3/8-in. to 2-in., the greater part being 1/2-in. Wire ranging up to No. 25 gage to be shipped in 133-lb. bundles, is also included in this inquiry.

British Iron and Steel Market

Cautious Buying Follows Higher Fuel and Iron Prices - Tin Plate Situation Unsatisfactory
(By Cable)

LONDON, ENGLAND, Feb. 28.

Pig iron demand has slackened and consumers are adopting a more cautious attitude, owing to the uncertainty as to future prices resulting from dearer fuel, but makers are still able to dispose of the output of Cleveland foundry iron. Scotland is buying more material from Cleveland. There have been further sales to Hamburg, which are believed to be destined ultimately for Czechoslovakia. Prices are firm on advancing fuel costs. The London Metal Exchange is resuming its dealings in pig iron.

Hematite is firmer and is moderately active, with improved Continental demand. Italy is purchasing with more regularity. The home trade generally is quiet. Few makers are willing to book it below £4 17½s. (\$21.55).

Durham coke is strong, producers asking up to 30s. (\$6.63) delivered, owing to strong Continental demand.

North Spain and African ore freights are rising; consequently weak sellers of Bilbao Rubio ore are expected to diminish their prices. Meanwhile the ore is held at nominally 26½s. (\$5.86) ex-ship Tees.

Lockout notices for March 11 have been posted by the Engineering Employers' Federation, owing to a dispute with the union on overtime payments. There is a reported strike of Welsh chemical workers, but confirmation is lacking.

Steel prices are unchanged, but the tendency is firmer on dearer fuel. Cheap export quotations on steel sections are less heard of, but the works are still badly in need of orders. There is a moderate home trade business in iron bars and hoops.

Sir W. G. Armstrong, Whitworth & Co., Ltd., has closed its Elswick works, at Newcastle-on-Tyne, owing to high costs. The Clyde shipbuilding output for February was six vessels of 20,451 tons.

American wire nails have been offered at 21s. per picul keg (\$3.48 per 100-lb. keg) c.i.f. Japan. American No. 8 gauge wire is quoted at £16 (3.16c. per lb.) c.i.f. Japan.

Belgian and Luxemburg foundry pig iron stands at £5 to £5 5s. (\$22.10 to \$23.20) f.o.b. French foundry pig iron is held at £5 10s. to £5 15s. (\$24.31 to \$25.42) f.o.b.

Belgian light rails are offered at £7 5s. (\$32.05) f.o.b., including fish plates. English heavy rails are being sold at £8 (\$35.36) f.o.b., for prompt shipment.

French, Belgian and Luxemburg merchant bars are held at £8 to £8 10s. (1.59 to 1.68c. per lb.) f.o.b., for April and May delivery; and plain structural steel at £7 10s. to £7 12½s. (1.48 to 1.51c. per lb.) for March and April shipment. Belgian angles have been quoted at £7 12½s. (1.51c. per lb.) f.o.b., for April and May delivery. Belgian angles are held at £7 12½s. (1.51c. per lb.) f.o.b., for April and May shipment.

German 3/16-in. plates are offered by agents at £7 12½s. (1.51c. per lb.) f.o.b., for May and June shipment. Belgian sheet bars are quoted at £6 10s. (\$28.73) f.o.b., for March shipment. French billets are held at £7 (\$30.94) f.o.b., and Luxemburg billets at £6 17½s. (\$30.39) f.o.b., both for March shipment. Belgian plates are quoted at £10 (1.97c. per lb.) c.i.f. India.

Tin plates are dull and the market is unsatisfactory. Further mills are closing, and consumers are purchasing only from hand to mouth, but the tendency

of prices is upward, due to dearer raw materials. Germany is offering 28 x 20 in. plates at 45s. (\$9.95) f.o.b. Hamburg, for 8 to 12 weeks delivery. South America has bought tin plate at 19s. (\$4.20) f.o.b., prompt delivery. Home consumers paid 18s. (\$3.98) f.o.b., prompt.

Galvanized sheets are in fair demand, but the market is quiet and business is slow. Prices are firmer on dearer pig iron. There are few sellers below £15 15s. (3.11c. per lb.) f.o.b. Commencing March 1, galvanized sheet makers will work on the allotment basis. Producers have endeavored to stimulate demand by advancing values, but prices are now weak. Corrugated, 24 gage, is being sold at £15 15s. (3.11c. per lb.) f.o.b.

Continental black sheets, 4 x 2½'s, 2/5, have been sold to India at £11 17½s. (2.34c. per lb.) c.i.f. We quote per gross ton, except where otherwise stated, f.o.b. maker's works, with American equivalent figured at \$4.42 per £1 as follows:

Durham coke, delivered	£1 8½s. to £1 10s.	\$6.30 to \$6.63
Cleveland No. 1 foundry	4 15	21.00
Cleveland No. 2 foundry	4 10	19.89
Cleveland No. 4 foundry	4 7½	19.34
Cleveland No. 1 forge	4 10	19.89
Cleveland basic	4 10	19.89
Hematite	7 0*	30.94*
East Coast mixed	4 15 to 4 17½	21.00 to 21.55
Permanganese	15 0 & 14 10*	66.30 & 64.09*
Balls, 60 lb and up	8 0 to 9 10	35.36 to 41.99
Billets	7 0 to 7 10	30.94 to 33.15
Sheet and tin plate bars,		
Welsh	7 0 to 7 7½	30.94 to 32.60
Tin plates, base box	0 18½ to 0 19	4.09 to 4.20
		C. per Lb.
Ship plates	9 0 to 10 10	1.78 to 2.07
Boiler plates	12 10 to 14 0	2.47 to 2.76
Tees	9 10 to 11 0	1.88 to 2.17
Channels	8 15 to 10 5	1.73 to 2.02
Beams	8 5 to 10 0	1.63 to 1.97
Round bars, ¾ to 3 in.	10 10	2.07
Galvanized sheets, 24 g.	15 15 to 16 0	3.11 to 3.16
Black sheets	12 10 to 13 0	2.47 to 2.57
Steel hoops	12 0 & 12 5*	2.37 & 2.42*
Cold rolled steep strip,		
20 K.	23 10	4.64

*Export price.

Puddlers' Pay Reduced

YOUNGSTOWN, Feb. 28.—The boiling rate for March-April will be reduced to \$8.03 per ton, from \$8.22, paid in January-February, as the result of the bi-monthly examination of sales sheets Tuesday by the Western Bar Iron Association and Amalgamated Association of Iron, Steel and Tin Workers.

The average price of bar iron covering the 60-day period ending Feb. 20 was \$1.60 per 100 lb., which represents a decline of 5c. per 100 lb. from the average two months before.

Under the new rate, finishers will be paid 28½ per cent above base, as compared with a rate of 30½ per cent above base in the first two months of year. The average bar iron price compares with the current market of \$1.40, and the puddling rate will therefore be still further reduced in May-June.

Aggregate shipments by affected interests were less than one third of normal, during the period covered by the settlement.

The puddling rate reached the peak of \$18.76 per ton on July-August, 1920, shipment when bar iron averaged \$3.55. There has been a steady decline since.

It is estimated 35,000 workers will be directly and indirectly affected by the settlement. James H. Nutt acted for the manufacturers and M. F. Tighe, Pittsburgh, for the employees.

Nagle Steel Co. in Difficulties

The Alan Wood Iron & Steel Co., Rogers, Brown & Co. and the Cortright Coal Co., all of Philadelphia, have petitioned the Federal Court in Philadelphia to adjudge the Nagle Steel Co. a bankrupt. The Nagle Steel Co. owns a small steel plant at Rahway, N. J., and plate and sheet mills at Pottstown and Seyfert Station, Pa.

Prices Finished Iron and Steel, f.o.b. Pittsburgh

Freight Rates

Freight rates from Pittsburgh on finished iron and steel products, in carload lots, to points named, per 100 lb., are as follows:

Philadelphia, domestic.	\$0.36	Kansas City	\$0.815
Philadelphia, export.	0.265	Kansas City (pipe)	0.77
Baltimore, domestic.	0.35	St. Paul	0.665
Baltimore, export	0.255	Omaha	0.815
New York, domestic.	0.38	Omaha (pipe)	0.77
New York, export.	0.285	Denver	1.35
Boston, domestic	0.405	Denver (wire products)	1.415
Boston, export	0.285	Pacific Coast	1.665
Buffalo	0.295	Pacific Coast, ship plates	1.335
Cleveland	0.24	Birmingham	0.765
Detroit	0.325	Jacksonville, all rail.	0.555
Cincinnati	0.325	Jacksonville, rail and water	0.46
Indianapolis	0.345	New Orleans	0.515
Chicago	0.38		
St. Louis	0.475		

The minimum carload to most of the foregoing points is 36,000 lb. To Denver the minimum loading is 40,000 lb., while to the Pacific Coast on all iron and steel products, except structural material, the minimum is 80,000 lb. On the latter item the rate applies to a minimum of 50,000 lb., and there is an extra charge of 9c. per 100 lb. on carloads of a minimum of 40,000 lb. On shipments of wrought iron and steel pipe to Kansas City, St. Paul, Omaha and Denver the minimum carload is 46,000 lb. On iron and steel items not noted above the rates vary somewhat and are given in detail in the regular railroad tariffs.

Rates from Atlantic Coast ports (i.e., New York, Philadelphia and Baltimore) to Pacific Coast ports of call on most steamship lines, via the Panama Canal, are as follows: Pig iron, 55c.; ship plates, 75c.; ingot and muck bars, structural steel, common wire products, including cut or wire nails, spikes and wire hoops, 75c.; sheets and tin plates, 60c. to 75c.; rods, wire rope, cable and strands, \$1; wire fencing, netting and stretcher, 75c.; pipe, not over 8 in. in diameter, 75c.; over 8 in. in diameter, 2 1/2c. per in. or fraction thereof additional. All prices per 100 lb. in carload lots, minimum 40,000 lb.

Structural Material

I-beams, 3 to 15 in.; channels, 3 to 15 in.; angles, 3 to 6 in., on one or both legs, 1/4 in. thick and over, and zeels, structural sizes, 1.35c. to 1.40c.

Sheared plates, 1/2 in. and heavier, tank quality, 1.35c. to 1.40c.

Wire Products

Wire nails, \$2.40 base per keg; galvanized, 1 in. and longer, including large-head barbed roofing nails, taking an advance over this price of \$1.25 and shorter than 1 in., \$1.75 bright Bessemer and basic wire, \$2.25 per 100 lb.; annealed fence wire, Nos. 6 to 9, \$2.25; galvanized wire, \$2.75; galvanized barbed wire, \$3.05; galvanized fence staples, \$3.05; painted barbed wire, \$2.55; polished fence staples, \$2.55; cement-coated nails, per count keg, \$1.90; these prices being subject to the usual advances for the smaller trade, all f.o.b. Pittsburgh, freight added to point of delivery, terms 60 days, net, less 2 per cent off for cash in 10 days. Discounts on woven-wire fencing are 70 1/2 per cent off list for carload lots, 69 1/2 per cent for 1000-rod lots, and 68 1/2 per cent for small lots, f.o.b. Pittsburgh.

Bolts and Nuts

Machine bolts, small, rolled threads, 70, 10 and 30 per cent off list
Machine bolts, small, cut threads, 70 and 10 per cent off list
Machine bolts, larger and longer, 70 and 10 per cent off list
Carriage bolts, 1/2 in. x 6 in.:
Smaller and shorter rolled threads, 70 and 10 per cent off list
Cut threads, 70 per cent off list
Longer and larger sizes, 70 per cent off list
Lag bolts, 70, 10 and 5 per cent off list
Flaw bolts, Nos. 1, 2 and 3 heads, 60 and 10 per cent extra
Other style heads, 20 per cent extra
Machine bolts, c.p.c. and t. nuts, 1/2 in. x 4 in.:
Smaller and shorter, 65, 10 and 5 per cent off list
Larger and longer sizes, 65 and 10 per cent off list
Hot pressed sq. or hex. blank nuts, \$5.50 off list
Hot pressed nuts, tapped, \$5.25 off list
C.p.c. and t. sq. or hex. blank nuts, \$5.25 off list
C.p.c. and t. sq. or hex. blank nuts, tapped, \$5.00 off list
Semi-finished hex. nuts:
1/2 in. to 9/16 in. inclusive, 80, 10, 10 and 10 per cent off list
Small sizes S. A. E., 80 and 10 per cent off list
1/2 in. to 1 in. inclusive, U. S. S. and S. A. E., 70, 10, 10 and 10 per cent off list
Stove bolts in packages, 80 and 3 tens and 5 per cent off list
Stove bolts in bulk, 80, 3 tens and 2 1/2 per cent off list
Tire bolts, 70, 10 and 5 per cent off list
Track bolts, carloads, 3c. to 3.25c. base
Track bolts, less than carloads, 4c. to 4.25c.

Upset and Hex. Head Cap Screws

1/2 in. and under, 80 and 10 to 80, 10 and 10 per cent off list
9/16 in. to 1 in., 80 and 10 to 80, 10 and 10 per cent off list

Upset Set Screws

1/2 in. and under, 80, 10 and 5 to 85 per cent off list
9/16 in. to 1 in., 80, 10 and 5 to 85 per cent off list

Milled Square and Hex. Cap Screws

All sizes, 75 and 10 to 80 per cent off list

Milled Set Screws

All sizes, 70, 10 and 10 per cent off list

Rivets

Large structural and ship rivets, \$2.10
Large boiler rivets, 2.20
Small rivets, 75 and 10 off list

Wire Rods

No. 5 common basic or Bessemer rods to domestic consumers, \$36; chain rods, \$36; screw stock rods, \$41; rivet and bolt rods and other rods of that character, \$36; high carbon rods, \$43 to \$16, depending on carbons.

Railroad Spikes and Track Bolts

Railroad spikes, 2 1/2 in. and larger, \$2 to \$2.10 base per 100 lb. in lots of 200 kegs of 200 lb. each or more; spikes, 1 1/2 in., 3/4 in. and 7/16 in., \$2.15 to \$2.25 base; 5/16 in., \$2.15 to \$2.25 base. Bolt and large spikes, \$2.15 to \$2.25 base per 100 lb. in carload lots of 200 kegs or more f.o.b. Pittsburgh. Track bolts, 3c. base per 100 lb. The plates, \$2 per 100 lb. Angle bars, \$2.10 per 100 lb.

Terne Plates

Prices of terne plates are as follows: 8-lb. coating, 200 lb., \$9.30 per package, 8 lb. coating, 1 C., \$9.60; 15-lb. coating, 1 C., \$11.80; 20-lb. coating, 1 C., \$13; 25-lb. coating, 1 C., \$11.25; 30-lb. coating, 1 C., \$15.25; 35-lb. coating, 1 C., \$16.25; 40-lb. coating, 1 C., \$17.25 per package, all f.o.b. Pittsburgh, freight added to point of delivery.

Iron and Steel Bars

Steel bars, 1.35c. to 1.40c. from mill. Refined bar iron, 2c. to 2.10c.

Welded Pipe

The following discounts are to jobbers for carload lots on the Pittsburgh basing card:

Steel			Iron		
Inches	Black	Galv.	Inches	Black	Galv.
1/4	51 1/2	28	1 1/4	39 1/2	25 1/2
3/8	60	32 1/2	1 1/2	42 1/2	29 1/2
1/2	65	50 1/2	3 1/4	42 1/2	27 1/2
5/8	69	56 1/2	1 to 1 1/2	44 1/2	29 1/2
1 to 3	71	58 1/2			
Lap Weld			Lap Weld		
2 1/2	64	51 1/2	2 1/2	39 1/2	25 1/2
2 1/2 to 6	68	55 1/2	2 1/2 to 6	42 1/2	29 1/2
7 to 8	65	51 1/2	7 to 12	40 1/2	27 1/2
9 to 12	64	50 1/2			
Butt Weld, extra strong, plain ends			Butt Weld, extra strong, plain ends		
1/4	50 1/2	33	1 1/4	4 1/2	37 1/2
3/8	56	38 1/2	1 1/2	35 1/2	23 1/2
1/2	62	50 1/2	3 1/4	42 1/2	28 1/2
5/8	67	55 1/2	1 to 1 1/2	44 1/2	30 1/2
1 to 1 1/2	69	57 1/2			
2 to 3	70	58 1/2			
Lap Weld, extra strong, plain ends			Lap Weld, extra strong, plain ends		
2 1/2	62	50 1/2	2 1/2	40 1/2	27 1/2
2 1/2 to 4	66	54 1/2	2 1/2 to 4	43 1/2	31 1/2
1 1/2 to 6	65	53 1/2	4 1/2 to 6	42 1/2	30 1/2
7 to 8	61	47 1/2	7 to 8	35 1/2	23 1/2
9 to 12	55	41 1/2	9 to 12	30 1/2	18 1/2

To the large jobbing trade the above discounts are increased by one point, with supplementary discounts of 5 and 2 1/2 per cent.

Boiler Tubes

The following are the discounts for carload lots f.o.b. Pittsburgh:

Lap Welded Steel		Charcoal Iron	
1 1/4 in.	26 1/2	1 1/4 in.	5
2 to 2 1/4 in.	41	1 1/4 to 1 3/4 in.	15
2 1/4 to 3 in.	52	2 to 2 1/4 in.	25
3 1/4 to 13 in.	57	2 1/4 to 3 in.	30
		3 1/4 to 4 1/2 in.	32

To large buyers of steel tubes, a supplementary discount of 5 per cent is allowed.

Standard Commercial Seamless Boiler Tubes

New discounts have been adopted on standard commercial seamless boiler tubes, but manufacturers are not yet ready to announce them for publication, and for that reason we publish no discounts this week.

Sheets

Prices for mill shipments on sheets of standard gage in carloads, f.o.b. Pittsburgh, follow:

Blue Annealed		Blue Annealed	
Cents per Lb.		Cents per Lb.	
No. 8 and heavier	2.20	Nos. 11 and 12	2.30
Nos. 9 and 10 (base)	2.25	Nos. 13 and 14	2.35
		Nos. 15 and 16	2.45
Box Annealed, One Pass Cold Rolled		Box Annealed, One Pass Cold Rolled	
Cents per Lb.		Cents per Lb.	
Nos. 17 to 21	2.80	No. 28 (base)	3.00
Nos. 22 to 24	2.85	No. 29	3.10
Nos. 25 and 26	2.90	No. 30	3.20
No. 27	2.95		
Galvanized		Galvanized	
Cents per Lb.		Cents per Lb.	
Nos. 10 and 11	3.00	Nos. 25 and 26	3.70
Nos. 12 to 14	3.10	No. 27	3.85
Nos. 15 and 16	3.25	No. 28 (base)	4.00
Nos. 17 to 21	3.40	No. 29	4.25
Nos. 22 to 24	3.55	No. 30	4.50
Tin-Mill Black Plate		Tin-Mill Black Plate	
Cents per Lb.		Cents per Lb.	
Nos. 15 and 16	2.80	No. 28 (base)	3.00
Nos. 17 to 21	2.85	No. 29	3.05
Nos. 22 to 24	2.90	No. 30	3.05
Nos. 25 to 27	2.95	Nos. 30 1/2 and 31	3.10

WASTE IN FOUNDRIES

Concrete Illustrations Given in Meeting of Newark Foundrymen's Association

That waste in industry is not something abstract, something for somebody else to act upon, was brought out strongly by C. E. Knoepfel, C. E. Knoepfel & Co., New York, in addressing the Feb. 25 meeting and dinner of the Newark Foundrymen's Association, at the Downtown Club, Newark, N. J. The subject of Mr. Knoepfel's address was "Some Foundry Overhead Problems under Present Conditions." In pointing out the great necessity for savings in overhead to-day, to offset in some measure lower selling prices and inroads of foreign competition, he stated that the problem of waste was entirely relative in its importance to industry. If all foundries and all manufacturers in the United States were operating at a 20 per cent waste and this 20 per cent of waste were also true of producers the world over, there would be no great necessity for considering waste as a great economic factor. But the relative performances of plants, industries and nations show something different in waste.

Business in this country does not know the facts of industry, past trends and future possibilities. Savings are possible in manufacture, and Mr. Knoepfel related the example of a manufacturer of pumps in the West, who, after performing a surgical operation on his pump, discovered that by thinning one metal part he saved \$80,000 a year in production costs. Consideration must be given to economics, budgeting and sales analysis. Mr. Knoepfel's speech was based upon twelve business axioms that he points out are essential to any line of industry. These are:

1. Greatest volume of business goes to that concern whose prices reflect the normal operating conditions.
2. Those who purchase goods should pay most for that which costs most to produce.
3. Productivity (relative amount produced) is, in the last analysis, the gauge of real economy in manufacturing.
4. The real investment in a plant, in goods produced, is the hours and minutes spent on them by machines and men (from president to office boy).
5. The best insurance against loss in producing goods is advance knowledge of likely happenings.
6. That concern is best protected against uncertainties in

commercial competition which is most closely in touch with all current conditions.

7. The only protection against unintelligent competition in industry is to insure that all factors are considered in setting prices.
8. No division of a business should be served at the expense or to the exclusion of other important divisions.
9. Averages should be ignored, as they mean that some items are less and others more.
10. Profits should be divided so that operating efficiency may be considered separately from sales and buying efficiency.
11. The concern which is best posted as to cost of idleness of men and machines and cost of rejections is in the best position to reduce industrial wastes.
12. Consumers and not producers are those benefited by uneconomic methods of costing and pricing.

All these axioms have a bearing on overhead, price and efficiency of operation, said Mr. Knoepfel, who explained each axiom by quoting actual occurrences in various plants of his experience.

Following the address H. M. Lane, H. M. Lane Co., industrial engineer, Detroit, gave a brief impromptu talk, in which he related several experiences in foundries where he eliminated some of the waste of material, time and other items, assisting in placing production upon a more efficient basis. One of the greatest wastes in foundries, said Mr. Lane, is walking too far in carrying through a process. In one foundry of his experience, after a few time studies he found that twelve men carrying trays of cores were doing the daily equivalent in mileage of one man carrying a tray of cores 14 miles into the country and returning with another tray. By rearranging some of the floor space, he reduced this walking to the equivalent of one man walking four miles into the country and back with the result that in this particular instance the foundry was able to reduce the number of men engaged in this work.

Another instance of reduction of costs by rearrangement was related by Mr. Lane, who told of a core room in which 44 girls were working. By rearranging the benches, tables and racks, which were in the center of the room, production was increased with a force reduced to 23 girls.

The meeting was presided over by J. L. Carter, Barlow Foundry Co., Newark, N. J. The Quigley Furnace Specialties Co., New York, was elected to membership in the association and a resolution opposing the Federal bonus bill, excepting as it includes all possible aid to the wounded and disabled, was passed.

HOG ISLAND SURPLUS

Steel Disposed of by United States Shipping Board in One Lot

WASHINGTON, Feb. 28.—Disposal of 93,754.5 gross tons of surplus steel at Hog Island, Pa., was made to De Neal Samuel, of Washington, as a member of the firm of M. Samuel & Sons, 1746 Woolworth Building, New York, at \$9.37 per ton, a total of \$887,479.67. M. Samuel & Sons have scrap yards at Brooklyn, Bridgeport, Conn., and Greenville, N. J.

The material was auctioned off last Tuesday through Edward P. Farley, vice-president of the United States Shipping Board Emergency Fleet Corporation. All of the material, according to the terms of the contract, must be removed from Hog Island by Dec. 31, 1922. Because of this the Shipping Board was unable to accept an alternate bid of the Bridgeport Iron & Metal Co., offering \$9.50 per gross ton, provided the board would give the company 18 months from the date of signing the contract in which to remove the material. It is the plan of the board to dispose of all of its Hog Island real estate and other property there as early as possible.

On Tuesday, March 7, at 11 A. M., the equipment and fixtures of the Pennsylvania Pressed Steel Corporation, alleged bankrupt, will be offered for sale by order of David L. Ullman, receiver, Philadelphia.

Coke Production Increases

UNIONTOWN, PA., Feb. 27.—Four hundred and fifty ovens were added Saturday to the active list of the H. C. Frick Coke Co., bringing the coke output of the company up to approximately 30 per cent. The week just passed has witnessed a slight further increase in coke production with a stiffening in price, although no increase of a considerable nature has been manifested. A shortage in foundry coke has developed.

Increased furnace activity is taken by observers as the reason for the increased production in coke. Most observers say that the threatened strike in union coal fields is not having an effect on increased coke output. Purchases during the past fortnight have been for immediate consumption. Quotations are \$3.25 to \$3.60 for furnace coke, with a sale or two reported at \$4.

Technologic paper of the Bureau of Standards, No. 206, discusses the "Effect of Heat Treatment on the Mechanical Properties of One Per Cent Carbon Steel." The effects of varying time-temperature relations in heat treatment on tensile impact properties, hardness and structure of 1 per cent carbon steel have been studied, including (a) effect of temperature variations in hardening, (b) time at hardening temperatures both above A_{cm} and between the A_{c1} and A_{cm} transformations, (c) effects of tempering steel hardened in different ways and effects of "soaking" just under the lower critical range, (d) comparison of oil and water hardening for production of definite strengths.

NON-FERROUS METALS

The Week's Prices

Cents Per Pound for Early Delivery							
	Copper, New York		Straits	Lead		Zinc	
	Lake	Electro-lytic*	Tin New York	New York	St. Louis	New York	St. Louis
Feb.							
21.....	13.00	12.75	29.25	4.70	4.40	4.82 ½	4.47 ½
23.....	12.87 ½	12.62 ½	29.87 ½	4.70	4.40	4.85	4.50
24.....	12.87 ½	12.62 ½	29.75	4.70	4.40	4.85	4.50
25.....	12.75	12.50	.....	4.70	4.40	4.85	4.50
27.....	12.75	12.50	30.75	4.70	4.40	4.85	4.50
28.....	12.75	12.50	29.75	4.70	4.40	4.90	4.55

*Refinery quotation.

New York

NEW YORK, Feb. 28.

Conditions in the copper market are slightly better and demand is improving. The tin market is spasmodically active and prices are rising. The lead market continues active and firm. Inquiry has improved for zinc and prices are stiffening.

Copper.—While actual sales of electrolytic copper cannot be said to have expanded, inquiry is improving and some orders have been placed. There is an undercurrent of optimism and a feeling that the bottom of the market has been reached and that from now on improvement may be expected. This is not alone the opinion of sellers, but also that of some buyers. It is a fact, however, that most large consumers are still well provided for, but a buying movement will not come unexpectedly if it should appear within the next 30 days. Quotations vary with the seller and the quantity involved, and it is possible to buy small amounts of electrolytic at 12.75c., delivered, or 12.50c., refinery, but the majority of sellers who are participating in the market quote 12.87½c., delivered, or 12.62½c., refinery, which may be regarded as the general market, there being still some large producers who remain uninterested under 13c., delivered. Export demand has also improved in the last week and sales have been made at a range of 12.62½c. to 12.75c., f.a.s. New York.

Copper Averages.—The average price of Lake copper for the month of February, based on daily quotation in THE IRON AGE, was 13.19c. The average prices of electrolytic copper was 12.92c., refinery, or 13.17c., delivered.

Tin.—On each day of the last week the market was exceedingly quiet except on Feb. 21 when heavy sales were made of Straits tin, estimated to total at least 1000 tons, with both dealers and consumers participating. The heavy decline in London on the day before, referred to in this report last week, was further emphasized on Tuesday to the extent that prices appeared attractive. Sales in this market were so heavy that some sellers, particularly dealers, found it necessary to do business on the holiday, Feb. 22, to cover sales made the day before, and several hundred tons were dealt in. There has been no activity since then except a sale of two lots of 25 tons of March delivery on the New York Metal Exchange at 28.75c. and 29c. respectively. One cause of the inactivity was the disappointment of the response of the London market to the heavy buying here, referred to. Yesterday and to-day the market was dull, but prices since last week have gradually advanced, due largely to the strength in sterling, until spot Straits to-day was quoted at 29.75c., New York. The London market to-day was about £5 per ton above the low point reached Feb. 21, with spot standard quoted at £145, future standard at £146 15s. and spot Straits at £147 5s. Arrivals thus far this month have been 3270 tons, with 7450 tons reported afloat.

Lead.—The eminently healthy condition of the lead market where consumption fully balances production, continues a characteristic of this market and quotations are unchanged with the leading interest still doing business at 4.70c., New York and St. Louis, and inde-

pendents at 4.40c., St. Louis, or 4.70c. to 4.75c., New York and Eastern points.

Zinc.—A better feeling pervades the market which has remained inactive and stagnant for many weeks. Inquiry from consumers, particularly galvanizers, is not active and moderate sales have been made at prevailing quotations. The tendency of prices is to stiffen and it is doubtful whether prime Western for early delivery could be bought to-day for less than 4.55c., St. Louis, and there are those who are inclined to quote 4.60c., St. Louis. The rise in the pound sterling has also had its influence, so that there have been tentative proposals by British buyers on a 4.50c., St. Louis, basis, which might have resulted in sales had not the market here stiffened at this time. We quote prime Western for early delivery at 4.55c., St. Louis, or 4.90c., New York.

Antimony.—Quietness pervades the market and wholesale lots for early delivery are quoted at 4.35c., New York, duty paid.

Aluminum.—Wholesale lots of virgin metal, 98 to 99 per cent pure, are still quoted by the leading interest for early delivery at 19c. to 19.10c., f.o.b. plant, depending on the quantity, and the same grade is offered by importers at 17c. to 18c., New York, duty paid.

Old Metals.—Prices are a little lower and buying is only of the hand to mouth variety. Dealers' selling prices are as follows:

	Cents Per Lb.
Copper, heavy and crucible.....	12.50
Copper, heavy and wire.....	11.50
Copper, light and bottoms.....	9.00
Heavy machine composition.....	9.50
Brass, heavy.....	7.25
Brass, light.....	6.75
No. 1 red brass or composition turnings.....	8.00
No. 1 yellow red brass turnings.....	6.00
Lead, heavy.....	4.25
Lead, tea.....	3.25
Zinc.....	3.00

Chicago

FEB. 28.—The metals are quiet and prices are the same as last quoted. Tin receded one cent during the latter part of last week and some business came in on the decline, but the price has since recovered to its former level. Old metal prices also are unchanged. We quote in carload lots: Lake copper, 13.25c.; tin, 31c.; lead, 4.50c.; spelter, 4.55c. to 4.60c.; antimony, 6.50c., in less than carload lots. On old metals we quote: Copper wire, crucible shapes and copper clips, 9.50c.; copper bottoms, 7.50c.; red brass, 7.50c.; yellow brass, 6c.; lead pipe, 3.25c.; zinc, 2c.; pewter, No. 1, 22c.; tin foil, 23c.; block tin, 25c.; all buying prices for less than carload lots.

St. Louis

Feb. 28.—Both lead and zinc are notably unchanged; we quote lead at 4.40c., carlots, and slab zinc at 4.50c. On old material we quote: light brass, 3.50c.; heavy red brass, 7c.; light copper, 7c.; heavy yellow brass, 4c.; heavy copper and copper wire, 7.50c.; pewter, 15c.; tin foil, 16c.; tea lead, 2c.; aluminum, 9c.

Nitrogen in Oxyacetylene Weld Metal

Analyses for nitrogen in oxyacetylene weld metal have been completed by the Bureau of Standards on samples which are representative of two types of fracture, crystalline and fibrous. On the basis of combined nitrogen, there seems to be no distinction between the crystalline and fibrous weld metal. The limits of combined nitrogen found were approximately one-sixth the limiting values for nitrogen in electric arc deposited metal, that is, 0.015 to 0.027 per cent nitrogen in oxyacetylene welds, as compared with 0.10 to 0.15 per cent in the arc weld.

A list of 500 or more trade directories is to be published by the Special Libraries Association, 1731 H Street, N. W., Washington. It is said that this is the first time such a list has been compiled and is an answer to demands for trade directories of a specific kind for pursuing sales campaigns and the like.

PERSONAL

Henry Harnischfeger started Jan. 28 on a combined business and pleasure trip around the world. Mr. Harnischfeger is one of the founders and president of Pawling & Harnischfeger Co., Milwaukee, Wis. He expects to go to Japan, the Philippines, China, Burma, Ceylon, India, up through Suez to Naples and Europe. He will visit the various foreign branch offices of the Associated Machinery Corporation, of which Mr. Harnischfeger is also president, with a view to looking over general business conditions and possibilities in the far East and also to determine upon the opening up of new offices. Mr. Harnischfeger will transact business at Kobe, Japan; Hongkong, China; Singapore, Rangoon and Bombay. He is accompanied by Mrs. Harnischfeger.

The resignation of Charles F. Smith, chairman of the board of directors New Britain Machine Co., New Britain, Conn., automatic screw machines, etc., has been accepted. Mr. Smith has been in poor health for some time.

Charles Glover, vice-president American Hardware Corporation, New Britain, Conn., has resigned and has been succeeded by George T. Kimball. Albert N. Abbee, purchasing agent, takes Mr. Kimball's place as secretary. Mr. Glover has been in ill health for some time. He was connected with the corporation or its components for forty years. He was made vice-president in 1917.

Harry Brearley, Brown Bayley's Steel Works, Ltd., Sheffield, England, sailed for home last Saturday after spending some time in this country on business.

Prof. William G. Fearnside, Sheffield University, Sheffield, England, who has been in the United States and Alaska since last August, returned last week.

J. Harvey Williams, president J. H. Williams & Co., Brooklyn, has been elected president of the American Drop Forging Institute and re-elected president of the Brooklyn Chamber of Commerce.

Clifford Egan has been elected president of the J. A. Fay & Egan Co., Cincinnati, succeeding his father, the late Thomas P. Egan. Si P. Egan and Fred T. Egan were elected vice-presidents; W. M. Green, secretary; A. A. Faber, treasurer, and R. W. Egan, general manager.

At the annual meeting of the stockholders of the Seneca Falls Mfg. Co., Inc., held at Seneca Falls, N. Y., on Feb. 15, Ogden R. Adams was re-elected president and general manager for the coming year. An entirely new board of directors was also elected.

John McConnell, formerly superintendent of the United Steel Co., Canton, Ohio, now the United Alloy Steel Corporation, having been affiliated with that company 11 years, has returned to the Canton corporation as its vice-president in charge of operation. For some time he has been vice-president of the Interstate Iron & Steel Co., Chicago.

Robert D. Carroll, Bucyrus, Ohio, has been elected a director of the Fairbanks Steam Shovel Co., Marion, Ohio.

Ross E. Willis, formerly sales engineer of the Lake-wood Engineering Co., Cleveland, in the southern Michigan territory, has become affiliated with Wm. F. V. Newmann & Sons, Detroit, representing the Baker, R. & L. Co. line of industrial tractors, trucks and cranes in the Detroit territory.

Phillip J. McKenna, representative of the Bridgeport, Conn., works of the Crane Co., manufacturer of valves, pipe fittings, plumbing supplies and goods, recently left Bridgeport for a business trip into Mexico.

Peter F. Augenbraun, recently appointed manager of the new plant of the Yale & Towne Mfg. Co., Stamford, Conn., in Germany, left New York for Germany, Feb. 4. He was tendered a farewell dinner at the home plant in Stamford, and was presented a handsome suitcase and a brief case, J. A. Horne, vice-president of

the company, being toastmaster. Mr. Augenbraun has been with the Yale & Towne company for 30 years.

The Gilbert & Barker Mfg. Co., Springfield, Mass., recently announced the following additions to the personnel at the plant in Springfield: George W. Atkinson has been chosen superintendent of the maintenance department. Mr. Atkinson was formerly with the U. S. Government, being electrical and consulting engineer at the Springfield, Mass., Armory. Edward W. Beckman, appointed superintendent of the foundry division. Mr. Beckman came from the Kewanee, Ill., plant of the Walworth Mfg. Co., tool manufacturer, where he was foundries superintendent. He was also with the Dodge Mfg. Co., Mishawaka, Ind., for a time. William J. Smith, formerly with the McNab & Harlin Co., has been selected as assistant superintendent of the foundry department.

Joseph H. Roberts, Midvale Steel & Ordnance Co., Nicetown Works, has resigned to become assistant to the president Electric Alloy Steel Co., Youngstown, Ohio.

Edwin S. Webster, president and director Stone & Webster, Boston, and George O. Muhlfeld, vice-president, are in Japan, looking over large engineering works.

James L. Richards, president Massachusetts Gas Co., which owns the New England Coal & Coke Co., Boston, is in Belleair, Fla., recuperating from a serious operation.

Richard W. Maher, sales representative Boston office, Rogers, Brown & Co., pig iron, has been transferred to that company's Buffalo office. Mr. Maher was associated with the Boston office for approximately 10 years, and one of the best known pig iron representatives in the New England territory.

Paul B. Morgan was re-elected president of the Morgan Construction Co., Worcester, Mass., at the annual meeting held last week. The other officers and directors were re-elected also.

Ralph M. Hamilton has resigned as general sales manager of the Jefferson Gas Coal Co. to become sales manager of the coal and coke department of the Iron Trade Products Co., Pittsburgh. In earlier years, Mr. Hamilton was with the Hillman Coal & Coke Co. and the Lackawanna Steel Co.

Oswald Fowler, Rogers Brown & Co., New York, has returned from an extended trip to Norway, Sweden and England. He went abroad to investigate the aluminum business. He found conditions abroad very much depressed with little prospect of early recovery due largely to the demoralized finances of most of the European countries.

Charles M. Schwab, president of the Bethlehem Steel Co., is scheduled to address the annual banquet Friday evening, March 3, of the Chamber of Commerce of Youngstown, Ohio.

Technologic Paper of the Bureau of Standards, No. 203, entitled, "The Influence of Phosphorus Upon the Microstructure and Hardness of Low Carbon Open-Hearth Steels," states that, in this investigation, no clear relationship could be established between the phosphorus content, varying within the range of 0.008 to 0.115 per cent which marks the usual limits in plain carbon steels, and the microstructure and hardness as developed in two series of specimens, one of basic and the other of acid open-hearth steel, by a series of different heat treatments because of the marked irregularity in the distribution and grain size of the ferrite and pearlite grains found present in many of the specimens. This irregularity was traced to the non-uniform distribution of the phosphorus. A cellular-like structure formed in conjunction with the microstructure normal to these steels was studied and the relationship between this unusual structure and the distribution of phosphorus was established.

R. L. White has been appointed district manager in charge of Detroit office, 309 Kresge Building, Detroit, of the Wilson Welder & Metals Co., Inc., New York, maker of arc welding machines and welding metals.

OBITUARY

WILLIAM C. GRAVES, aged 45, president Graves Machinery Exchange, 50 Church Street, New York, died suddenly at the Richmond Hotel, Richmond, Va., Feb. 27. Mr. Graves, whose home is at Manhattan Beach, L. I., was on his way to his winter home at Miami, Fla. He was born in Louisville, Ky., where he first became interested in the machinery business through operating a small bicycle repair shop in that city. He was for several years a salesman with the Wicks Machinery Co., Jersey City, N. J., leaving that connection to establish the New York Machinery Exchange with L. Bertollette of the Bertollette Machine Tool Co., Jersey City, N. J. Later, when Mr. Bertollette withdrew from the company, Mr. Graves changed the name to the Co-operative Machinery Exchange, becoming associated with C. W. Pritchard and George Bennett. About 1916, when the latter withdrew from the company, Mr. Graves again changed the name. This time to the Graves Machinery Exchange, under which name it now operates.

MORRIS THOMAS, purchasing agent National Enameling & Stamping Co., died Feb. 16 at his home in Milwaukee, aged 51 years. He was connected with the company in various capacities for more than 33 years.

REINHARD MANNESMANN, Berlin, Germany, manufacturer of seamless steel tubing, died in Berlin Feb. 22.

Possible Youngstown Merger

YOUNGSTOWN, Feb. 27.—Possibilities of a merger of independent steel interests in the Mahoning Valley, in event current consolidation negotiations involving scattered plants fail, are being appraised. Principal independents in the Valley district are the Youngstown Sheet & Tube Co., Republic Iron & Steel Co., Brier Hill Steel Co., Trumbull Steel Co. and the Sharon Steel Hoop Co. Of these, the first three have been most prominently mentioned in connection with merger reports.

It is contended that with the Valley interests merged into one corporation, they would be in better position to bring pressure to bear on problems confronting the district. Furthermore, there appears to be a growing disposition that an amalgamation of concerns with plants in different sections may not materialize at this time.

Jeffrey Mfg. Co. Policies

The Jeffrey Mfg. Co., Columbus, Ohio, has made some changes in its sales plans. The company has established a direct action method in place of the old branch office system. The sales forces of the various departments are being condensed and consolidated under direct control of the home office at Columbus. The company also announces the expansion of its department of contract engineering to engage in more extensive and complete engineering projects than has been its policy heretofore, and the Middle States Construction Co. becomes an integral part of this department. The company also intends to still further extend its dealer-agency system, thereby assuring the widest distribution of Jeffrey standardized equipment. Important economies are expected to ensue as a result of the changes.

An exposition of plumbing apparatus and sanitary equipment for buildings is to be held in the General Motors Building, Detroit, in connection with the fortieth annual convention of the National Association of Master Plumbers. A bureau has been established for taking care of the details of the exposition under the business management of E. K. Durham at 484 Penobscot Building, Detroit.

Thermal Expansion of Nickel, Monel Metal, Stellite, Stainless Steel and Aluminum

The increasing use of nickel, Monel metal, stellite, stainless steel and aluminum for spark plugs, steam valves, automobiles and in household and surgical appliances has created a considerable demand for the accurate determination of the thermal expansion of these metals and alloys.

Scientific Paper No. 426 of the Bureau of Standards considers this subject fully. Ten samples of commercial nickel containing from 94 to 99 per cent nickel, five of which were heat rolled and five heat rolled and annealed; 10 samples of Monel metal, 60 to 69 per cent nickel, of which two samples were cast, three hot rolled, and the remaining of various compositions and treatments; five samples of stellite of different grades; two samples of stainless steel and two samples of 99.4 per cent aluminum were used in the work. The conclusions should prove of assistance to engineers using these metals in connection with varying temperatures.

Taylor Society to Meet in Philadelphia

A mid-winter meeting of the Taylor Society will be held at the City Club, Philadelphia, March 16, 17 and 18. The tentative program is as follows:

Thursday afternoon, March 16, "A Case of Sales Research," by John M. Holcombe, Jr., manager sales research division, Phoenix Mutual Life Insurance Co., Hartford, Conn. Thursday evening, "Problems of General Management," by Henry P. Kendall, manufacturer and banker, Boston.

Friday forenoon, "Super-Standards," by Dr. Frank B. and Dr. L. M. Gilbreth, Montclair, N. J. Friday afternoon, "Budget Control," by George E. Frazer, Frazer & Torbet, Chicago. Friday evening, "Mills, Minds and Men," by Arthur Pound, Flint, Mich., author of the articles, "The Iron Man," now appearing in the *Atlantic Monthly*.

Saturday forenoon, "String-Board Graphics," by Percy S. Brown, works manager, Corona Typewriter Co., Groton, N. Y. "The Work of the Balance of Materials Clerk," by Thomas W. Mitchell, Philadelphia.

New Iron Agency in Buffalo

Waldo, Egbert & McClain, Inc., Buffalo, recently chartered under State laws, will engage in a general agency and brokerage business in pig iron, steel, coke, fluorspar, etc. Offices have been opened at 744-46 Marine Trust Building. Fred J. Waldo, president, has been connected with Rogers, Brown & Co. for a number of years, recently resigning to form the new company; Justus Egbert, vice-president, was associated with the American Radiator Co. in different capacities for about 20 years, and at one time was identified with the company's plants in France and England; William J. McClain, secretary and treasurer, resigns from the position of district sales manager at Buffalo for the Republic Iron & Steel Co., to become connected with the new enterprise. He was associated with the Republic company for about 11 years, and previous to this spent four years with the United States Steel Corporation, located in the operating department at Youngstown, Ohio.

Presented a Community House

At a community celebration Thursday evening, Feb. 23, the Carnegie Steel Co. formally presented to the Village of McDonald, in Trumbull county, Ohio, a three-story pressed brick Community House building. It contains assembly rooms, reading, billiard, bowling and other recreational facilities. The building was formally accepted by James A. Freed, mayor of the village. McDonald was created by the Carnegie company for the employees at its McDonald bar mills. The company recently completed the erection of 172 dwellings of modern type, which are sold or rented to employees, as desired. Workers are offered an attractive deferred payment arrangement in case of purchase, and many have taken advantage of this plan. McDonald is located five miles west of Youngstown.

VEHICULAR TUNNEL CONTRACT

Reported That Bethlehem Steel Co. and Davies & Thomas Co. Will Be Awarded Castings

Although the contract for the construction of the New York-New Jersey vehicular tunnel has not yet been formally awarded to the low bidder, Booth & Flinn, Inc., New York and Pittsburgh, it is expected that the papers will be signed within two or three weeks. The delay has been caused by the refusal of the Erie Railroad to vacate certain streets in Jersey City, though the city government has posted notices that these streets will be closed. As yet no legal action has been taken.

Despite this delay, Booth & Flinn, Inc., is understood to have virtually completed arrangements for cast iron and steel segments, fabricated steel and bolts, nuts and washers required in the tunnel work. THE IRON AGE is reliably informed that the Bethlehem Steel Co. will cast 60 per cent of the 105,000 tons of cast iron

segments and all of the steel castings, about 2600 tons, and will also fabricate about 10,000 tons of structural steel required in the work. The remaining 40 per cent of the cast iron segments, THE IRON AGE is informed, will be cast and machined by the Davies & Thomas Co., Catasauqua, Pa., which did similar work for the Hudson tubes.

The Bethlehem Steel Co. will, of course, furnish its own pig iron, while it is expected that the pig iron supply for the work to be done by the Davies & Thomas Co. will come from the furnaces of the Empire Iron & Steel Co., Catasauqua, Pa., Leonard Peckitt being president of both companies. According to original estimates about 75,000 tons of pig iron, the remainder scrap, will be required for the castings.

It is further intimated that a large part of the bolts, nuts and washers for the tunnel will also go to the Bethlehem Steel Co., though it is reported that a Pittsburgh company is slated to receive a part of this business. The specifications provide for approximately 1,000,000 nickel steel bolts, the same number of nickel steel nuts and about 2,000,000 washers.

BROADER BUYING

Activity at Youngstown Not Great Enough to Cause Marking Up of Prices

YOUNGSTOWN, Feb. 28.—While lighter steel products are benefiting from current buying, there is a tendency to over-emphasize the movement. Without exception Valley steel makers report that incoming tonnage is on a broader basis, but it still lacks sustaining influence. In finished directions, tin plate makers are in the best operating position. The Trumbull Steel Co., for instance, which ranks as the third largest independent tin-plate interest in the country, has a backlog of unfilled orders which will engage its capacity through March at a rate close to normal.

Buying of strip steel is likewise on a larger scale and production schedules have been accelerated. The principal district interest claims to be holding to a base of 2c. on hot-rolled, though reports of concessions in this market are frequent.

Valley producers believe that in the immediate future any price changes will be in the way of firming current levels and eliminating concessions, rather than actual advances in the nominal market.

In most finished lines buyers are still booking tonnage with considerable caution, deterred by the uncertainties surrounding the whole price structure.

The Ford Motor Co. has come into the market for larger requirements against an increased production schedule in March. Sheets are likewise moving to subsidiaries in the General Motors group, the Dodge Bros., Studebaker and the Fisher Body Corporation, among others. Makers not catering to the auto trade similarly report more activity from other sources. The Republic Iron & Steel Co., for instance, now has eight of 18 sheet mills at its Niles works engaged, as compared with four during the first weeks of February.

Fair Orders for Refractories

PITTSBURGH, Feb. 27.—Business in refractories is feeling quite fully the betterment in blast furnace and steel plant operations. While there is yet no disposition on the part of the iron and steel makers to anticipate their requirements, their needs are increasing and the past few weeks have been marked by fairly numerous, if individually small, orders. The business is well distributed among the different kinds, but relatively is better in silica and magnesite than in fire clay or chrome. Quotations are unchanged, but observance of published prices is not 100 per cent. Less than \$53 Baltimore, has been done on magnesite brick, and some concessions are appearing also in fire clay and silica.

Chrome brick are not readily sold at more than \$40 per net ton works.

We quote per 1000, f.o.b. works:			
Fire Clay		High Duty	Moderate Duty
Pennsylvania	.....	\$32.00 to \$35.00	\$30.00 to \$32.00
Ohio	.....	30.00 to 35.00	28.00 to 30.00
Kentucky	.....	32.00 to 35.00	30.00 to 32.00
Illinois	.....	32.00 to 35.00	30.00 to 32.00
Missouri	.....	32.00 to 35.00	28.00 to 32.00
Silica Brick			
Pennsylvania	.....		30.00
Chicago	.....	35.00 to	37.00
Birmingham	.....		40.00
Magnesite Brick			
Standard size per net ton (f.o.b. Baltimore)			53.00
Chrome Brick			
Standard size, per net ton.....		40.00 to	42.00

Ohio Foundry Operations

The trade report of the Ohio State Foundrymen's Association for the month of January shows that the actual melt of 78 foundries reporting was 23 per cent of normal. Figures for the month showed that foundries in operation had received 2715 tons of pig iron and 776 tons of scrap. The actual melt of pig iron and scrap during the month was 6929 tons, and the stock of pig iron reported on foundry yards, as of Feb. 1, was 23,595 tons and scrap 5704 tons. Samuel Powell, Jr., secretary of the association, in the January bulletin, urges the members to send in their complete reports.

The annual meeting of the Ohio State Foundrymen's Association will be held at the Hotel Deshler, Columbus, Ohio, on March 31. The election of five new members of the board of administration and the officers for the ensuing year will take place at this meeting. In addition to the regular business program, the subject of uniform foundry practice will be presented to the association by the committee that has this matter in hand.

Contracting all the maintenance of way and maintenance of equipment work on the Ohio Region of the Erie Railroad has been completed, it is announced from the Youngstown, Ohio, offices of the regional manager. The Meadville Machinery Co., Inc., Meadville, Pa., has been awarded a contract to operate the Meadville car yards, roundhouse and repair shop, the Cleveland roundhouse and repair shop and the Galion shops. This interest has also taken over, effective March 1, all other repair work in the region not covered in previous contracts.

The Williamson & Lawrence Sand Co., Springfield, Mass., has been incorporated with Robert E. Lawson, president, and Harley F. Williamson, treasurer. The company owns 135 acres of silica sand at Provincetown, Mass., suitable for molding and for glass manufacture, and expects to begin operations on or about March 20.

Mining and Metallurgical Engineers

Continued from page 587)

New Jersey Zinc Co., Franklin, N. J., as the chairman. This meeting was a further step in the movement started a year ago when the first assemblage on this subject came together at the February meeting of the institute. This was described in THE IRON AGE, Feb. 24, 1921.

The session this year was an assemblage of the advisory board, created in the past year by the appointment of representatives of the various technical and engineering societies and consisting of the following appointees:

American Iron and Steel Institute: no one yet appointed; American Society of Civil Engineers: T. R. Lawson, Rensselaer Polytechnic Institute, Troy, N. Y.; American Society of Mechanical Engineers: George T. Cousins, manager mining and drill department Ingersoll-Rand Co., New York; American Society for Steel Treating: H. S. Brinard, metallurgist Ingersoll-Rand Co., Phillipsburg, N. J.; American Society for Testing Materials: Dr. J. A. Mathews, president Crucible Steel Co. of America, New York; Associated General Contractors of America: George H. Clark, chief engineer Holbrook, Cabot, Rollins Corporation, New York; American Institute of Mining and Metallurgical Engineers: B. F. Tillson, assistant superintendent New Jersey Zinc Co., Franklin, N. J.; N. B. Braley, superintendent North Butte Mining Co., Butte, Mont., and Prof. H. M. Boylston, Case School of Applied Science, Cleveland; American Welding Society, represented by the American Bureau of Welding: C. J. Holslag, chief engineer Electric Arc Cutting & Welding Co., Newark, N. J., and Walcott Remington, chief engineer Thompson Electric Welding Co., Lynn, Mass.; Engineering Foundation: Prof. H. M. Boylston, Case School of Applied Science, Cleveland; National Research Council: Bradley Stoughton, 1107 Broadway, New York; Tool Steel Society: no one yet appointed; American Petroleum Institute: Van H. Manning, director of research American Petroleum Institute, 15 West Forty-fourth Street, New York.

All the members of this board were present, with one or two exceptions.

At this meeting the following report, outlining the proposed scope of the research investigation, was submitted by the Bureau of Standards and the Bureau of Mines:

1. A survey, under the direction of the Bureau of Mines, of the present status of the work.
2. Study of drill steels that give the greatest service before failure by breakage:

(a) nature of sections; (b) microstructure; (c) composition; (d) methods of manufacture; (e) heat treatment.

We recommend that this problem be assigned to the Bureau of Mines.

3. Testing of steel for determining:

(a) service qualities; (b) development of methods for recording service.

We recommend that this problem be assigned to the committee on field tests and shop practice, of which F. W. Denton is chairman.

4. Mechanics of failure:

(a) microanalysis; (b) nature of stresses, (c) detection of incipient failure: (1) magnetic analysis, (2) other methods not destructive of bar steel; (d) is failure due to fatigue of metal?

We recommend that this problem be assigned to the Bureau of Standards.

5. Methods and machine development for accelerated tests: (a) nature of forces involved: (1) impact; (2) vibratory compressional waves; (3) combined bending, vibratory, shearing and torsional.

We recommend that this problem be assigned to the committee on machine development for accelerated tests, of which W. H. Leonard is chairman.

6. Correlation of field tests with accelerated laboratory tests. We recommend that this problem be assigned to the chairman of the committees in charge of subjects Nos. 3 and 5, co-operating with representatives of the Bureau of Mines and the Bureau of Standards.

7. Special studies relating to the importance of heat treatment and use of steels best adapted to the drilling of oil and gas wells, and the application of acquired data on rock drills to such work, with special reference to conditions met with in the drilling of oil and gas wells.

We recommend that this problem be assigned to the Bureau of Mines.

8. Reclamation of depreciated drill steels:

(a) before failure; (b) after failure; (c) methods of

heating: (1) oil-fired furnaces, (2) electric furnaces: resistance (carbon or nichrome), induction (high-frequency or low-frequency), (3) ohmic resistance methods; (d) welding of fractured steel: (1) electric, (2) forge.

We recommend that this problem be assigned to the committee on the reclamation of depreciated drill steels, of which B. F. Tillson is chairman.

This report was adopted substantially as read after some discussion.

Non-Ferrous Sessions

The various meetings of the institute of metals division were presided over by W. H. Bassett, technical superintendent American Brass Co., Waterbury, Conn., and were some of the most profitable ever held by the institute.

A feature was a lecture on "Colloid Chemistry and Metallurgy" by Prof. Wilder D. Bancroft, Cornell University, delivered at a special session, Tuesday morning, Feb. 21, an abstract of which it is hoped may be published later in these columns.

Another feature was the presentation at the last session on Tuesday afternoon by Dr. Zay Jeffries, director of research, Aluminum Castings Co., Cleveland, of an abstract of his work on the "Slip Interference Theory of Hardening of Metals"—a theory which has attracted wide attention and whose importance is generally regarded as considerable. It applies to both steel and non-ferrous metals. Dr. Paul D. Merica, research engineer International Nickel Co., Bayonne, N. J., discussed Doctor Jeffries' theory, characterizing it as of paramount importance and agreeing with most of its phases with one or two exceptions.

Some interesting light on the process of sherardizing was thrown by a paper by Leon McCulloch, East Pittsburgh, Pa., entitled "Experiments with Standardizing." The author gives the composition of such coatings and discusses their life.

Election of Officers

At the annual election of officers, the following were selected:

Arthur S. Dwight, president.

J. V. W. Reynolders, vice-president and director.

Dr. A. R. Ledoux, vice-president and director.

Charles E. Rand, treasurer and director (re-elected).

New directors: William H. Bassett, Waterbury, Conn.; Thomas B. Stearns, Denver, Col.; William Kelly, Vulcan, Mich.

The new president is well known as a mining engineer, particularly for his connection with the Dwight-Lloyd sintering process for iron ore.

Walter H. Aldridge, New York, was made chairman of the finance committee; Doctor Ledoux, New York, chairman of the executive committee and Edward DeGolyer, New York, chairman of the membership committee.

The report of the membership committee showed that in 1921 there were 1251 new members placed in the roll, bringing the total to 10,206 after deducting 402 losses from various causes. At the end of 1920 the total membership was 9323. In finances, the deficit which prevailed at the end of 1920 has been wiped out and last year ended with "a creditable balance on hand."

The Banquet

The annual banquet, held on Wednesday evening at the Hotel Pennsylvania, was next to the largest ever held, with an attendance of about 650. The toastmaster was George Otis Smith, director U. S. Geological Survey, Washington, and the other two speakers were the outgoing president, Edwin Ludlow, and the new president, Arthur S. Dwight.

The plant of the Birmingham Steel Corporation, Birmingham, Ala., a Government works during the war period, has been purchased at a bankruptcy sale by the United States Shipping Board for \$7,000 and assumption of obligations totaling \$123,000. The plant specialized in the manufacture of structural shapes for shipbuilding, and is equipped for a capacity of about 3000 tons of fabricated steel per month.

Roberts Type of By-Product Coke Oven

(Continued from page 583)

the upper pass and the lower pass of the recuperator, due to the difference in the temperature of the waste gas in the two passes, does not interfere with the tension on the vertical joints in the recuperator, because with a temperature above 500 deg. Fahr. the coefficient of expansion in silica brick up to about 1200 deg. Fahr. is very small, compared to its expansion from atmospheric temperature up to 500 deg., or its rate of expansion above 1200 deg. Fahr. In other words, the operating temperatures of the recuperator are such that that part of the brick exposed to the lowest temperature comes in the flat part of the line in the expansion curve of silica brick, and will stand a variation of about 300 deg. without sufficient movement to affect the joints.

Our experience at Granite City since we started the plant has been such that we have operated at from 12 to 24 hr. coking time. In changing from one coking time to another we do not find that the overall efficiency of the recuperators for the recovery of heat is materially affected.

It is evident from our experience that the recuperative type of oven can be designed and built to give as good efficiencies as any other method of heat recovery. It will give longer satisfactory service without being affected by the wide swings that may come in operation.

The only question that may be involved in the relative value of a recuperator of this type as against the regenerator is the difference in cost. It is true that it costs more to install the recuperator than the regenerator, if brick only is considered, but in regarding it only from the angle of operation, and offsetting the higher brick cost by the elimination of reversing machines and valves, the relative cost is about the same.

One drawing shows graphically some heat effect curves as they refer to the Roberts coke oven wall. The curve *I* represents the ideal condition, where the heat would be transferred to the coal at an absolutely uniform rate throughout the entire height of the wall. The curve *M* represents the heat effect as it actually happens in the Roberts wall, and the curves *K* and *L* and *R* represent theoretical extremes to which the gases would go if they were not influenced by the conditions existing in the oven.

Theoretically, at the point of the primary gas introduction, the heat effect upon the coal would be according to curve *L*. Due, however, to the fact that 100 per cent of the air is introduced at this point, with only 50 per cent of the gas, and that the combustion starts in the mixing chamber, which is a flue-like structure, the flame temperature is tempered down to curve *K*, and the lower rate of heat transfer from the flue-like structure brings the heat effect line back to the curve *M*.

Below this point the baffle structure starts, and the rate of heat extraction is higher than above, due to the fact that more surface is exposed to the flame, so that the heat effect upon the coal is at a higher rate than would be indicated by the curves *K* or *L*. When getting to the point where the secondary gas is introduced, the curve *R* would be the natural effect for the introduction of this new gas, but it is being introduced in an atmosphere diluted by the products of combustion from the gas above, so that the rate of flame propagation is lower, and is taking place in a baffle wall structure where the rate of heat transference is high, so that the heat effect line as indicated by *M* is at a higher rate than the extremes indicated by curve *R*.

There is a marked decline, of course, in the temperature near the sole; but, due to the fact that the heat is transferred into the coal from three sides at that point, it is desirable to have this decline in temperature.

As the relative temperature of the upper zone compared to the lower is arbitrary, dependent upon the relative quantities of gas introduced at the two points, we consider that, so far as heat effect upon the coal is concerned, we have this well worked out, and high walls are no longer a problem. From a structural standpoint the design of a high wall, if designed in this

manner, is also solved, so that, if it is found desirable to build narrow coke oven chambers, and at the same time maintain the tonnage capacity of the oven, it can be done.

We have found that it is not necessary to have narrow coke oven chambers for the production of coke from the Illinois coal, as is very commonly supposed at present. The reason for advocating the narrow coke oven chamber for the many years that we have been carrying on experimental work is not due to this at all, but rather to the idea that greater economy can be obtained by narrow chambers and shorter coking time than by wide coke ovens and longer coking time.

We have demonstrated many times that the width of the oven has nothing to do with the ability to coke these high volatile, high oxygen coals. In fact, we can shut all of the heat off from one side of these ovens and coke the coal entirely from the opposite side, which would be equivalent to approximately a 28-in. oven.

It is our idea that better control can be obtained of the heat conditions throughout a long and high wall, if small quantities of gas are handled at any given point. The gas in the Roberts coke oven is introduced at 96 different points; that is, there are 48 primary orifices and 48 secondary orifices, one-half of which are on each wall. By admitting the gas in this manner it is always easy to inspect the points of inlet. By dealing with a small quantity at an individual point, there is less tendency to have wide variations in the heat effect from combustion.

Contrary to general belief, the velocities of the gases through the wall are slow, and at no point exceed 3.18 ft. per sec. When the gas adjustments are set for some given coking time, a uniform temperature can be obtained upon the wall throughout its entire height.

As stated above, the Granite City plant was designed to use Illinois and Indiana coals, and to operate the blast furnace upon the coke resulting from these coals. This we have successfully done, and the following operating data for January, 1922, will give an idea of what has been accomplished.

Average coking time.....	14 hr. 56 min.
Average charge of coal per oven.....	14.6 tons
Total coal per oven per day.....	23.9 tons
Average coke yield.....	67.21 per cent
Average coke breeze.....	3.7 per cent
Average tar yield per ton of coal.....	7.21 gal.
Average sulphate yield per ton of coal.....	28.7 lb.
Average total gas yield.....	10,248 cu. ft.
Average B.t.u. rich gas.....	593
Average B.t.u. fuel gas.....	517
Average fuel consumption.....	60 per cent
Average surplus gas.....	40 per cent
Average analysis of coal:	
Moisture.....	8.06 per cent
Volatile.....	34.61 per cent
Ash.....	9.35 per cent
Sulphur.....	1.38 per cent
Average analysis of resultant coke:	
Moisture.....	4.44 per cent
Volatile.....	2.47 per cent
Ash.....	13.06 per cent
Sulphur.....	1.13 per cent
Average weight per cu. ft.....	28 lb.
Shatter test on 2 in.....	51.52
Shatter test on 1 in.....	86.44
Shatter test on 3 in.....	13.12
Shatter test on 4 in.....	2.6
Porosity, wall average.....	55 per cent

It is interesting to note that the amount of breeze is only 3.7 per cent of the total coke produced, because when using such a large percentage of high volatile coal, it has always been assumed that the breeze losses would be out of proportion to the total coke produced.

From the above it is apparent that the quality of the coke is good, and some of the peculiarities of this type of coal show up. It is evident that it requires more heat to make coke from this coal than out of the coking coals. But the yield of coke is good, and its strength is best evidenced by its use in the blast furnace, the data of which will be given later.

There was nothing unusual during the month's run on the coke ovens. The most significant thing was the uniformity of the coke size and structure throughout the entire month. The coke during the month of January was made from 90 per cent Black Brier, Ill., coal and 10 per cent Pocahontas.

To determine the relative value of the coke in the blast furnace as compared to last month, starting on

Feb. 1, the plant was put on 100 per cent Illinois coal, consisting of 75 per cent Black Brier and 25 per cent Orient. The Black Brier mine is in Williamson County and the Orient property in Franklin County. So far this month, practically the same results have been obtained in furnace practice with the 100 per cent Illinois coke, the only difference being that the rich gas is running higher in heat value than last month and the tar yield is slightly higher.*

Based on this, there is great doubt in our minds as to whether the mixture of any low volatile coal with the Illinois coals will give better results in the blast furnace, and everything at the present time indicates that we will get as good furnace practice and as low coke consumption on the 100 per cent Illinois as with the mixed coals.

The following report by Chas. R. Holzworth, general superintendent St. Louis Coke & Chemical Co., on the operation of the blast furnace during the month of January, upon the coke mentioned above, gives a better idea of comparison to established practice than anything else:

Attached is a tabulation of the results, which shows capacity of furnace 19,853 cu ft. pig per 100 cu ft. capacity 246 tons; average tonnage for the month 488, on coke consumption of 1875 lb. per ton of pig. The limestone used per ton of pig was 1121 lb., and ash in coke 13.06 per cent, both

*Editor's Note: The blast furnace report of Feb. 11 showed a production of 513.8 tons, with a consumption of 1756 lb. of coke per ton of iron. The analysis of the coke was as follows: Moisture, 5.00 per cent, ash, 12.26 per cent; volatile, 0.84 per cent, sulphur, 1.05 per cent. Analyses of the five casts showed silicon ranging from 0.68 to 1.36 per cent, sulphur from 0.055 to 0.047 per cent, phosphorus, 0.220 to 0.231, manganese, 0.59 to 0.69 per cent.

of which are higher than used in good practice, such as is shown for No. 3 furnace, South Works, in the Year Book of the American Iron & Steel Institute for 1920.

As a matter of interest, if January, 1920, data on No. 3 furnace are used for a basis, we can calculate what our production and coke consumption would have been on the same limestone per ton of pig, and the same ash in coke, disregarding the smelting quality of the mixtures of ores. There is no method known whereby to determine the relative amounts of coke required to smelt mixtures of Old Range and Mesabi ores, although it is generally conceded that a Mesabi mixture reduces more easily than the Old Range mixture, with consequent lower fuel consumption per ton of pig.

The most important data on No. 6 furnace are shown in parallel columns with that of our furnace; one column for our furnace showing results obtained, and another column results that can be expected on the same basis of limestone used per ton of pig and per cent of coke ash.

Comparative Data		Furnaces on Comparative Basis	
	No. 6	Furnaces	19,853
Capacity, cu ft.	19,853	19,853	19,853
Tons per 100 cu ft.	246	246	246
Average tons per day	488	488	488
Average coke consumption	1,875	1,875	1,875
Lb. stone per ton pig	1,121	1,121	1,121
Scrap used over produced	109	109	109
per ton of pig lb.	109	109	109
per cent Mesabi ore	22.2	22.2	22.2
Ash in coke, per cent	13.06	13.06	13.06
Cu ft. per minute at 60 deg., lost time deducted	31,200	31,200	31,200
Cu ft. alt. per lb. coke	54.1	54.1	54.1
Blast temperature	1,936	1,936	1,936
Top temperature	261	261	261
Actual yield	49.68	49.68	49.68
Average silicon, per cent	0.81	0.81	0.81
Average sulphur, per cent	0.040	0.040	0.040
Purest per ton of iron lb.	88	88	88

(To be concluded)

American Incomes, Farmer and Otherwise

Figures prepared by the National Bureau of Economic Research show estimates of the aggregate individual incomes in the United States for the calendar years of 1910 to 1920 inclusive. Appended to these figures are the estimated aggregate incomes of the farm communities, both in dollars as received and in equivalent dollars based on 1913 prices. Based upon the aggregate figures, average individual incomes have been computed in 1913 dollars in two groups, one covering all those gainfully employed, as expressed in census statistics, while the other includes the farmers only.

It will be noted, from the table appended, that the farmers' percentage of the aggregate incomes during the years 1910 to 1916 inclusive varied between 12 and 14. In the three years of guaranteed prices on farm products, the farmer received about 17 per cent of the total income. Collapse of farm prices in 1920 cut down the farmers' proportion of 10.9 per cent of the total. Ex-

thirds of the total average for the country in the early years of the decade, reached in 1918 and 1919 a figure greater than the average for the rest of the country. In the year 1920, however, the farmer's proportion dropped off much more heavily than that of the rest of the country, which fact is responsible for many political and other movements now engaging the attention of the public press.

Restraining Order Against Wheeling Strikers Extended

Holding that "the right to work is open to all and one cannot be accosted or interfered with unlawfully merely because he chooses to work in an open shop or mill," Judge Addleman in the circuit court at Wheeling, W. Va., on Feb. 23, extended the restraining order of last August, directed against striking employees of the Wheeling Steel & Iron Co., to include a number of other locals, including the Crescent lodge of the Amalgamated Association of Iron, Steel & Tin Workers of North America, on petition of the plaintiff in the original case. A temporary injunction was allowed restraining the defendants from molesting non-union or other workers at the Yorkville, Ohio, mills of the Wheeling Steel & Iron Co. The first injunction dealt with picketing and interference on the part of strikers at the Belmont plant of the company. This new order merely enlarges the scope of the injunction to cover operations in Yorkville and follows an injunction of similar tenor recently granted by the United States district court at Columbus, Ohio. One paragraph of the restrictions imposed on the strikers lays down the general proposition that "the union has no right under the law superior to a non-union man and there must be no interference with any of these rights by any of the defendants."

Electrical resistivities of different resistor materials are being determined under different conditions of temperature, pressure, purity, etc., at the Northwest Experiment Station of the Bureau of Mines at Seattle, Wash., by Prof. G. R. Shuck of the University of Washington. It is hoped that these data will be of value in designing furnaces which use a resistor as the heating element or which make use of carbon as a reducing agent, and also in the manufacture of electrodes.

Calendar Year	Billions of Dollars			Average Income in 1913 Dollars		
	Aggregate Individual Incomes	Aggregate Farmers' Incomes	Farmers' Incomes, 1913 Basis	Farmers' Percentage of Total	All Gainfully Employed	Farmers' Percentage
1910	30.0	3.5	4.01	13.2	940	67.1
1911	30.2	3.7	3.78	12.5	933	64.3
1912	31.5	4.0	4.04	12.7	939	66.5
1913	32.5	4.2	4.20	12.9	955	68.8
1914	32.2	4.2	4.17	13.0	932	70.0
1915	34.5	4.7	4.59	13.7	1,000	71.7
1916	41.8	5.8	5.10	13.9	1,060	75.0
1917	50.7	8.8	6.45	17.4	1,025	97.9
1918	60.2	10.45	6.50	17.4	941	107.4
1919	64.7	10.85	6.10	16.8	938	101.0
1920	65.8	7.2	3.50	10.9	850	63.9
Average	43.1	6.17	4.77	13.0	955	77.8

pressed in another way, the average income of all those gainfully employed varied in 1910 to 1919 inclusive between \$920 and \$1,060, in dollars of 1913 purchasing power. During this same period, the average farmer's income in 1913 dollars varied from \$593 to \$1,011.

The average farmer's income, which was about two-

NEW WORKING RULES

Abuses of Labor Unions Abandoned as Decree Is Accepted

A consent decree, drawn and signed in Washington, Feb. 24, established new working rules for approximately 119,000 members of the Bricklayers, Masons and Plasterers' International Union of America. These new rules are directly opposed to many of the rules of the American Federation of Labor.

The decree followed a conference with Attorney General Daugherty with the leaders of the union. It will be entered in the United States Court in New York.

The work of preparing a decree that would be accepted by more than 50 representatives of the various locals throughout the United States and by the Government followed research and inquiry on the part of the Federal officials for nearly four months.

The conviction and imprisonment of several persons charged with violation of the Sherman law, the voluntary disintegration of illegal combinations and the pending trials of others operated favorably in obtaining the consent of the union to discuss the matter with the authorities.

As finally prepared the decree provides in brief:

1. There is to be no limit to the productive capacity of the individual workman within the working day or any other time.
2. There is to be no limit upon the right of the employers to purchase their material wherever and whenever and from whomever they may choose, whether these materials be union made or otherwise.
3. There is to be no favoritism shown by organized labor toward employer or trade associations and no discriminations are to be indulged in against the independent employer who may not be a member of such an organization.
4. The labor organization is not to be used, or permit itself to be used, by material men or contractors or subcontractors as an instrument for the collection of debts or enforcement of alleged claims.

Employee Representation Defeated

The employees of the General Electric Co. at Schenectady, N. Y., have defeated the Rockefeller or American shop plan by a vote almost two to one. There were 5704 votes against the plan and 3549 in favor of its adoption.

When working with a full force the plant has 22,000 employees, and the vote was approximately less than half of that number, but many men have been idle some time, owing to business depression.

Industrial representation as expressed by the proposal was the result of weeks of careful study by a committee of 11, eight selected from among the employees and six by the company. Their draft was submitted to a committee of 250 selected from all sections of the plant. This committee approved the plan.

Under the terms of the defeated plan the plant would have been divided into 12 sections and the sections, in turn, into election districts. Each election district was entitled to one representative and one alternate representative for each 150 employees, or fraction thereof, in the district, their terms of office to be one year. Day workers elected to the committees would have been paid their day rate and piece workers their average piece workers' earnings for time spent on committee work.

Labor Conditions in Pennsylvania

HARRISBURG, Pa., Feb. 28.—Slight improvement in general conditions in the iron and steel trade is shown in the semi-monthly report of the Pennsylvania Department of Labor and Industry for the period ending Feb. 15. Three offices report conditions improved, while one reports that conditions have become more slack.

The McKeesport branch office optimistically reports that the main plants of the iron and steel mills of the district are operating nearer to capacity than they did at any time during 1921. This has brought about a

great reduction in the total amount of unemployment in the district.

Johnstown and Altoona are the other offices to report improvement. "Marked improvement" in the iron and steel trade was attributed by the Johnstown office to have materially helped in the decrease of 3700 in the number of unemployed. Re-hiring of workers in the railroad shops at Altoona has brought relief there, the Altoona office reports.

Scranton, the sole office to report worse conditions, says that "the laying off of metal workers and the slump in the mines and building have resulted in an increase of about 5500 in unemployed."

Conditions generally throughout Pennsylvania were about the same at the end of the period as they were at the start, according to Commissioner Clifford B. Connelley. Sporadic increases and decreases were reported, but the total number of idle in the entire State on Feb. 15 was reported to be 313,575.

Shift Workers in American Industry

More than 500,000 shift workers are employed in American industries, according to a report of the committee on work periods in continuous industries of the American Engineering Council of the Federated American Engineering Societies made public a few days ago.

Chairman H. E. Howe of the National Research Council said that the conclusions of the committee are based on a nation-wide survey of "an unexplored field" conducted under the direction of Dr. Horace B. Drury, formerly of the faculty of Ohio State University. The survey is now complete with the exception of certain regions of the South and Far West.

Labor efficiency, it is indicated, is higher with three shifts of eight hours each than with two 12-hr. shifts. Continuous operation, according to the engineers, was found to constitute a great social and industrial problem.

"While the committee plans a further engineering study in the steel industry," says the report, "its investigations to date have been in industries other than steel. It has been found that the extent of continuous operation industry outside of steel is greater than had been supposed. There are well up to 40 or 50 industries which involve a greater or smaller amount of continuous operation in all or a portion of the country's plants."

"Very roughly, the number of shift workers in the United States is probably well over 500,000, though likely not as large as 1,000,000. And the number of men on 12-hr. shifts, in the period preceding the depression, was perhaps not far from 300,000, of which about as many were outside the steel industry as in the steel industry."

Will Study Unemployment

WASHINGTON, Feb. 28.—Consistent with the previously expressed opinion of Secretary of Commerce Hoover that the question should be studied further because it is made the object of legislation, the fundamentals of unemployment and control of the business cycle are to be the subjects of a thorough investigation by a special committee of the President's Conference on Unemployment. The committee was selected at a meeting held at the Department of Commerce on Monday of last week and will report to the Conference on Unemployment and the public in about six months. The committee consists of Owen D. Young, vice-president General Electric Co., New York, chairman; Joseph H. Defrees, president, Chamber of Commerce of the United States; Clarence Mott Woolley, vice-president American Radiator Co., New York; Matthew Woll, vice president American Federation of Labor and Miss Mary Van Kleck, Russell Sage Foundation, New York. Edward Eyre Hunt, secretary of the President's Conference on Unemployment, was appointed secretary of the committee, and Wesley C. Mitchell, New York, was made field director of the study.

The Champion Engineering Co., Kenton, Ohio, manufacturer of electric traveling cranes, has added more than 100 men to its working force as a result of a recent increase in orders.

Machinery Markets and News of the Works

FEBRUARY SALES DROP OFF

Machine-Tool Trade in Past Month Not So Active As in January

Inquiries Are Fairly Numerous But Prospective Buyers Are Slow in Placing Orders

Inquiries for machine tools are more numerous than orders. Prospective buyers are slow in closing. Used tools are in better demand than new tools, this situation being largely due to the very low prices quoted on used machines in good condition.

Sales in nearly all selling centers dropped off in February as compared with January. In some markets there are signs of improvement, but the situation is spotty, and, on the whole, the industry sees no promising indications of early resumption of satisfactory activity.

It is believed that marked improvement in the industrial situation must come as a prelude to better buying of machine tools. In this respect, however, there are some gains. It is reported from the Cleveland district that foundries are generally operating at 30 per cent as compared with a low point of 20 per cent last year. New England metalworking plants are slowly increasing the number of operating hours.

New York

New York, Feb. 28.

February business in machine tools in this market did not show as large a total as that of January. There are few inquiries and fewer orders. Buying of new tools is restricted considerably by the number of used tools in good condition which are offered at prices varying from 25 to 50 per cent of the prices asked for new machines.

The McCabe & Sheeran Machinery Corporation, Singer Building, New York, has sold a used 16-ft. boring mill to a Cleveland manufacturer, a 6-ft. Bullard boring mill to a Canadian company, and an 8-ft. Niles mill to a New Jersey company.

The Ward Baking Co., New York City, which is planning to equip a shop for building motor trucks for its own use, has inquired for the following metalworking and wood-working machines.

- One threading machine (bolt cutter).
- One circular metal saw.
- Two 18-in. stationary head drill presses.
- One No. 1½ milling machine with index head and centers.
- One 20-in. shaper.
- One 26-in. x 12-ft. lathe.
- One 16-in. x 10-ft. lathe.
- One 16-in. x 6-ft. lathe.
- One 11-in. x 6-ft. speed lathe.
- Three 16-in. four-jaw chucks.
- Three 10-in. three-jaw universal Westcott chucks.
- Three sets Armstrong lathe tools.
- One No. 5 emery grinder.
- One No. 3 emery grinder.
- One No. 2 emery grinder.
- One American universal saw bench.
- One American single surfacer, 30 in.
- One American 24-in. jointer.
- One two-spindle shaper.
- One No. 2 borer.
- One No. 20 hollow chisel mortiser.
- One No. 10 band saw, 36 in.
- One No. 1 rip saw.
- One motor-driven swing saw.

A few fairly good-sized orders have been placed, notable among which is that of the Franklin Motor Co., Syracuse, N. Y., for about 30 machines. The General Electric Co., Lynn, Mass., has bought several large milling machines, but most of the equipment listed on its recent inquiry for 42 machines will be moved from other plants. The H. B. Smith Co., Westfield, Mass., has closed on the remainder of its recent list. A Cincinnati manufacturer bought about \$10,000 worth of tools. The P. H. Murphy Co., New Kensington, Pa., recently bought several Bliss and Toledo presses.

There is very little railroad buying, such orders as that of the Maine Central for an 80-in. driving wheel lathe and a 60-in. boring, drilling and milling machine being conspicuous. The Santa Fe has bought several tools and the Chesapeake & Ohio is reported to have selected several used tools at the Hog Island shipyard. Requirements of its subsidiary road, the Hocking Valley, numbering seven machines, may be satisfied at the same source.

The Ward Baking Co., New York, is out with an inquiry for about 30 metalworking and woodworking machines, in addition to chucks, vises, etc., for a motor truck shop. The Springfield, Mass., plant of the Westinghouse Electric & Mfg. Co., which is busy on radio apparatus, may close soon on several tools.

- One 14-in. mult. Buffalo large blower.
- One 3-ft. dust collector.
- Eight woodworking vises.
- 18 Monarch vises.
- Two direct-connected motor-driven forges.
- One power hack saw.
- One Buffalo No. 45 combination punch and shear.

The crane market continues dull as far as actual purchasing is concerned but inquiries continue to appear from time to time. Considerable activity is manifest in chain blocks in capacities varying from 1 and 2 tons to as high as 20 tons. One hand-power hoist inquiry, for export to Brazil, comes through H. E. Braisted & Co., 32 Broadway, New York, and calls for quotations on eight 20-ton chain hoists and several boxes of chain. Among recent chain block purchases were eight 2-ton hoists to the Bethlehem Steel Co. for the Wilmington plant, placed with the Chisholm-Moore Mfg. Co. This company has also booked an order for 12 1-ton, 12 1½-ton and 12 2-ton chain blocks for export to Japan.

Revised bids have been submitted on a revival of the inquiry of P. L. Smith & Co., 50 Church Street, New York, for a 10-ton crane with 3-nd bucket for the Glens Falls Portland Cement Co., Glens Falls, N. Y.

Among recent sales were, Grey Steel Products Co., 111 Broadway, New York, two 30-ton, 50-ft. boom used Browning locomotive cranes and one 20-ton used Browning locomotive crane from Philip T. Kemp, 30 Church Street, New York; Kelsey Motor Co., Newark, N. J., two crane runways and two 1000-lb. capacity electric hoists from the New Jersey Foundry & Machine Co.; David H. Smith & Sons, Brooklyn, N. Y., a 7½-ton transfer crane from the Shepard Electric Hoist Co.

The National Marble & Slate Corporation, 236 West Fifty-fifth Street, New York, is arranging for the establishment of a plant for cutting, shaping, polishing and other operations, and will purchase machinery, including traveling cranes, etc. A stock issue of \$19,000 has been arranged to finance the project. John J. Burns is president, and James D. Corra, secretary and treasurer.

The New York Central Railroad, W. C. Bower, purchasing agent, 466 Lexington Avenue, New York, is taking bids

until March 8 for one 2000-kw synchronous motor-generator set, with appurtenances, switchboard, etc.

The Fitzgerald Brothers Brewing Co. 490 River Street, Troy, N. Y. is having plans prepared for remodeling its two-story plant 120 x 140 ft. for ice manufacturing and cold storage works. Estimated cost, about \$300,000, including machinery. Office Hill & Morton, 11 West Forty-second Street, New York, is architect.

The Van Nostrand Co., 111 E. 11th St., New York, is arranging for the installation of a general machine shop at 111 E. 11th St. Sanford is head.

Albert O. Van Nostrand, 111 E. 11th St., New York, is having plans prepared for a new plant at 111 E. 11th St. Sanford is head.

The New York City Board of Education is having plans prepared for a new school at 111 E. 11th St. Sanford is head.

The New York City Board of Education is having plans prepared for a new school at 111 E. 11th St. Sanford is head.

The United States Shipping Board is having plans prepared for a new ship at 111 E. 11th St. Sanford is head.

The United States Shipping Board is having plans prepared for a new ship at 111 E. 11th St. Sanford is head.

The International Combustion Engineering Corporation, 43 Broad Street, New York, has arranged an appropriation for the construction of a new foundry at the works of its French subsidiary, Lapuloo Pulverized Fuel Systems, and will commence work at an early date. Location is under way on a foundry at Derby, England, for its British organization, the Underfoot Stoker Co., Ltd., to eliminate the necessity for having casting and in outside shops.

The Precision Thermometer Corporation, New York, has leased a floor in the building at 111 E. 11th St. Sanford is head.

The Standard Oil Co., New York, has filed plans for an addition to its refinery at 111 E. 11th St. Sanford is head.

A vocational department will be installed in the new high school to be erected at 111 E. 11th St. Sanford is head.

The Public Service Co., New York, will install a new condenser boiler and other equipment at its plant at 111 E. 11th St. Sanford is head.

The Water Committee, New York, is planning for the installation of new pumping machinery at the White Oak Ridge waterworks. An appropriation of \$100,000 is being arranged for the extension.

The P. W. Wall, Motor Sales Co., 2 Coolman Avenue, Asbury Park, N. J., will open bids for a two-story service and repair building to cost about \$70,000.

The Atlantic Metal Products Corporation, Newark, N. J., has leased the three-story and basement factory at 91 New Jersey Railroad Avenue for a new plant to manufacture metal specialties. Improvement will be made at once and machinery installed.

The Bayonne Steel Products Co., affiliated with the Bayonne Steel Rolling Co., 2 West Nineteenth Street, New York, will soon file plans for a two-story building, 10 x 27 1/2 ft., at Clinton and Fifth Avenue, Newark. Carl I. Gold, 40 Broadway, Bayonne, N. J., is architect.

New England

Boston Feb. 25

The machine tool market was quiet the past week. The most important development was in connection with the recent inquiries put out by the General Electric Co., West Lynn, Mass., for 4' tool for work requiring fine measurements, and for miscellaneous heavy duty equipment. The company purchased a few large milling machines, but abandoned the remainder of the list having substituted equipment heretofore used in other departments of the West Lynn and subsidiary plants. The H. B. Smith Co., Westfield, Mass., heating appliances, closed on the remainder of its machine shop equipment and the Maine Central has purchased one 30-in. driving wheel lathe, a 60-in. horizontal boring, drilling and milling machine, motor driven, with 4 1/2-in. bar, and an 18-in. lathe. Other sales include a 30-in. x 12-ft. motor driven lathe to the Worcester Electric Light Co., and smaller single lathes, upright drills, etc. The Stevens-

Dursey Co., Chicopee Falls, Mass., is in the market for a squaring shear.

Several local houses report numerous new inquiries for single machines, and Providence dealers also have good prospects. Dealers in other sections of New England report business quiet. The belief is general here among the more important firms that February bookings will show a considerable falling off as compared with January. Sentiment is hopeful, however, it being pointed out the aggregate number of live prospects eliminating the General Electric Co., has not lessened the past fortnight. Industrial New England is slowly increasing its operating hours taken collectively, but the situation is still more or less spotty. The settlement of the textile labor situation will it is generally believed be a signal for better buying of machine tools.

The Hydrate Pump Co., Salem, Mass., is having plans prepared for a contemplated four story, 50 x 100-ft. unit to be used by the engineering testing and packing departments.

A large overhead crane operated in the gun room of the Field Iron Foundry, 9 Coddington Street, Providence, R. I., recently was badly damaged by fire, as was a part of the foundry.

Michael D. Lee, Port Chester, Conn., coal dealer, plans the erection of a 50 x 1.8 ft. coal bunker with 300-ton capacity. Conveying machinery, etc., will be required.

Construction on a \$1,000,000 repair shop at South Everett, Mass., for the Boston Elevated Railway Co., Boston, will begin in May and be completed in one year. It will consist of three units, one 156 x 650 ft. and two 50 x 150 ft. Eventually it is planned to consolidate most of the company's repair shops in the new Everett plant. Machine tool requirements have not yet been prepared, but are expected within a short time.

The Fabric Machine Co., 307 Center Street, Bridgeport, Conn., filed a certificate of incorporation Feb. 20 to engage in the manufacture of cloth cutting and winding machinery. It has been organized by Joseph J. Musante, who purchased the building's machinery and business of the late A. L. Adams last December. The capital stock is \$5,000 and the incorporators include Mr. Musante, Clifford J. Lewis and Arthur J. Bromley. Arthur Sullivan will be general manager.

The city of Middletown, Conn., is planning to erect a trade school at the corner of Church and Main streets to cost about \$40,000. Frank A. Cole, 128 Main Street, is chairman of the committee.

The H. I. Judd Co., 12 Cherry Street, Wallingford, Conn., fence hardware manufacturer, has let contract for its six-story reinforced concrete addition, 75 x 102 ft. Lockwood & Co., 60 Federal Street, Boston, are the engineers and John W. Ferguson, 23 Broadway, New York, has the general contract.

A vocational department will be installed in the new high school to be erected at Palmer, Mass., for which an appropriation of \$170,000 has just been approved. E. C. and G. C. Gardner, 33 Lyman Street, Springfield, Mass., are architects.

Underhill Brothers, 6 Sherman Street, Charkstown, Mass., manufacturers of hardware, have filed plans for the erection of a one-story factory, 50 x 100 ft. on Winthrop Avenue, Somerville, Mass.

A vocational department will be installed in the new high school to be erected by the School Board, Belchertown, Mass., appropriation for which has just been approved.

The Lynch Brothers Carriage Co., Chelsea, Mass., has foundation work under way for a one-story addition to approximately 5000 sq. ft. of floor space.

The Lush Mfg. Co., Wellington Avenue, Hartford, Conn., manufacturer of automobile radiators and other metal products, has completed plans for a one-story addition, 50 x 250 ft. Buck & Sheldon Inc., 60 Prospect Street, Hartford, are architects.

The Victor Page Motor Corporation, 301 Lafayette Street, New York, has awarded a contract to the Truscon Steel Co., 110 West Fortieth Street, for a one-story plant, 50 x 105 ft., on Melrose Avenue, Stamford, Conn., to cost about \$25,000. The company is now operating a works at Farmingdale, L. I.

A one-story power house will be erected by the Velvet Textile Corporation, P. O. Box 1962, New Haven, Conn., in connection with a new factory to cost about \$180,000, at Alimtown. D. E. Smith, 152 Temple Street, New Haven, is architect.

Herbert B. Rust, Meredith, N. H., and associates are planning the construction of a hydroelectric power plant on the Pemigewasset River, vicinity of Manchester, N. H., with transmission system to furnish power at Ashland, Wolfeboro, Plymouth, Bristol and vicinity.

A vocational department will be installed in the new high school to be erected at Belfast, Me., three stories, 140 x 150 ft., estimated to cost \$150,000. Kilham, Hopkins & Greeley, 9 Park Street, Boston, are architects.

Chicago

CHICAGO, Feb. 27.

Sentiment has improved in the local machinery district because of the more active interest taken in the market by buyers, but thus far inquiries have greatly outnumbered sales. Orders for single machines predominate and used equipment continues to move faster than new tools. One dealer, however, reports the sale of a 34-in. boring mill, a 16-in. shaper, a 20-in. shaper, and a No. 3 milling machine, all new tools, within the past week. The Santa Fe continues to make a few purchases against its outstanding list from time to time. For La Junta, Colo., it has ordered a 48-in. x 48 x 12-ft. motor-driven planer, and for San Bernardino, Cal., it has bought a 15-ton overhead traveling crane. The Burlington is preparing an extensive list which is expected to be issued within a week or two.

C. R. Berglund, manufacturer of automobile bodies, 2630 Wentworth Avenue, Chicago, is taking bids on a one-story plant, 100 x 125 ft., on Sixty-seventh Street near Park Avenue, to cost \$75,000.

The Elgin Stove & Oven Co., 14 Chicago Street, Elgin, Ill., plans to construct a two-story factory to cost \$50,000.

The American Clutch & Machinery Co., recently organized, is about to start operations at 1842 East Miner Street, Des Plaines, Ill. It will manufacture steel clutches for shafting and will also do general machine shop work.

At a special election at Muscatine, Iowa, a \$350,000 bond issue was authorized for the construction for a municipal electric light and power plant.

At the recent annual meeting of the Rockford Steel Equipment Co., Rockford, Ill., it was voted to raise the capital stock to \$150,000 to finance the provision of larger quarters to take care of the company's growing business. W. H. Hendrickson is president and general manager.

The Atlas Powder Co., Wilmington, Del., contemplates the erection of a \$2,000,000 powder plant at Pinckneyville, Ill.

The City Council, Red Wing, Minn., has passed an ordinance calling for the erection of a municipal light and power plant. Three years ago the city authorized the issue of \$350,000 worth of bonds for the construction of such a plant, but this was delayed owing to arrangements made with the Wisconsin-Minnesota Light & Power Co.

The Central Illinois Public Service Co. has purchased 180 acres of land two miles north of Grand Tower, Ill., as a site for a \$2,000,000 power plant.

C. G. Budig, McCook, Neb., will start the construction of a machine shop, 32 x 75 x 100 ft. about March 1. The building will cost \$250,000 and will be used for general machine shop work and automobile truck and tractor repairs.

Abraham Mikkil, 1311 Washburn Avenue, Chicago, has taken bids on a two-story garage, 72 x 107 ft., at the north east corner of West Taylor Street and Garibaldi Avenue to cost \$50,000.

The Chicago Union Station Co. will soon take bids on the construction of a power plant at Harrison and Canal streets, Chicago.

The L. W. A. Bunge Mfg. Co., recently incorporated with \$20,000 capital stock, has leased space at 2638 West Madison Street, Chicago. It will engage in general machine shop business and is fully equipped with machine tools for the time being. The officers are L. W. A. Bunge, president and treasurer; H. C. Dawson, secretary, and H. D. Bunge, vice-president.

The American Cabinet Co., 3021 North Crawford Avenue, Chicago, has let a contract for a one-story plant, 100 x 125 ft., to cost \$40,000.

Fred R. Chandler, 3817 North Pennsylvania Street, Indianapolis, has completed plans for a four-story automobile service and repair building, 60 x 200 ft., on West Vermont Avenue, estimated to cost \$125,000. Vonnegut, Hohn & Mueller, 610 Indiana Trust Building, are architects.

The Lampman Tool Co., Angola, Ind., is planning for the installation of new machine tools and other equipment. H. W. Lampman is manager.

A vocational department will be installed in the new high school to be erected at Shelburn, Ind., plans for which have been prepared.

The Evan L. Reed Mfg. Co., Sterling, Ill., manufacturer of metal display stands, racks, etc., has completed plans for a three-story and basement addition, 40 x 90 ft., estimated to cost in excess of \$125,000, with equipment. Evan L. Reed is president and general manager.

The Union Light, Heat & Power Co., Fargo, N. D., has preliminary plans under way for a new electric power plant near Broadway and Roberts Street.

The Illinois Central Railroad Co., 135 East Eleventh Place, Chicago, is arranging a preferred stock issue to total \$50,000,000, to be disposed of in allotments over a period of years, the larger part of the proceeds to be used

for the electrification of its system in the Chicago district, including about 190 miles of line, power plants, electrical equipment, etc., with new passenger terminal and other work.

The Union Utilities Co., Rutland, Iowa, is having plans prepared for a new hydroelectric generating plant near Rutland, estimated to cost about \$150,000. Toitz, King & Day, Inc., 1410 Pioneer Building, St. Paul, Minn., are architects and engineers.

A vocational department will be installed in the three-story and basement high school to be erected at Fort Madison, Iowa, 157 x 190 ft., estimated to cost about \$350,000. Owen, Payson & Carswell, American Bank Building, are architects.

The Common Council, Hillsboro, N. D., will soon take bids for the construction of a municipal electric light and power plant. The C. L. Pillsbury Co., 1200 Second Avenue, South Minneapolis, Minn., is engineer.

A vocational department will be installed in the new senior and junior high school to be erected at Ainsworth, Neb., W. A. Sawyers, secretary, bids for which are being taken until March 20. Davis & Wilson, Lincoln, Neb., are architects.

The Common Council, Centralia, Ill., will commence the immediate erection of a one-story municipal power plant, 50 x 105 ft., to cost about \$85,000.

Philadelphia

PHILADELPHIA, Feb. 27.

The Moore-White Co., Fifteenth Street and Lehigh Avenue, Philadelphia, manufacturer of machinery and parts, has commenced the construction of a two-story foundry addition, 60 x 165 ft., estimated to cost about \$35,000.

The Grissenger Machine Works, 904 Quarry Street, Philadelphia, has leased the first floor and basement of the building at 236 Quarry Street, for extensions.

The Champion Incandescent Light Co., 235 Market Street, Philadelphia, manufacturer of lighting fixtures, has purchased the building at 635 Market Street, for \$125,000. Alterations and improvements will be made, and the structure occupied as a new plant.

The Bureau of Supplies and Accounts, Navy Department, Washington, will take bids under schedule 9461 until March 7 for 1800 socket wrenches for the Philadelphia Navy Yard.

The Electrical Foundry & Equipment Co., Philadelphia, has construction under way on a new plant at Tacony and Bleigh streets, estimated to cost about \$200,000, including machinery. It will specialize in steel castings, with facilities to manufacture castings up to 200 lb. William P. Cunningham is president.

Thomas E. Miller, 3243 Germantown Avenue, Philadelphia, operating a brass manufacturing and refinishing works, has had plans prepared for an addition. Improvements will be made, also, in the present building.

The Bureau of Highways, City Hall, Philadelphia, has arranged a list of machine tools to be purchased for its new automobile service and repair works, including engine lathes, drill press, power hack saws, shaper and portable floor crane. E. H. Craven, room 216, is director.

A one-story power house will be constructed at Fifth and Annsbury streets, Philadelphia, by the Oscar Nehel Knitting Mills, 3860 Coral Street, for mill service. It will cost \$75,000.

John M. Greene, Drexel Building, Philadelphia, is making inquiries for a used compound 12 x 12-in. air compressor, from 400 to 500 cu. ft., operating at 100 lb. pressure.

The International Harvester Co., 606 South Michigan Avenue, Chicago, has taken title to property on Sixteenth Street, Philadelphia, 100 x 194 ft., for \$62,000, to be used for the erection of a local branch.

Joseph Katter Co., 1621 Ridge Street, Philadelphia, manufacturer of lighting fixtures, has leased the first floor of the building at 19 North Ninth Street, opposite its present branch works, for extensions.

A vocational department will be installed in the three-story and basement high school addition to be erected at Ford City, Pa., bids for which will be asked early in March. W. G. Eckles, Lawrence Savings & Trust Building, New Castle, Pa., is architect.

The East Penn Foundry Co., Macungie, Pa., will operate a nickel-plating department in connection with its casting room for plumbing fixtures. Heretofore this work has been handled in outside shops. The company has other extensions and improvements under way.

The Crescent Truck Co., Lebanon, Pa., recently organized, has taken over the factory of the Hunsicker Engineering Co., 167 North Tenth Street, previously used for machinery manufacture, which it will use for the manufacture of small storage battery trucks.

Fire, Feb. 18, destroyed a portion of the plant of the Wehaver Hardware Co., Danville, Pa., with loss estimated at about \$75,000, including equipment.

A one-story power house will be erected at the plant of the York Sanitary Milk Co., North George Street and Hamilton Avenue, York, Pa., 45 x 52 ft. Rinnhard Dempwolf, Cassett Building, is architect.

The Keystone Carbonic Gas Co., Connelisville, Pa., recently organized, has acquired the plant of the Highspire Distillery Co., Highspire, Pa., for the manufacture of industrial gas. T. B. Ironnelly is vice president, and E. W. Powell, secretary, both of Connelisville.

The Dudley Watch Co., Orange and Queen streets, Lancaster, Pa., has awarded a contract to Herman Wohlsein, Woolworth Building, for a two-story factory, 12 x 100 ft., on South West End Avenue. Henry Y. Shaub, Imperial Building, is architect.

Buffalo

BUFFALO, Feb. 27

The Atlas Vase Co., Inc., Lowville, N. Y., is planning for the erection of a new two-story factory to cost about \$27,000. E. W. Fulton, Lowville, is president.

The H. H. Franklin Mfg. Co., Syracuse, N. Y., manufacturers of automobiles, has arranged an appropriation of \$5,000,000 for a new plant to manufacture a light four-cylinder, air-cooled automobile. A site at Eastwood, near Syracuse, is being considered. The company is said to be negotiating for the purchase of the plant of the Willys Corporation, Elizabeth, N. J., never entirely completed. With such acquisition the proposed Eastwood plant would be deferred. H. H. Franklin is president.

The Syracuse Twist Drill Co., Syracuse, N. Y., is planning to rebuild the portion of its plant recently destroyed by fire with loss estimated at about \$20,000.

The Greene Machine Co., Watertown, N. Y., is planning for the erection of a new two-story machine shop to cost about \$25,000. C. H. Greene is head.

The Johnson City Motor Car Co., Johnson City, N. Y., has awarded contract to H. B. Van Ness, Washington Street, Endicott, N. Y., for a one-story service and repair building, 72 x 115 ft.

The United Fertilizer & Lime Co., Merchants' Bank Building, Syracuse, N. Y., is planning for the installation of new crushing and screening machinery at its plant at Gouverneur, N. Y.

The National Lamp Works, 1495 Fillmore Avenue, Buffalo, has filed plans for a machine shop to cost \$15,000.

Fire, Feb. 17, damaged the plant of the McKaig-Hatch Co., 1590 Niagara Street, Buffalo, maker of tools and drop forgings. The loss is estimated at \$30,000.

Cleveland

CLEVELAND, Feb. 27

Machine tool sales fell off the past week. Inquiries are holding up fairly well, but practically all that came out during the week were for single machines. Plant operations in the metal working industries show a slight gain and the sentiment is better than for some time. Cleveland foundries are operating on an average of about 30 per cent as compared with the low point of about 20 per cent reached last year. Some of the recent buying has been from comparatively new industrial concerns that had not provided all the equipment they expected to install when the slump came a year ago and which shut off on additional purchases at that time. Some additional machine tool business is looked for from this source shortly.

Demand for used machinery picked up with some dealers during the week. In used machinery one local dealer reports the sale of four single spindle drilling machines to a northern Ohio manufacturer and four lathes, a shaper and drilling machine for equipping a Chicago shop.

Inquiry for hydro-electric equipment shows improvement. There is also better inquiry for locomotive cranes.

The Fostoria Welding Co., Fostoria, Ohio, a new company, has established a plant at 319 North Main Street. A. W. Zenz is the principal owner.

The India Machine & Rubber Mold Co., Akron, has purchased the plant of the Vulcan Welder Co. in that city and will move into its new quarters shortly.

The Sandusky Gas & Electric Co., Sandusky, Ohio, will enlarge its plant. Additional equipment to be installed will include boilers, turbines and coal and ash handling equipment.

It is reported that the Wells Process Co., Conneaut, Ohio, will build a one-story machine shop, 66 x 130 ft.

The Standard Body Co., Angola, Ind., will establish a plant in Hicksville, Ohio, for the manufacture of motor truck bodies. It has acquired a lease of the Collier factory and is installing equipment.

The Lucius Mfg. Co., Uhrichsville, Ohio, has completed and placed in operation its plant for the manufacture of welded tanks for automobile and other uses. The officers are J. E. Smith, president; Alexander Robinson, vice-president; C. E. Lucius, secretary and manager; John L. West, treasurer.

The United States Street Sweeping Machine Co., Akron, Ohio, has been incorporated to manufacture patented street sweeping equipment. Offices have been opened at 712 Second National Bank Building, Akron.

The Interstate Aluminum Co., Canton, Ohio, which recently increased its capital stock from \$25,000 to \$60,000, plans to enlarge its works and install new equipment.

The D. Connelly Boiler Co., Cleveland, has taken an order from the San Joaquin Light & Power Co., Los Angeles, Cal., for six 850-hp. water tube boilers.

Cincinnati

CINCINNATI, Feb. 27.

At least two fair-sized orders were placed the past week in which local manufacturers participated. The Franklin Motor Co., Syracuse, N. Y., closed for approximately 30 machines, many of which were booked in this market. The General Electric Co. was also a buyer for its Lynn, Mass., plant, and local manufacturers were also well represented in this deal. The Santa Fe closed for several tools, among them a large planer. A Cincinnati manufacturer was also a purchaser, buying about \$10,000 worth of equipment. The Chesapeake & Ohio is reported to have bought a number of used tools from the Hog Island shipyards and it is said that the Hocking Valley Railroad, which recently inquired for seven machines, will likely fill its requirements from the same source.

Some manufacturers have quoted on more inquiries the past two weeks, while others state the market is much quieter than for some months past. The market can well be classed as "spotty," but the majority of manufacturers are of the opinion that the general position of the industry is much improved. Some large lists of high-grade used tools are coming out and an analysis shows that tools classed as 95 per cent new are being offered at approximately 55 per cent of to-day's list prices. On smaller tools some low prices are being made by dealers, in one instance an 18-in. x 8-ft. engine lathe, with full attachments, being offered at \$600 and an intimation made that this price could still be shaded considerably. A 14-in. x 8-ft. engine lathe with full attachments is being offered at \$400. Prices on heavier machines, however, are holding firm and local manufacturers are refusing to make any concessions on even the most attractive business.

The Midwest Engine Co., Indianapolis, Ind., is being reorganized as the Midwest Engine Corporation. Howard S. Mott, New York, is the chairman of the new corporation and Oscar F. Stevens, New York, secretary.

The Globe Register Co., Reading Road, Cincinnati, has placed contract with the Ferro-Concrete Construction Co. for a two-story addition which will increase its manufacturing facilities 50 per cent. The present plant is a three-story structure and two additional floors will be added.

The Hamilton, Ohio, plant of the Ford Motor Co., which has been engaged in tractor production, has been turned into a wheel manufacturing plant and is now turning out 300 sets a day. It is understood that the plans of the company call for an increase in the output until the entire production of 4000 sets a day are made. The plant also manufactures locks for touring cars, 4500 a day being the present capacity.

Detroit

DETROIT, Feb. 27.

The Stafford Roller Bearing Co., Lawton, Mich., has awarded contract to Benjamin Barnhart, Lawton, for a new one-story plant. L. K. Stafford is president.

The Detroit Edison Co., Detroit, is arranging an appropriation of \$3,000,000 for extensions and improvements in electric generating plants and system during the year.

A vocational department will be installed in the new high school to be erected at Rockford, Mich., for which bonds for \$100,000 have been voted.

The Big Rapids Electric Co., Big Rapids, Mich., will build an addition to its generating plant and install new equipment. W. A. Stillwell is secretary.

The Gangnier Stereotype Foundry Co., 525 Howard Avenue, Detroit, will take new bids on revised plans for its one-story factory, 30 x 200 ft., estimated to cost about \$40,000.

Business changes in machine tool trade are mentioned.

E. C. Chaffield, Escanaba, Mich., is organizing a company to build and operate a foundry at Iron Mountain, Mich., for the manufacture of iron, brass and other metal castings. A site has been selected.

The Egyptian Portland Cement Co., Port Huron, Mich., is completing plans for remodeling the former shops of the Grand Trunk Railway Co., recently acquired, for the establishment of a new cement manufacturing plant.

The National Portland Cement Co., Mt Pleasant, Mich., is planning to break ground early in April for its new works at Coldwater Lake, to comprise a main two-story mill, with several one-story buildings, estimated to cost about \$500,000, including machinery. H. C. Shields is general manager.

The Dall Steel Products Co., Lansing, Mich., is arranging to extend its production and will soon commence the manufacture of steel toys.

Milwaukee

MILWAUKEE, Feb. 27

Machine tool trade in February is generally regarded as equal in volume to either December or January. The tone of business showed slight improvement over previous periods, although this betterment was noticeable more in the character and scope of inquiry rather than sales. Used tools continue to furnish strong competition to new equipment, especially where price is the determining factor. It is said that there still remains an enormous quantity of used tools to be worked off, although the supply is steadily being reduced. Improvement in the general position of metal-working industries continues to manifest itself with more certainty, if slowly.

The Prairie du Chien, Wis., Tool Co., manufacturer of mechanics' tools, grinders, etc., has increased its capital stock from \$50,000 to \$150,000 by a new issue of \$50,000 common and \$50,000 preferred stock. The proceeds will be used for the general development of the business, which contemplates enlargement of the facilities during the present year.

The Board of Education, West Allis, Wis., is asking bids for the construction of a west wing of the new high school building to be used exclusively for manual arts training. The cost of the addition, with shop equipment, etc., is estimated at \$100,000. The architects are Robert A. Messmer & Bros., 221 Grand Avenue, Milwaukee.

The Argo Tool & Machine Mfg. Co., Milwaukee, has been incorporated with a capital stock of \$25,000 to manufacture machinery, tools, mechanical specialties, etc. The incorporators are Charles A. Phillips, 383 Thirty-first Avenue; Charles E. Helm, 345 Twenty-fifth Avenue, and Arthur J. Huck, 809 Fortieth Street, Milwaukee, all of whom have been for many years connected with the West Milwaukee locomotive and car shops of the Chicago, Milwaukee & St. Paul Railway Co. as shop superintendent.

William Trachte, Watertown, Wis., has plans for a garage, sales and service building, 56 x 100 ft., part two stories and basement, to be erected at Third and Jefferson streets for the occupancy of the Klinger Buick Agency. It is to cost about \$25,000 and be ready May, 1.

The Board of Education, Chippewa Falls, Wis., will close bids March 27 on the construction and equipment of a junior high and vocational training school, to cost \$175,000. The architect is E. J. Hancock, Eau Claire, Wis. It will contain machine, plumbing, automotive and other manual arts shops.

The Svoboda Altar Works, Kewaunee, Wis., manufacturer of church furniture, fixtures, etc., has purchased a two-acre site for a new factory which it will build in units, the first to be undertaken immediately. It will be of brick, 60 x 125 ft., part two stories. Current will be purchased. Considerable new wood and metal-working equipment will be purchased to supplement the equipment of the present factory. Joseph Svoboda is proprietor.

The Jacobsen Auto Co., 1713 West Sixth Street, Racine, Wis., will build a new public garage with display rooms and machine shop, 85 x 102 ft., one-story and basement, to cost about \$30,000. William J. Redden, local architect, is in charge.

The Mar-Tan Motor Mfg. Co., Milwaukee, has been granted a charter to manufacture engines, motors, machinery, etc. The capital stock is \$125,000 and the incorporators are A. E. Martin, W. L. Tanhauser and H. E. Winkle, 78 Loan & Trust Building, Milwaukee. A definite statement of plans will be made later.

The Board of Education, Sheboygan, Wis., will take bids after March 15 for the construction of the second unit, or continuation school department, of the new \$1,250,000 high school designed by Childs & Smith, architects, Chicago.

J. H. Oatery, Waukegan, Ill., has been awarded a contract by the city of Waukegan for the construction of a public bathhouse, 53 x 140 ft., two stories and part basement. It will cost about \$37,000, including equipment.

The J. W. Bithrong Sheet Metal Co., Waukegan, has been organized by J. W. Bithrong, who has leased a building at 139-141 West Broadway and will purchase new equipment to supplement that acquired from the Perkins Hardware Co., with which concern he was connected for fifteen years.

The Board of Education, Ashland, Wis., is calling for bids for the construction of the Latimer Memorial manual arts training school, estimated to cost \$120,000. It will be two stories, 65 x 122 ft., and is to be ready for the opening next September.

The Nordberg Mfg. Co., Milwaukee, has taken a contract to build two 13,000-hp. steam engines for a rolling mill at Steubenville, Ohio, at a price said to be approximately \$500,000, for delivery in about a year. The engines will be of special design and are said to be the largest units of the kind ever built in this country.

Pittsburgh

PITTSBURGH, Feb. 27.

Inquiries for machine tools still are more numerous in this district than orders and the trade drives most of the cheerfulness shown from the somewhat better operation of steel plants. Purchases of individual tools are constant enough, but they do not run into very large values. Prospective buyers who have issued lists are moving slowly about closing. Seemingly, there is not much urgency for the tool sought or it is possibly believed that a little delay will bring more favorable quotations. The P. H. Murphy Co., New Kensington, Pa., recently closed for several processes, the business being divided by the E. W. Bliss Co., Brooklyn, and the Toledo Machine & Tool Co., Toledo, Ohio. These were double-turn presses with 8 in. shafts. This company is doing nothing at present in connection with equipment for the Pressed Steel Mfg. Co., Chicago, a subsidiary plant. The Westinghouse Electric & Mfg. Co. will probably close soon for some additional tools for its Springfield, Mass. plant, which is busy on radio apparatus.

The crane market does not show much life, although manufacturers' representatives are getting a fair number of inquiries. The Ellwood City Forge Co., Ellwood City, Pa., has closed with the Northern Engineering Works, Detroit, for a 15-ton crane with 5-ton auxiliary, with 60 ft. span. The Northern Engineering Works also has taken a 1-ton hoist for the Pennsylvania Rubber Co., Jeannette, Pa. The Sharpsburg Foundry Co., Sharpsburg, Pa., has ordered a Shaw yard crane.

The Babcock & Wilcox Co., has taken the order for three Stirling boilers and superheaters for installation at the Carrie furnaces, Homestead, Pa., works of the Carnegie Steel Co. These boilers have a combined rating of 2500 hp. The West Penn Power Co. is expected to close shortly for two 30,000-kw. turbines and several boilers for its Windsor, W. Va., plant, and the West Lechburg Steel Co. for a new 16-in. electrically driven continuous strip mill, with necessary auxiliary equipment.

The National Supply Co. of Pennsylvania, 1304 Union Bank Building, Pittsburgh, manufacturer of oil well, water well and other equipment, is revising plans for its proposed two-story and basement building, 100 x 105 ft., at Delaware and Preble streets, estimated to cost about \$50,000. J. H. Barr is president.

Julius J. Quertlinmont, Point Marion, Pa., head of the Jeannette Window Glass Co., plans to construct a sheet glass works at Fairchance, Pa., estimated to cost in excess of \$300,000, including machinery. Work will commence at an early date.

The Erie Railroad Co., 50 Church Street, New York, has arranged for the operation of its repair shops at Meadville, Pa., under the management of W. S. Schlafre, head of the mechanical department of the road, recently granted a leave of absence for this purpose. It will resume under full capacity at once, giving employment to more than 800 men.

The Granny Branch Coal Co., 70 Wall Street, New York, is planning for the installation of electrically operated mining machinery and other equipment, including motor cars, at its properties in the vicinity of Big Chimney, W. Va. Bids will be asked in the spring. Clark & Krebs, Charleston, W. Va., are engineers.

The Virginia Western Power Co., Alderson, W. Va., is disposing of a bond issue of \$850,000, and will use more than one-half of the proceeds for extensions in its power plant, including new generating machinery. The company operates

A steam-turbo plant at Ronceverte, W. Va. Headquarters are at Clifton Forge, Va.

The receivership of the Jeffery-Dewitt Insulator Co., Kenova, W. Va., has been dismissed, and the plant and property returned to the officials. The company has been reorganized with a capital of \$800,000 to manufacture high-tension insulators, etc. and is affiliated with the Champion Spark Plug Co., Detroit. R. A. Stranahan, president of the last noted organization, is head of the West Virginia company; J. F. Sinclair is general manager and will be in charge at the Kenova works.

A vocational department will be installed in the two-story and basement high school to be erected by the Wayne County Board of Education, Clarksburg, W. Va., estimated to cost about \$180,000. Herman P. Dean is secretary.

A one-story power house addition will be erected by the Libbey-Owens Sheet Glass Co., Charleston, W. Va., at its plant at Kanawha City, W. Va., in connection with other extensions estimated to cost \$200,000, including equipment.

C. E. Hines, Buckhannon, Pa., will build a one-story power house in connection with his proposed new wood working plant.

The Gulf States

BERMINGHAM, Feb. 27

The Dallas Power & Light Co., Dallas, Tex., has made application for permission to make extensions in its power plant and system to cost about \$167,000. C. W. Davis is general manager.

Thompson & Norman, Mexia, Tex., have completed plans for a new one-story machine shop at Marshall, Tex.

The Shreveport Foundry & Machine Co., Cedar Grove, La., has acquired property at Bossier City, La., and has plans under way for a new plant. It is proposed to remove the present works to the new location.

The Common Council, Willis Point, Tex., is considering tentative plans for the establishment of a municipal electric light and power plant.

The Petros Mfg. Co., Chuluota, Fla., recently organized with a capital of \$50,000, has plans under way for a two-story factory, 40 x 80 ft., to manufacture concrete brick and kindred products. The machinery installation will include a steam shovel for sand digging. The plant will have an initial daily capacity of about 30,000 brick. J. A. Rogers is secretary and treasurer and A. S. Nunamaker manager.

Fire, Feb. 20, destroyed a portion of the plant and machinery of the Hesse Envelope Co., Carter and Caruth streets, Dallas, Tex., with loss estimated at \$100,000. George S. Otey is president.

The Republic Power & Service Co., Breckenridge, Tex., is planning for extensions and improvements in the former plant of the Breckenridge Ice & Cold Storage Co., recently acquired, estimated to cost about \$45,000, including equipment.

Fire, Feb. 15, destroyed the mechanical plant of the Griswold Oil Co., Wichita Falls, Tex., with loss estimated at about \$25,000. It will be rebuilt.

The Texas Power & Light Co., Dallas, Tex., is considering tentative plans for its new central generating plant at Denton, Tex., which has been held in abeyance. The company is operated by the Electric Bond & Share Co., 71 Broadway, New York.

John P. King and E. P. Maddox, Fort Worth, Tex., have organized a company to build a one-story ice manufacturing plant at Arlington, near Fort Worth, to cost \$40,000. James Davis, Arlington, is also interested in the new organization.

The Frost-Johnson Lumber Co., Shreveport, La., has acquired timber properties in the vicinity of Monroe, La., for about \$60,000, and has tentative plans for the erection of a new lumber mill near Bastrop, La.

The city manager, G. H. Cairns, Gainesville, Fla., will install a new turbo-generator set, switchboard and other equipment at the municipal power plant. Bids are being asked. Robert & Co., Red Cross Building Atlanta, Ga., are engineers.

Baltimore

BAITMORE, Feb. 27.

The Boston Iron & Metal Co., Pratt and Fremont streets, Baltimore, has acquired through its president, Morris Schapiro, the plant and property of the C. A. Gambrell Mfg. Co., Ellicott City, for \$410,500. The new owner plans to utilize the property in connection with its business.

The General Machinery & Supply Co., Baltimore, has leased the three-story building at 411 Exchange Place, for local works and headquarters.

The Eastern Shore Gas & Electric Co., Salisbury, Md.,

has arranged for a bond issue to ~~total \$250,000~~ a portion of the proceeds to be used for enlargements to the electric generating plant at Laurel, including the installation of a 2500-kw. turbo-generator and auxiliary equipment. John E. Zimmerman is secretary and treasurer.

The United States Engineer Office, Wilmington, Del., will take bids until March 20 for a complete pumping unit, consisting of centrifugal pump and engine, piping, etc., for use at Chesapeake City, Md. The unit is to have a daily capacity of 50,000,000 gal. of water, with alternate estimates to be received covering electrically-operated equipment, oil and steam-operated.

The Norfolk & Western Railroad Co., Roanoke, Va., has preliminary plans under consideration for enlargements in its car and locomotive shops at Hagerstown, Md.

John H. Gels & Co., Brooklyn, Baltimore, will take bids in March for a one-story planing mill, 65 x 100 ft., estimated to cost about \$32,000, including machinery. William A. White, 2024 North Smallwood Street, is architect.

The American Locomotive Co., 1301 North Boulevard, Richmond, Va., is planning for the erection of a one-story brass foundry, to cost about \$16,000.

The Bureau of Supplies and Accounts, Navy Department, Washington, will take bids until March 7 for 9000 ft. of plow steel wire rope for the Norfolk Navy Yard.

The Jarvis Storage Battery Co., Winston-Salem, N. C., has filed plans for a one-story factory, 72 x 100 ft. J. C. Jarvis is president.

An ice-manufacturing plant to cost about \$60,000 will be constructed by the American Cone & Pretzel Co., Macon, Ga. Plans have been completed.

The office of the Chief of Air Service, United States Army, Washington, will take bids until March 30 for seamless annealed copper tubing.

A vocational department will be installed in the two-story and basement high school at Charlotte, N. C., estimated to cost \$100,000. C. C. Hook, Trust Building, is architect.

The Hiddenite Quarry Co., Concord, N. C., is planning for the construction of a new rock crushing plant at Hiddenite, N. C., with screening and sorting departments. It will have a capacity of about 1000 tons a day. E. V. Correll is manager.

The White Provision Co., Atlanta, Ga., has plans under way for the erection of a one-story power house, cold storage and refrigerating plant, and will call for bids soon.

The Lansing Lumber Co., Lansing, N. C., recently organized with a capital of \$100,000, will call for bids early in March for planing mill and wood-working machinery for a new plant, 60 x 80 ft. V. E. Ballou is secretary and manager.

The Pacific Coast

SAN FRANCISCO, Feb. 21.

The Los Angeles Automotive Co., Los Angeles, will break ground at once for its new one-story automobile manufacturing plant, 71 x 252 ft., at 1020 Towne Avenue, estimated to cost about \$100,000, including equipment. The Moran Co., 206 Kerckhoff Building, has the contract.

M. Elsasser, Oakland, Cal., care of S. Helman, 57 Post Street, San Francisco, architect, is completing plans for a one-story machine shop, 75 x 100 ft., at Fourth and Washington streets, Oakland, to cost about \$18,000.

Knox & Stout, 522 North Main Street, Santa Ana, Cal., have awarded contract to Ross & Ritchie, Long Beach, Cal., for a one-story automobile service and repair works, to cost \$65,000.

A vocational school will be constructed by the Board of Education, Glendale, Cal., in connection with the group of high school buildings, plans for which are being prepared, estimated to cost in excess of \$600,000. John C. Austin, 1125 Baker-Detwiler Building, is architect.

The Power Implement & Machine Works, Modesto, Cal., are having plans prepared for new works on property recently acquired on San Fernando Road, Glendale, Cal., consisting of a main one-story shop, 40 x 200 ft., and adjoining structure, 25 x 125 ft., estimated to cost about \$30,000. Henry F. Bean, Central Building, Los Angeles, is architect.

The Pacific Gas & Electric Co., 445 Sutter Street, San Francisco, is arranging for an expenditure of \$1,870,000 during the next 24 months for extensions to its hydroelectric generating plants.

Fire, Feb. 11, destroyed a portion of the plant of the Thomas Day Co., 725 Mission Street, San Francisco, manufacturer of electrical equipment and supplies, with loss estimated in excess of \$250,000, including equipment.

The San Joaquin Light & Power Co., Fresno, Cal., will commence the immediate erection of an addition to its steam-operated electric generating plant at Buttonwillow, Kern County, to cost in excess of \$1,000,000.

The City Council, Fallon, Nev., will take bids until

March 15 for a new electrically-operated pumping plant, including pumping machinery, motors, automatic control, tank, valves, piping, etc. The city engineer is in charge.

The Columbia Tire Corporation, Northwest Bank Building, Portland, Ore., will open bids early in March for its new two-story plant, 80 x 350 ft., on the Columbia Boulevard, estimated to cost about \$85,000. R. A. Wurzburg is president.

The City Council, Canby, Ore., has plans under way for a municipal electric light and power plant.

The Consolidated Railway Equipment Co., Knott Street, Portland, Ore., is making inquiries for an overhead electric traveling crane, about 50-ft. span, 35-40 tons capacity.

The Long-Bell Lumber Co., Kansas City, Mo., is considering preliminary plans for a new mill in the vicinity of Kelso, Wash., estimated to cost in excess of \$300,000 with machinery. R. A. Long is chairman of the board; F. J. Bannister is president.

The Common Council, Puyallup, Wash., has tentative plans under consideration for a municipal electric light and power plant.

The General Petroleum Corporation, 310 Sansome Street San Francisco, is planning for extensions in its terminal plant at Harbor Island, Seattle, Wash., to cost about \$100,000. The installation will include new steel tanks, pumping machinery, distributing equipment, etc.

The Central South

St. Louis, Feb. 27.

The Chicago, Rock Island & Pacific Railroad Co., Chicago, has completed plans for a new coaling station at Booneville, Ark.

Fire, Feb. 23, destroyed the grinding plant of the Charleston Mining & Mfg. Co., near Mount Pleasant, Nashville, Tenn., with loss estimated at \$150,000, including machinery.

The United Light & Power Co., Manhattan, Kan., has plans nearing completion for a one-story power house, 50 x 80 ft., at Downs, Kan.

Fire, Feb. 14, destroyed a portion of the plant of the Ardmore Nut Co., Ardmore, Okla., and adjoining works of the James Everett Machine Co., with total loss estimated at \$100,000, including buildings and equipment.

The Common Council, Foss, Okla., has commissioned H. G. Olmstead & Co., Oklahoma City, Okla., engineers, to prepare plans for a municipal electrical light and power plant.

A vocational department will be installed in the two-story and basement junior high school, 120 x 215 ft., to be erected at Peabody, Kan., estimated to cost about \$150,000. Mann & Gerow, Rorabaugh-Wiley Building, Hutchinson, Kan., are architects.

The Osage Power Development Co., P. O. Box 922, Lamar, Mo., W. R. Banks, manager, is perfecting plans for its new hydroelectric generating plant on Linn Creek, Camden County, with capacity of about 30,000 hp. A transmission system, over 100 miles long, will also be built. The entire project is estimated to cost in excess of \$3,000,000.

The Kansas City Power & Light Co., Kansas City, Mo., will build a new one-story and basement power house, 50 x 140 ft., at 1110-12 Baltimore Avenue. H. C. Blackwell is manager.

A vocational department will be installed in a one-story and basement high school to be erected at Frederick, Okla., estimated to cost about \$150,000. Tonnini & Bramblett, Terminal Arcade Building, Oklahoma City, Okla., are architects.

The Martin-Parry Corporation, York, Pa., manufacturer of automobile bodies, has leased about 20,000 sq. ft. at Kansas City, Mo., for the establishment of a branch assembling plant for commercial car bodies.

The Midland Metal Mfg. Co., 1219 Lydia Avenue, Kansas City, Mo., has filed plans for a one-story addition, 50 x 75 ft.

The Broderick & Bascom Rope Co., 4600 North Main Street, St. Louis, manufacturer of wire rope and cable, will rebuild the portion of its wire-stranding department, recently destroyed by fire with loss estimated at about \$75,000, including equipment.

The Board of Water Commissioners, St. Louis, will construct a steam-operated power house in connection with extensions to the city waterworks, to include electric generator, exciter, engine, boiler and auxiliary equipment. A machine shop will also be built. The entire project will cost in excess of \$1,000,000. Edward E. Wall is water commissioner in charge.

Fire, Feb. 19, destroyed a portion of the plant of the Commercial Car Co., Highland Park, Louisville, manufacturer of automobile bodies, etc., with loss estimated at \$100,000 including equipment and stock.

IRON AND INDUSTRIAL STOCKS

Steel Shares Attracted Much Attention During the Past Week

Steel shares attracted much attention in the investment world. Industry, in general, is looking to the steel industry for an indication of prospective business. Increased steel mill operations, as well as renewed talk dealing with combinations of steel properties, have but accentuated public interest in steel shares. The strength of United States Steel common has been the outstanding feature the past week establishing, as it has, new high records for this movement. Against the strength of Steel common there has been some liquidation in other steel shares, prompted by published and forthcoming annual statements. Aside from the steel outlook, the continued strength of foreign exchange is perhaps the most outstanding development.

The range of prices on active iron and industrial stocks from Monday of last week to Monday of this week was as follows:

Allis-Chalm. com.	44 1/4 - 45 1/4	Lackawanna Steel.	45 1/2 - 46 1/2
Allis-Chalm. pf.	90 1/2 - 92	Midvale Steel	30 - 31 1/2
Am. Can. com.	39 1/2 - 41 1/2	Nat.-Acme	10 1/2 - 11 1/2
Am. Can. pf.	98 1/2 - 100	Nat. E. & S. com.	32 1/2 - 33 1/2
Am. C. & P. com.	116 1/2 - 119 1/2	Nat. E. & S. pf.	— - 85 1/2
Am. C. & P. pf.	120 - 120 1/2	N. Y. Air Brake	58 1/2 - 60 1/2
Am. Loco. com.	108 1/2 - 111 1/2	Pittsburgh Stl. pf.	— - 88
Am. Loco. pf.	— - 115 1/2	Press. Steel com.	64 1/2 - 66 1/2
Am. Radiator com.	87 - 88	Press. Steel pf.	— - 82
Am. Steel E. com.	31 1/2 - 33 1/2	Ry. Stl. Spg. com.	96 - 98 1/2
Am. Steel E. pf.	— - 93 1/2	Replieg Steel	30 1/2 - 32 1/2
Bald. Loco. com.	105 1/2 - 109 1/2	Republic com.	46 1/2 - 48 1/2
Bald. Loco. pf.	106 1/2 - 107 1/2	Republic pf.	74 - 76
Beth. Steel com.	88 1/2 - 91	Sloss com.	37 1/2 - 41 1/2
Beth. Stl. Cl. B.	63 - 66	Sloss pf.	75 - 78 1/2
Chic. Stl. 8 1/2 pf.	107 - 108	Superior Steel	— - 30
Colo. Fuel	25 1/2 - 27 1/2	Transue-Williams	— - 34 1/2
Cris. Steel com.	54 1/2 - 62	Un. Alloy Steel	26 1/2 - 27
Cris. Steel pf.	80 - 82	U. S. Pipe com.	25 1/2 - 26 1/2
Gen. Electric	150 1/2 - 155 1/2	U. S. Pipe pf.	60 1/2 - 62
Gt. No. Ore. Cert.	37 - 38	U. S. Steel com.	90 1/2 - 92 1/2
Gulf States Steel	67 - 71 1/2	U. S. Steel pf.	116 - 118 1/2
Int. Har. com.	85 - 92 1/2	Vanadium Steel	33 1/2 - 35 1/2
Int. Har. pf.	106 1/2 - 107 1/2	Va. I. C. & Coke	— - 50
		Westingh's Elec.	54 1/2 - 56 1/2

Lackawanna Steel Co. Loss

The Lackawanna Steel Co. for the year ended Dec. 31 reported a loss of \$1,082,276 from operations, after taxes and maintenance, against profits of \$10,674,345 in 1920. The net profit and loss deficit after inventory adjustment and other charges, amounted to \$3,384,876, against a surplus of \$4,294,375 in 1920. Details of the report follow:

	1921	1920
Net earnings after providing for taxes, expenses, maintenance	\$1,082,276	\$10,674,345
Interest on bonds and other obligations—		
Lack Steel Co.	887,962	985,151
Subsidiary Co.	147,916	157,006
	\$1,035,879	\$1,122,211
Balance	\$2,118,155	\$9,552,112
Less—Appropriations		
For extinguishment notes and invest	\$151,557	\$300,00
For deprec. and accruing renewals	1,378,176	2,127,421
	\$1,529,734	\$2,427,421
Balance of profit	\$3,647,889	\$7,124,691
Less—Adjust account of excess prov. for Fed. taxes and sundry res. less inventory revaluation adjust.	\$263,012	\$2,830,321
Net profit and loss for year	\$3,384,876	\$4,294,375

*Deficits.

Truscon Steel Co. Report

President Julius Kahn of the Truscon Steel Co., Youngstown, Ohio, informed stockholders at the yearly meeting in Detroit that business this year is at a rate 30 per cent above the corresponding period in 1921. The company's gross receipts last year aggregated about \$10,000,000. At the end of the year it showed a deficit of \$336,000 after all charges depreciation and dividends.

Inventory writeoff and depreciation charge in 1921 totaled \$980,000. Current assets as of Dec. 31 last were \$3,661,228.84 and current liabilities \$796,249.86, the latter item representing total obligations of the interest, other than cap

REPUBLIC'S REPORT

stock. Current assets included these items—cash, \$264,438.14; inventory, \$1,830,813.64; bills receivable, \$1,490,236.01, and investments and bonds \$185,285.

During the year the company paid dividends at the rate of 7 per cent on its preferred stock and 11½ per cent on common. President Kabin said that, unless conditions should prove worse than now anticipated he expected the company to earn its dividends this year.

Last year was the first in which the company lost money, attributed largely to depreciation in inventory valuation, occasioned by large stocks of raw materials on hand when cancellations started about a year ago.

National Enameling & Stamping Co. Elects New Directors

The management of the National Enameling & Stamping Co. at the annual meeting of its stockholders in Jersey City met with opposition in the form of a ticket against that put up by those in control. Under the leadership of Clement Studebaker, a ticket consisting of six new directors and ten old directors won over the management ticket by a vote of 130,512 to 77,719.

The six new directors elected are Clement Studebaker, J. W. Dougherty, former president of the Crucible Steel Co. of America; W. J. McGuire, J. S. Moran, Fred Orthwein, associated with the Bush interests of St. Louis, and W. B. Randolph. The following were re-elected, having received all the votes of the opposition: L. C. Bartling, G. V. Hagerty, G. W. Knapp, A. W. Niedringhaus, G. W. Niedringhaus, M. H. Schwartzburg, A. J. Knocheter, L. I. Niedringhaus, G. H. Niedringhaus and W. Howard Matthau. The directors who were defeated for re-election were: H. W. Bartling, George W. Knapp, Jr., W. H. Matthau, Charles L. Wagandt, Solomon Richman, Robert D. Samuels.

The board re-elected G. W. Niedringhaus president and adjourned until March 2, when a reorganization meeting will be held and action taken on the common and preferred dividends.

Mr. Studebaker said after the meeting the election of his ticket did not indicate that there was any dissatisfaction with the present management. "It means that we are going to advocate a more active policy and develop to a greater degree the steel end of the business," he said. The election of Mr. Dougherty as a director is expected to be of assistance in this direction.

The report of earnings for 1921, made public at the annual meeting, showed an operating loss of \$218,510, against a net profit of \$4,183,927 in 1920. After depreciation, interest and other charges, there was a deficit of \$1,258,615, against a surplus of \$3,362,151, after payment of common and preferred dividends, the total deficit last year amounted to \$2,591,123 against a surplus of \$1,726,613 in 1920.

Railway Steel Spring Shows Deficit

The annual report of the Railway Steel Spring Co. shows net earnings from all sources of \$1,551,625, in 1921, after deducting all operating expenses, depreciation, reserve for taxes, etc., as compared with a net of \$3,435,350 in 1920. After dividends there was a deficit of \$473,365, while in 1920 there was a surplus of \$1,410,350.

The dividends on preferred stock amounted to \$915,000 and on the common stock to \$1,080,000. Surplus accounts was reduced from \$12,912,344 to \$12,168,990. The company has \$1,433,601 in cash, \$1,460,896 in accounts receivable, \$7,877,162 in securities and investments and \$2,405,781 in inventories. Accounts payable amount to \$122,927. Total assets and liabilities are \$41,233,262.

President Fitzpatrick told the stockholders that the railroads had purchased only moderate quantities of equipment and supplies in the last two years, and that these purchases should increase greatly during 1922. The regular quarterly dividend of 2 per cent was declared on common and ½ per cent on preferred stock.

The St. Louis office of the Chicago Flexible Shaft Co. is to be resumed March 1, in charge of J. J. Wittenburg, who has been with the Chicago office of the company for three years. The office, as heretofore, will be located in the Railway Exchange Building.

Owing to the continued high cost of materials entering into industrial plant construction, the Youngstown Steel Co., Youngstown, Ohio, is not likely to proceed this year with its proposed mechanical puddling plant at Warren, Ohio. Several years ago the company acquired a site at Warren and planned to proceed with its plant this year. The mechanical puddler which it will employ is the invention of E. L. Ford of Youngstown.

Large Deficit, Payment of Dividend on Preferred Stock Suspended

The quarterly dividend of 1½ per cent due to be declared on the preferred stock of the Republic Iron & Steel Co. was passed by the directors last Thursday. Dividends at the rate of 7 per cent annually have been paid regularly since 1916. In that year and in 1917 payments exceeded 7 per cent, owing to extra payments on account of accumulated dividends for previous years. Dividends on the common stock were passed last May. The company had paid at the rate of 6 per cent annually on that stock from the beginning of 1917 to last spring.

A statement issued by the company following the meeting said, in part:

"The board of directors has decided to suspend payments on the preferred stock until future earnings warrant resumption of dividend disbursements. As current operations are without profit and the future outlook for business is uncertain, it was the opinion of the board of directors that this action is to the interest of the stockholders."

The annual report for 1921 shows that the company did a gross business of \$20,756,749, against \$76,342,220 the year before. Total net income amounted to \$685,120, against \$11,171,161. After all charges, including interest and other deductions, there was a deficit of \$5,665,242, against a surplus of \$7,616,522 the year previous. The income account follows:

	1921	1920
Net earnings	\$511,528	\$13,825,522
Interest, acc.	173,482	318,642
Total income	\$685,010	\$11,174,164
Expenses, etc.	1,194,130	.....
Loss	\$809,120	*\$14,174,164
Total deductions	1,049,148	5,819,674
Deficit	\$4,808,268	*\$8,354,489
Bond-note interest	806,974	737,967
Deficit	\$5,665,242	*\$7,616,522
Preferred dividend	1,750,000	1,750,000
Deficit	\$7,415,242	*\$5,866,522
Common dividend	450,000	1,500,000
Deficit	\$7,865,242	*\$4,066,522
Previous surplus	37,141,571	33,880,972
Surplus	29,276,329	37,947,494
Written off	.....	605,923
Final surplus	\$29,276,329	\$17,441,571

*Net profits and surplus.

On Dec. 31, 1921, the company reported unfilled orders on hand amounting to 67,731 tons of finished and semi-finished products and 23,839 tons of pig iron, against 162,906 tons of finished and semi-finished and 35,772 tons of pig iron at the close of 1920.

The general balance sheet on Dec. 31, 1921, showed inventories valued at \$15,251,801, against \$18,751,451 at the close of the previous year. Accounts receivable amounted to \$3,636,145, against \$8,869,442 and cash \$1,292,437, against \$1,443,752. Accounts and bills payable were \$4,196,639, against \$6,653,892, while reserves for depreciation totaled \$12,675,924, against \$11,901,170.

The report says:

"The operating results for the year ending Dec. 31, 1921, were decidedly the worst in our history, notwithstanding the company's growth with respect to diversity of product and facilities for economic manufacture. The outstanding feature of the business situation affecting operations was the general collapse in demand which occurred in the early part of the year, which situation became intensified during the second and third quarters of the year. Price declines occurred throughout the year on an increasing scale, but the fall in price was out of all proportion to cost reductions.

"General conditions affecting operating results can be best summarized by the statement that the tonnage shipped during 1921 decreased about 68 per cent as compared with the tonnage shipped during 1920, whereas selling prices for the principal iron and steel products, as tabulated by trade journal authorities, declined from the high point of 1920 approximately 50 per cent. Our total tonnage for the year was adversely affected by the unprecedented depression in the agricultural implement trade, and also by subnormal demands from the railroads, railway equipment, trade and other construction enterprises, using such heavy iron and steel products as bars, plates and shapes, which products represent about one-half of our finishing capacity. In other departments of our business, such as sheets and tubular products, the demand was relatively better. As a result of this unbalanced condition of trade, our total production and

shipments for the year were only approximately 25 per cent of our normal capacity.

"The total earnings for the year ending Dec. 31, 1921, were \$685,010.21, from which amount there was deducted on account of idle plant expenses, depreciation, inventory shrinkage and other miscellaneous items the amount of \$6,350,252.35, and as a result the net loss for the year ending Dec. 31, 1921, was \$5,665,242.14.

"Earnest efforts were made during the year to effect economies in all directions: common labor rates were reduced about 40 per cent, with relative adjustments in all other labor and salaries, and substantial reductions in other items of cost were also effected, but as price reductions were necessarily made before cost reductions were possible, operating losses followed; furthermore, the limited demand for our products made an economic operation impossible.

"Freight charges, a large item of cost in iron and steel (due to the fact that it requires five tons of inbound material for the production of one ton of outbound shipment) were maintained throughout the year on a war basis, these rates being about double pre-war rates, in consequence of this abnormal condition, freight charges now represent about 50 per cent of the cost for producing crude products of iron and steel, and until this blockade against further cost reductions is lifted by freight rate reductions, neither normal costs nor normal demand for iron and steel can be expected.

"In view of the liberal charges heretofore made for provisional funds, the board of directors were of the opinion that these charges for the year ending Dec. 31, 1921, should be reduced. Ample expenditures, however, were made for proper upkeep of the plants and property, and we are therefore in position to take advantage of any improvement in demand which may occur. In addition to these expenditures, over \$3,000,000 was expended during the year, completing prior year's appropriations, for improvements and extensions to property and equipment, the most important items being increased sheet steel finishing capacity, and for additions to our Northern mineral properties.

"Dividend payments on the preferred stock of the company were continued throughout the year because the board of directors were of the opinion that accumulated surplus justified such payments. As a result of these various expenditures, working capital has been necessarily reduced, leaving, however, a balance of net quick assets as of Dec. 31, 1921, of \$15,180,064.10. Reductions were also made in the surplus account, through the absorption of losses incurred and dividends paid, leaving the net balance Dec. 31, 1921, of \$29,576,329.35."

Industrial Finances

The Ryan Car Co., Chicago, has increased its capital stock from \$2,500,000 to \$6,000,000 by the issuance of 35,000 shares of additional common stock with par value of \$100 per share. The new stock issued was distributed to the old common stock holders as a stock dividend. The company is merely capitalizing its assets. It is not contemplating any new extensions, as it has completed within the last year or so a large steel repair plant at Chicago.

The gross sales of the Transue & Williams Steel Forging Corporation for 1921 were \$3,605,444, the net profits after charges and Federal taxes \$43,138, and the deficit after \$300,000 paid out in dividends \$256,862. In 1920, the gross sales were \$7,559,871, the net profits \$670,734, dividends \$500,000, and the surplus \$170,784.

The net profits of the Wellman-Seaver-Morgan Co., Cleveland, for the year ending Dec. 31, 1921, after Federal taxes were deducted, amounted to \$61,518, according to the statement presented at the annual meeting, Feb. 21. The company's surplus at the end of the year amounted to \$770,467 as compared to \$728,956 a year ago. Reports show that the company has no bank loans and is in a strong financial position, having \$399,773 in cash on hand as against \$269,691 on Dec. 31, 1920.

Plans of New Companies

The Automotive Accessories Corporation, Redford, Mich., has let contracts covering dies and an initial order of 1000 oil pans to the Detroit Stamping Co., Detroit. The new company states that whether it will install equipment has not been definitely decided.

The Brake Appliance Co., 3609 Gratiot Avenue, Detroit, is just getting into manufacture on a production basis, its product being the Simplex brake equalizer which applies the tension to both brake drums through the medium of a steel compression spring. It is claimed that this device eliminates the wearing jerk, causes instant response to the pressure of the foot upon the brake and obtains a safe, smooth stop under all conditions.

TRADE CHANGES

Negotiations have just recently been consummated whereby R. W. Munger, Elkhart, Ind., has purchased controlling interest in the Godfrey Conveyor Co. of that city. At the last meeting of the board of directors Mr. Munger was elected president of the company. Other officers elected were B. C. Godfrey, vice-president, D. H. Heibster, treasurer, and Chas. F. Clouse, secretary. The board of directors includes all officers of the company with James H. Channon, Chicago, and Fred W. Reid. At the meeting it was announced that the Godfrey Conveyor Co. would plan to occupy a greater place in the conveyor field than before and would aim to serve a wider field in supplying additional equipment now perfected and ready for the market. This new equipment includes the Godfrey standard car puller, which is designed to economically serve all general car moving needs, and Godfrey single drum hoists, which are destined to fill a great need among contractors and manufacturing plants.

L. Norris Hall, Inc., 910 North Front Street, Philadelphia, have just been appointed sales agents for the Philadelphia territory by J. W. Brainerd Steel Co., Warren, Ohio, manufacturer of patented hoops and rivets.

The George J. Hagan Co. has recently opened up offices in Detroit and Chicago. The Detroit office is located at 515 Murphy Building and is under the management of J. Sandberg, formerly of the General Electric Co. The Chicago office is at 70 East Jackson Boulevard and is under the management of V. A. Ham, formerly of the General Electric Co.

Frank E. Waddell and John Husband, for 15 years actively identified with the Consolidated Coke Co., Uniontown, Pa., and Pittsburgh, and the Pioneer Coal & Coke Co., Pittsburgh, have disposed of their holdings to George Whyel, Uniontown, Pa., and Charles E. Colbert, Jr., Pittsburgh.

The Norwalk Iron Works Co., South Norwalk, Conn., recently dissolved, was the old concern incorporated under the laws of Connecticut. The new company by the same name is incorporated under the laws of Delaware. The proceeding was simply a matter of form. The newly organized company announces the personnel of its executive staff as follows: C. L. Thompson, president and general manager; Howard E. Adt, first vice-president; Harold B. Knowles, treasurer and assistant secretary; Thomas M. Steele, secretary; A. R. Betts, vice-president in charge of sales; W. E. Mathews, vice-president in charge of manufacturing and engineering; G. W. Wardwell, chief engineer; W. M. Greene, general superintendent.

M. Samuel & Sons, scrap dealer, 1746 Woolworth Building, New York have opened a branch office at 1721 H Street, N. W., Washington, which is in charge of DeNeal Samuel, a member of the firm.

The United States Cast Iron Pipe and Foundry Co. has opened a new office at the Interstate Building, Kansas City, Mo., which will be in charge of D. W. Pratt, sales agent.

The Cummings Machine Co., Munster, Ohio, has had its name changed to the Industrial Equipment Co.

The A. Z. Boyd Co., 126 Chambers Street, New York, has taken the New York agency for the sale of the line of screw plates made by the Russell Mfg. Co., Greenfield, Mass. It has had wide experience in selling these tools, having in the past been instrumental in building up the New York sales of one of the largest makers of screw plates.

The Spad Mfg. Co., Inc., has been incorporated for the purpose of manufacturing and distributing the Spad timer, a distributor for Ford cars. The company has gone into rather large production on this item and is solely occupied with its manufacture at present. Parts of this work are done under contract, such as brass automatic screw machine parts, pressed and rolled screw parts and rubber molding. Not wishing to confine itself for the entire future of the company to the manufacture of one item, the incorporation papers allow room for the fabrication of practically any devices in the automotive industry.

The International Lubricants Co., Ltd., Evanston, Ill., established 1914, has been incorporated and capitalized for \$500,000, fully paid up, under the trade name of International Refining & Mfg. Co. W. O. Jeffery, president, has been in this line of business practically all his life, and the company can take care of domestic and foreign trade in its special lines of cutting lubricants, fibre, transmission and cup greases.

Butts & Ordway Co., Purchase Street, Boston, on March 11, will open a branch store at 68 Brookline Street, devoted exclusively to lines used in the garage and service station business, including a line of metal-working machine tools.

Current Metal Prices

On Small Lots, Delivered from Merchants' Stocks, New York City

The following quotations are made by New York City warehouses.

As there are many consumers whose requirements are not sufficiently heavy to warrant their placing orders with manufacturers for shipment in carload lots from mills, these prices are given for their convenience.

On a number of articles the base price only is given, it being impossible to name every size.

The wholesale prices at which large lots are sold by manufacturers for direct shipment from mills are given in the market reports appearing in a preceding part of THE IRON AGE under the general heading of "Iron and Steel Markets" and "Non-ferrous Metals."

Iron and Soft Steel Bars and Shapes

Bars:	Per Lb.
Refined bars, base price.....	2.53c.
Swedish bars, base price.....	10.00c.
Soft steel bars, base price.....	2.53c.
Hoops, base price.....	3.38c.
Bands, base price.....	3.13c.
Beams and channels, angles and tees	
3 in. x ¼ in. and larger, base.....	2.63c.
Channels, angles and tees under 3 in. x	
¼ in., base.....	2.53c.

Merchant Steel

	Per Lb.
Tire, 1½ x ½ in. and larger.....	2.50c.
(Smooth finish, 1 to 2½ x ¼ in. and larger) ..	2.70c.
Toe-culk, ½ x ¾ in. and larger.....	3.20c.
Cold-rolled strip, soft and quarter hard..	6.25c. to 7.25c.
Open-hearth spring steel.....	3.55c. to 6c.
Shafting and Screw Stock:	
Rounds.....	3.35c.
Squares, flats and hex.....	3.85c.
Standard cast steel, base price.....	12.00c.
Extra cast steel.....	17.00c.
Special cast steel.....	22.00c.

Tank Plates—Steel

¾ in. and heavier.....	2.63c.
------------------------	--------

Sheets

Blue Annealed

	Per Lb.
No. 10.....	3.28c. to 3.53c.
No. 12.....	3.33c. to 3.58c.
No. 14.....	3.38c. to 3.63c.
No. 16.....	3.48c. to 3.73c.

Box Annealed—Black

	Soft Steel C. R. One Pass Per Lb.	Blue Stove Pipe Sheet, Per Lb.
Nos. 18 to 20.....	3.55c. to 3.80c.	.....
Nos. 22 and 24.....	3.60c. to 3.85c.	4.10c.
No. 26.....	3.65c. to 3.90c.	4.15c.
No. 28.....	3.75c. to 4.00c.	4.25c.
No. 30.....	4.00c. to 4.25c.	.....

No. 28 and lighter, 36 in. wide, 10c. higher.

Galvanized

	Per Lb.
No. 14.....	3.85c. to 4.10c.
No. 16.....	4.00c. to 4.25c.
Nos. 18 and 20.....	4.15c. to 4.40c.
Nos. 22 and 24.....	4.30c. to 4.55c.
No. 26.....	4.45c. to 4.70c.
No. 27.....	4.60c. to 4.85c.
No. 28.....	4.75c. to 5.00c.
No. 30.....	5.25c. to 5.50c.

No. 28 and lighter, 36 in. wide, 20c. higher.

Welded Pipe

Standard Steel

	Black Galv.	Wrought Iron	Black Galv.
½ in. Butt....	—56 —40	¾ in. Butt....	—30 —13
¾ in. Butt....	—61 —47	1½ in. Butt....	—32 —15
1-3 in. Butt....	—63 —49	2 in. Lap....	—27 —10
3½-6 in. Lap....	—60 —46	2½-6 in. Lap....	—30 —15
7-8 in. Lap....	—56 —34	7-12 in. Lap....	—23 —7
9-12 in. Lap....	—55 —33		

Steel Wire

BASED PRICE* ON NO. 9 GAGE AND COARSER

	Per Lb.
Bright basic.....	3.50c. to 3.75c.
Annealed soft.....	3.50c. to 3.75c.
Galvanized annealed.....	4.25c. to 4.50c.
Coppered basic.....	4.00c. to 4.25c.
Tinned soft Bessemer.....	5.50c. to 5.75c.

Brass Sheet, Rod, Tube and Wire

BASE PRICE

High brass sheet.....	16½c. to 17 c.
High brass wire.....	17 c. to 17½c.
Brass rod.....	14½c. to 14½c.
Brass tube, brazed.....	26 c. to 27½c.
Brass tube, seamless.....	18½c. to 19 c.
Copper tube, seamless.....	20½c.

Copper Sheets

Sheet copper, hot rolled, 24 oz., 20½c. to 21c. per lb. base.

Cold rolled, 14 oz. and heavier, 2c. per lb. advance over hot rolled.

Tin Plates

Bright Tin	Grade "AAA" Charcoal 14x20	Grade "A" Charcoal 14x20	Coke—14-20	Primes Wasters
			80 lb..	\$6.05 \$5.80
			90 lb..	6.15 5.90
			100 lb..	6.25 6.00
	IC..	\$10.00 \$8.50	IC..	6.40 6.15
	IX..	11.25 10.00	IX..	7.40 7.15
	IXX..	13.00 11.50	IXX..	8.40 8.15
	IXXX..	14.75 13.25	IXXX..	9.40 9.15
	IXXXX..	16.25 15.00	IXXXX..	10.40 10.15

Terne Plates

8-lb. Coating 14 x 20

100 lb.....	\$7.00
IC.....	7.25
IX.....	7.50
Fire door stock.....	10.00

Tin

Straits, pig.....	33c.
Bar.....	38c. to 43c.

Copper

Lake ingot.....	15 c.
Electrolytic.....	14½c.
Casting.....	14½c.

Spelter and Sheet Zinc

Western spelter.....	6½c. to 7c.
Sheet zinc, No. 9 base, casks.....	10½c. open 11c.

Lead and Solder*

American pig lead.....	5½c. to 6¼c.
Bar lead.....	6¾c. to 7 c.
Solder, ½ and ½ guaranteed.....	24c.
No. 1 solder.....	22c.
Refined solder.....	18c.

*Prices of solder indicated by private brand vary according to composition

Babbitt Metal

Best grade, per lb.....	75c.
Commercial grade, per lb.....	35c.
Grade D, per lb.....	25c.

Antimony

Asiatic.....	5½c. to 6c.
--------------	-------------

Aluminum

No. 1 aluminum (guaranteed over 99 per cent pure), in ingots for remelting, per lb....26c. to 28c.

Old Metals

The market continues weak and transactions are hard to put through. Dealers' buying prices are nominally as follows:

	Cents Per Lb.
Copper, heavy crucible.....	10.50
Copper, heavy wire.....	9.75
Copper, light and bottoms.....	8.00
Brass, heavy.....	5.00
Brass, light.....	4.50
Heavy machine composition.....	7.25
No. 1 yellow brass turnings.....	5.00
No. 1 red brass or composition turnings.....	6.75
Lead, heavy.....	8.75
Lead, tea.....	2.50

THE IRON AGE

New York, March 9, 1922

ESTABLISHED 1855

VOL. 109, No. 10

Submarine Cutting Torch Under Water

Broken Siphon Pipe Burned Off by Electric Torch Under
50 Ft. of Water—Great Advance in the Art of
Submerged Metal Cutting

BY ROBERT G. SKERRETT

AS the oxy-acetylene flame is capable of fusing its way through metallic masses of all sorts and divers thicknesses, whenever it can be brought into play in capable hands, it is not surprising that much experimenting has been done in the last decade to adapt the torch to the needs of the marine worker. This flame has been utilized extensively in cutting out the rivets of steel hulls, so as to hasten repair jobs and replacements; but as a rule this procedure has been confined to ships in dry dock or to parts of vessels that could be approached in the open air. It has long been realized that much could be gained if a torch capable of working under water could be devised, for service in cutting metal bodies of one kind or another. To this end, the Germans brought out some years back a submarine oxy-acetylene torch.

Broadly stated, the gases were discharged through a cup-shaped nozzle, and the flame was generated at the inner center of this vessel. The pressure of the expanding gases was relied upon to prevent the enveloping water from flooding the nozzle. Further, the force of the gas blast also served to wipe away or to scatter the metal made fluid by the heat of the flame. If the position of the nozzle opening or the impulse of the stream of gas was such that the water could inundate the cup, then the flame was extinguished and it was necessary to carry the torch to the surface to relight it.

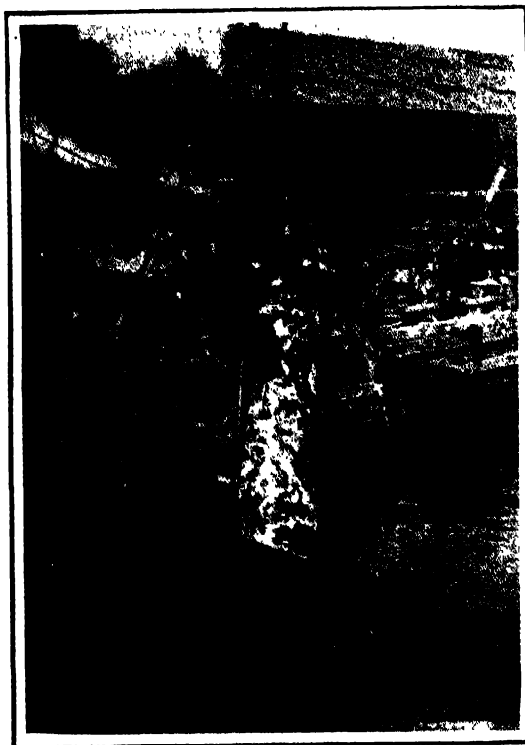
In using this torch, care had to be exercised to hold the nozzle downward—at least not to raise its mouth above the horizontal. And the flame could not be kept alive unless the pressure of the repelling gases considerably overbalanced the hydrostatic pressure at the operating depth. In short, this submarine-cutting apparatus was found effective only at comparatively shallow depths. Nevertheless, the Germans pointed the way and proved that a bare flame could be kept burn-

ing when submerged. This much was clear gain.

The question is often asked: "Why try to cut metals with a flame under water when there are already available pneumatically-driven tools that can be utilized for such work?" And the query is a logical one, as compressed air must be used for the divers. Air-actuated tools have been built for service of this sort, but they are not commonly employed, for one reason or

another. Mechanisms of this character are apt to clog with ice, owing to the refrigerating action of the rapidly expanding exhaust air, and this chilling is speeded up when the temperature of the water is already low. Therefore, the idea of a submarine torch has appealed to the inventive mind.

During 1918 and 1919 the French naval authorities became much interested in efforts made at Lorient to improve upon the earlier German torch, and to devise comparatively simple attachments by which the ordinary oxy-acetylene torch might be operated under water in dealing with marine salvage problems, of which there were then many. After months of experimenting a measure of success was attained, and steelwork—parts of wrecked vessels—was so dealt with. That is to say, angles, T-bars, deck beams, etc., were thus cut through in a fairly rapid manner at depths ranging from 10 to 30 ft.



Hoisting from the Water the Broken Section of
Pipe with—at Top—the Bell Cut from the Next
Section

The nozzle finally evolved for the work was a double-walled affair, the inner tube constituting the flame chamber. From between this tube and the outer sleeve was discharged a stream of compressed air at sufficient pressure to form an atmospheric envelope for the flame. The force of this air held the water at bay while the torch reached the metal so bared.

While theoretically simple, the French torch was, in fact, complex, because it had to be supplied with acetylene, comparatively pure oxygen and air, each at a different pressure. At a depth of 30 ft., the pressure of

the acetylene was about 23 lb. per sq. in., while that of the oxygen and the air was much higher. The purpose in keeping the pressure of the acetylene as low as possible was to check its tendency to explode rather than to burn as a flame. Indeed, this characteristic of acetylene has limited its subaqueous use; and, inasmuch as the pressure of the gas must be augmented as the depth increases, the operation of such a torch has been confined to submergences of less than 40 ft.

While the French found that their torch was apt to

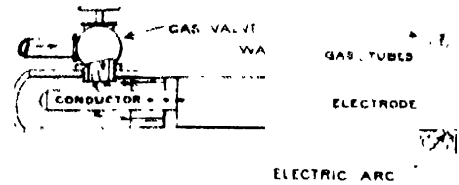


Diagram of the American Torch

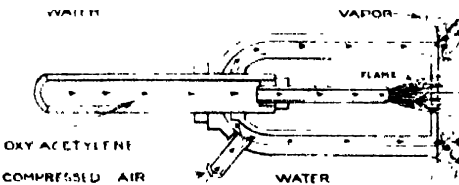


Diagram of the French Torch

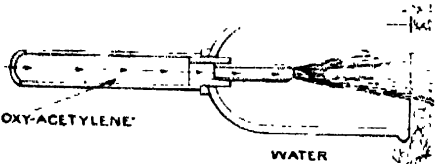


Diagram of the German Torch

be extinguished if the nozzle touched the metal surface, yet the tip of the apparatus had to be held from it a distance of but a few millimeters. It has latterly been reported that they have improved upon the apparatus, so that it can be ignited under water by chemical action; this obviates necessity for the diver to return to the surface to relight the gases. But there is nothing to indicate that this torch has yet gone beyond the experimental stage.

American Progress in Submerged Cutting

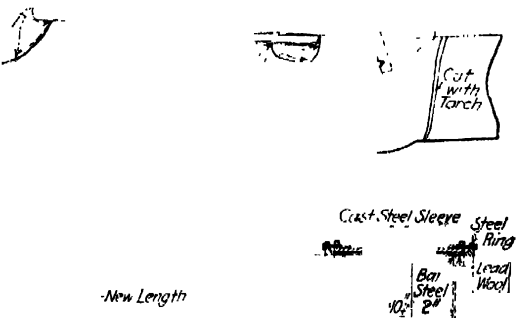
The foregoing résumé of the art will help to a better understanding of what has been achieved here during the last few years. These steps forward have placed our engineers in a position to attack successfully certain difficult tasks under water; and the recent repair of the ruptured water main beneath the Narrows in New York harbor represents a climacteric performance. Staten Island, by reason of the break, was cut off from the Catskill water supply system for several weeks, and this period of isolation would, undoubtedly, have been a good deal longer but for the aid rendered by submarine cutting torches in facilitating the removal of the damaged piping.

These torches are the outcome of experiments begun in 1918, during the refloating of the transatlantic liner St. Paul, which sank at her slip. For the purpose of draining that craft the divers blasted passages through various bulkheads. These holes allowed the water within the ship to move freely from one compartment to another so as to reach the suction of wrecking pumps. But the salvors realized that this time-honored method of breaching steel partitions always did a good deal of damage and entailed correspondingly heavy outlays in making repairs.

Therefore Ralph E. Chapman, one of the engineering force of the wreckers, and J. W. Kirk, an associate, set about adapting the oxy-acetylene torch and the electric arc for subaqueous service. The improvements evolved by them did much to insure a more nearly continuous working of the cutting flame; and by means of this apparatus 12 holes, each about 14 in. in diameter, were made through as many steel barriers. It took several hours to cut the average opening; some of the passages were located in decidedly awkward places; and the deepest of them were 50 ft. under water. The torch was lighted below the surface electrically, both at the outset and whenever the flame was extinguished accidentally. However, experience revealed that the acetylene was troublesome at the lower depths, and for the reason already explained.

This introduction of the electrical feature marked an advance in the art; and between 1918 and 1921 the Merritt & Chapman Derrick & Wrecking Co., recognizing the desirability of such a tool for dealing with wrought iron and steel under water, gave Ralph E. Chapman a free hand in the further development of the torch. Last December, in its new form, the torch was put to a convincing test during the raising of the United States submarine S-48, which sank off Bridgeport, Conn.

To refloat that boat, it was necessary to drain the flooded afterbody; and the primary problem was to get divers into the vessel to make a pipe connection so that wrecking pumps could be brought into action. The logical way to do this was through a hatch immediately over the inundated motor-room, but that hatch—at a depth of 70 ft.—was sealed tight by a cast-steel cover locked in position from within the submarine. A hole

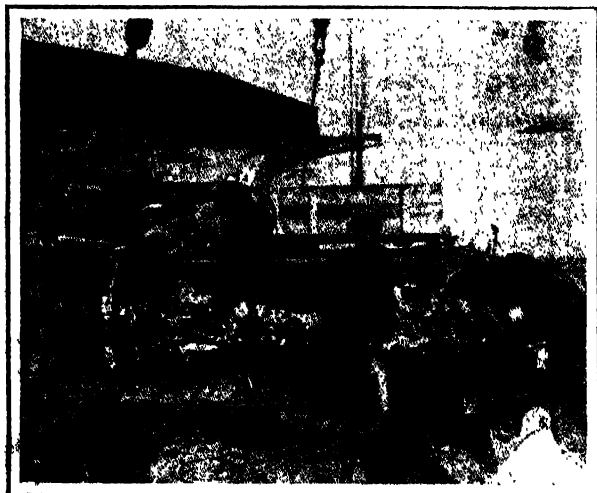


How the Old Pipe Section Was Cut Out and Lifted; How the New Section Was Inserted and Made Tight

was cut through the center of the heavy steel hatch cover by the new torch; and when this was large enough a diver reached in and released the locking gear.

The torch used on the submarine was simple in its get-up. Its operative parts, at the working end, consisted of a carbon electrode, a few inches long, traversed longitudinally by two small gas conduits—brass tubing about 1/8 in. in external diameter. The pressure and the quantity of gas conform with the operating depth. All the diver has to do is to bring his tool close enough to the metal to be cut to cause arcing; and the best effect is obtained when the electrode is something like 1/4 in. away from the "ground." The electrode is connected to one pole of a generator, the other pole being grounded through the water to the work. Acetylene is not employed. The "cutting gas," of a nature not disclosed, is supplied from the surface through a suitable hose, within which is carried also the electrical conductor.

The temperature of the oxy-acetylene flame is in the neighborhood of 3600 deg. Fahr., while that of the electric arc is more than 6000 deg. The function of the gas used is to create a gaseous envelope for the arc, by converting the surrounding water into steam, and to oxidize and blow away the metal that is fused by the arc. Without this action of the gas, the fused metal would be apt to "freeze" quickly with the shifting of the electrode, and thus slow up the speed of cutting. The new torch is not hampered by hydrostatic pressure so long as the "cutting gas" has sufficient heat to vaporize the water, and force enough to blow the melted



Illustrating the Method of Cutting from Outside the Pipe; the Lower Third of the Bell, at Left, Had to Be Cut from Inside the Pipe, the Diver Lying on His Side to Operate the Torch

metal aside. A carbon electrode will last for 30 minutes of cutting.

The torch lately used on the Narrows siphon was much like that employed in cutting through the hatch of the S-48, save that it had to be modified slightly so that it could deal with thick cast iron. The remelting temperature of cast iron is around 2800 deg. Fahr.; and the higher the fusing point the faster a metal freezes, especially when acted upon by cold water. The problem, therefore, was to utilize as much of the heat of the electric arc as practicable in melting the cast iron, and then to scour out the molten crater by a suitably strong blast of "cutting gas." At the time the work was undertaken in February there was ice in the harbor, and the temperature of the water was close to 32 deg. Fahr.

Cutting of metal walls ranging in thickness from 1½ in. to 3½ in. was involved, the thinner body being severed at a linear speed of from 4 to 6 in. an hour, depending upon the ease with which the divers could get at their points of attack. All told, the divers made cuts aggregating nearly 30 ft. in length; and they were engaged on this phase of the task for the better part of ten days. One portion of the work involved cleaving circumferentially a section of the cast-iron pipe having an external diameter of 39 in.; this cut was made on a slant to facilitate lifting out the detached portion. The lower third of this cutting had to be done from within the conduit.

What Made the Job Necessary

Where the siphon nears the bulkhead line of the Staten Island piers, it rests 53 ft. below the surface of the water and is buried under 26 ft. of mud. By chance a dredge, engaged in deepening the overlying slip, hit one of the 12-ft. pipe lengths a shattering blow; the impact opened up a wide and long fracture. This necessitated shutting the gate valves at the Brooklyn and the Staten Island ends of the main. The ques-

tion was, how to withdraw the damaged unit and to insert a new one in the shortest possible time, and with the least disturbance of the neighboring links? The Merritt & Chapman Derrick & Wrecking Co., which had laid the siphon, tackled the job.

First, a wide excavation was made in the harbor bed for the purpose of baring the injured pipe, and to give the divers a chance to work without fear of the mud sliding in on them. The blow that had fractured one pipe unit also forced the two contiguous ones downward out of line; and before any cutting was done the divers blocked these up. Next, the fracture was enlarged near the spigot end (right end, in our drawing) to form a hatchway through which a diver could get inside to cut the lower part of the adjoining pipe just back of the bell. Most of the upper section of the bell of the ruptured pipe length was then detached by cutting, including an enveloping wrought iron band 4 in. wide and 1½ in. thick. This work produced an elbow-like hollow which allowed sufficient play, when the opposite end was lifted, as shown in dotted lines, to break that lead-packed joint and to let the remaining part of the bell swing outward and free.

A new section was promptly lowered and installed in place of the fractured one, the joint at the bell being sealed with a packing of lead wool hammered home. The gap between the spigot end of the new unit and the pipe from which the bell had to be severed was bridged by a cast steel sleeve of ample length (5 ft.) to provide a strong union. The manner of making this connection is shown in the sketch. The bolts shown were used merely to equalize the space to be used for lead wool packing.

Before the repaired siphon was permitted to send water onward to Silver Lake reservoir, Staten Island, it was scoured out and sterilized. This was done by turning Catskill water into the siphon at Brooklyn and discharging it into a sewer at the Staten Island side by way of a 12-in. blow-off. When all of the mud and foul water were thus purged from the conduit, chloride of lime was added to the water entering at Brooklyn.



This Portion of the Bell of the Broken Pipe Section Was Cut Off to Permit Easy Separation of the Broken Unit from the Next Intact Section

This protective measure continued until tests showed the siphon to be absolutely clean. These steps were essential, for normally this siphon supplies some 125,000 people daily with the bulk of their potable water.

The Commonwealth Steel Company, St. Louis, is paying its molders 76c. an hour and not 90c., as recently stated in these columns.

Novel Applications for Thin Steel Bands

Special Advantages Follow Their Use for Power Transmitting and Conveying Purposes—Question of Tension Important

BY BERNARD KRUGER*

WHILE the entering of metal bands into competition with ropes, leather and textile belts for the transmitting of power and the mechanical handling of material, has made great headway during the past few years in Europe, very little concerning this development has appeared in the literature of this country. At present there is almost 1,000,000 hp. being transmitted by steel bands, covering every class of drive, and over 1000 steel band conveyors are at work, handling not only ordinary materials, but including some hitherto impossible for any kind of belt conveyor.

Successful use of steel bands for power and conveying has been gradually evolved from experiments made during a period of nearly fifteen years in most countries where mechanical power is used. The early experimental attempts were directed to the use of steel bands for power transmitting, but after a short period of use they invariably broke when subjected to any considerable increase in load. Persistent failure also attached itself to the various connections used in joining the ends of the bands together.

Subsequent experiments showed that these unsatisfactory results were attributable mainly to mistaken conceptions as to the conditions under which steel bands should be used. In calculating and constructing metal band gearing, on the occasion of previous experiments, it was found that consideration was not given to the fact that the metal band employed is subjected to a flexure constantly varying from zero to a maximum, and that to insure durability with such a demand it was not sufficient for the bands to be calculated in the usual manner, that is, so that the greatest bending stress which occurred was below the limit of fracture of the material. The error consisted in not regarding the result of philosophical researches first undertaken by Wohler, according to which a tension constantly varying from zero value to a maximum, and frequently applied to a body, causes self-destruction, if the maximum tension is not confined to half the breaking stress of the material.

Avoiding Fractured Bands

The present system is, therefore, based on the knowledge that a fracture of the belt band, even with a constantly varying demand on its flexibility, can be avoided with certainty if the maximum demand likely to occur is kept so low that it does not attain the value of the limit of fracture. According to the present method the breaking of the bands is avoided, and the durability made unlimited by the thickness; that is, the sectional dimension which, when wrapping the pulley, is perpendicular to the pulley surface, is arranged to be not more than a definite maximum.

The bands are made from carefully hardened and tempered carbon steel, prepared by special process, rough rolled at red heat and then brought down to standard thickness and width by cold working. The tensile strength of the finished material is about 95 tons to the sq. in. The edges are rounded and so finely finished that the bands can be safely handled, even when running at high velocity.

The dead weight of the steel band is very small, as compared with its great tensile strength, consequently, power for power, it is far lighter than any leather or woven-belt, than the equivalent power chains or cotton ropes. In the following table are shown the approximate leading dimensions, namely, effective driving

width and weight of leather belt, cotton ropes, power chain and steel band for transmitting 200 hp. at about 3000 ft. per min.

System	Weight Per Ft.	Driving Width
Double leather belt.....	6 lb.	24 in.
Five 2-in. cotton ropes.....	7 lb.	15 in.
Three-inch pitch chain.....	43 lb.	7 in.
Steel band	15 lb.	8 in.

It will be gathered from the preceding figures that the steel band is so light in weight that it would be impracticable to depend upon its sag to give any serious proportion of the driving tension or adhesion to the pulleys.

Owing to the high modulus of elasticity of steel it is necessary to determine the length of a driving band with considerable accuracy; a short extension, compelled by cutting the band too short in the first instance, sets up very serious stresses. To accomplish this determination, an ingenious device has been invented for determining the necessary length for the purpose, obtaining a truly correct working tension. For this purpose it is requisite to make allowance for the sagging of the band, which is effected in this manner:

A measuring band of small breadth and of definite section is mounted on the pulleys on which the operating band will subsequently be required to run, and the ends fitted into a tension frame. By means of a helical spring and calibrated nut, by the compression of which the arms of the tension frame approach one another, the total tension equaling the desired initial unit stress in the driving band is read off on a scale. One of the pulleys around which the band is placed (or also both pulleys, in opposite directions) is now slowly rotated so that the friction of the pulley causes a rise in tension in that branch in which the tensioning apparatus is placed, without, however, the band being driven by the pulley. The tension indicated by the apparatus is noted, the pulley or pulleys are then rotated in the reverse direction, so that the branch under test is now slackened to a certain extent; the tension then indicated by the apparatus is again read, and it is ascertained whether the arithmetical mean of the two tensions which has been read corresponds to the desired fundamental tension. The overlap of the ends of the measuring band is now cut off and, the tension being released, the remaining length is the correct measurement to which the driving band unstrained must be cut.

The Joint

Attention was next devoted to evolving a suitable method of connecting the ends of the bands together. It was discovered essential, for insuring durability, that the joint be provided at its ends with extension surfaces of suitable curvature, from which the steel band would be able to ride off, on transition to the circular path around the pulley from the straight path. This led to the invention of the present joint in which, the clamping plates being shaped to the pulley profile, stresses at the joint are distributed evenly over the whole width, and one of the most prolific causes of fracture in the early installations is thus avoided.

Friction Covering on Pulleys

So that metal does not run to metal, and to prevent any possible slip, a friction coating consisting of a layer of canvas, to which are glued fine sheets of cork, is placed over the pulley rim, and to avoid stripping under variable load, the pulley rim is first serrated by a rough file or chisel nuts. A special cement is available for use in very damp situations.

In a prolonged series of tests, made to show the

*J. G. Wray & Co., engineers, Chicago; late manager and director Steel Belts Limited, and Steel Conveyors, Limited. The paper was presented before the Western Society of Engineers.

values of the coefficient between a steel band and a covered pulley, it was found that for a useful tension, such as is now considered good practice in steel band driving, the frictional coefficient between steel bands and covered pulleys has practically an equivalent value to that between leather belts and iron pulleys.

Stresses

The permissible bending and tensile stresses for the normal use of steel bands depend on the total amount of the stresses, on the ratio of speed reduction, and on the ratio of the driving distance to the velocity of the bands. The bending stresses caused by running the belt over the pulley depend on the ratio of the band thickness to the pulley diameter. The tensile stresses thus determine the maximum bending stresses and the permissible thickness for the required pulley diameter. Where it is found impossible to obtain a width for a necessary tensile area by means of one band, several individual bands are run alongside each other. So as to allow the maximum power to be transmitted over a pulley of small diameter, it has been found necessary that the breadth of the band should be as large, and the thickness as thin, as possible.

Necessary Conditions

The requirements necessary to the successful employment of steel band transmission are simple, but nevertheless important. The lack of even one of the essentials would lead to unsatisfactory results. On the other hand, given suitable conditions, the results are definite and certain. The shafts, bearings and fixings must be of solid construction, strong enough to transmit the maximum load demanded. The shafts must also be parallel, and the pulleys running true.

Pulley Construction

In steel band transmission it is necessary that the pulley face should be flat. This is due to the fact that if the pulley was crowned, the centers of gravity of the joint clip would be raised slightly from the pulley every time the clip would run on the latter, thus causing a blow to be struck which is greater, the smaller the pulley diameter and the higher the belt speed. The stress caused by this blow would be thrown mainly onto the middle of the band, and this would cause at this point gradual deterioration of the material and ultimate fracture. As the steel band is only one-third the width of an equivalent leather belt, the use of specially narrow and correspondingly stronger pulleys enables considerable saving in weight to be made, particularly in large diameters, at the same time considerably reducing the cost.

Assuming, from a millwright's point of view, that the shafts and bearings are properly proportioned and fixed, and the amount of power to be transmitted being already determined, the necessary calculations are then made for the size and length of the belt to be used. These are based upon carefully worked out formulae, and as the material is practically static (the maximum and minimum contraction and expansion being only $\frac{1}{2}$ in. to the yard) the tension necessary for any particular power or width is exactly determined. Thus it will be readily understood that, when once the belt has been mounted in the manner previously described, it requires no further adjustment.

Advantages

Assuming that the necessary conditions can be fulfilled, steel band transmission is guaranteed to give the following important advantages:

1. An efficiency in power delivery of 99.995 per cent.
2. Great steadiness: a necessity for electrical machinery, textile purposes, paper mills, etc.
3. Favorable use of space, the distances of pulleys are optional to a great extent, depending on the speed; a perpendicular drive is no disadvantage for steel band driving.
4. Absence of stretching: a steel band does not stretch by use, as has been seen by eight years' experience.
5. Even running, free from slip: as there is no actual measurable slip, it follows that transmission by steel bands is uniform and invariable.
6. Narrower width: a steel band is only about one-third as broad as a corresponding leather belt.
7. Cool bearings, owing to the exact calculations of the necessary tension for each particular drive, together with the great reduction in the weight of steel bands, there is a

minimum of strain on the bearings, which consequently run cooler.

8. Cleanliness: no dressings are required.
9. Unwearability: steel driving bands have now been in operation for eight years, and tests made of the belts first fitted show no signs of deterioration.

Steel Bands for Conveying Materials*

In using the steel band in conveying, the same general basic principles are adhered to as for transmission, but other factors developed have also to be taken care of. The steel band conveyor is designed in two ways: With the upper strand supported by rollers, i.e. rolling conveyor; with the upper strand sliding on timber runners, i.e. sliding conveyor. In both cases the lower strand is supported by rollers at intervals of 15 to 30 ft.

With the rolling conveyor, the upper strand of the band is supported by rollers at intervals of 6 to 13 ft., according to the nature of the material conveyed. For materials such as charcoal and coal, a box troughing arrangement can be employed, but in this case the distance between rollers is reduced considerably below that employed for the open belt.

With the sliding conveyor, in many cases, particularly for short conveyors, and for certain classes of material, the upper strand of the steel band can slide on a timber support instead of being carried by rollers. With this type of construction the belt can run:

1. Free without trough.
2. In the bottom of the trough.
3. So that it forms the bottom of a trough narrower than the steel band and lined with steel plates.

Relative applicability of the rolling and sliding conveyor types depends on the nature of the material conveyed, and on local circumstances. A combination of the two methods can also be employed. The framework is made either of wood or metal. As a general practice, the terminal pulleys are of cast iron of 40 in. diameter. The bearings of the terminal pulleys are designed so as to permit easy adjustment.

The only variations in length of the band to be taken into consideration are those due to changes in temperature. For short conveyors the tension of the band is adjusted by means of movable bearings of the driven terminal pulley. For long conveyors, 130 ft. or more, as well as for conveyors handling warm material, the driven terminal pulley is fitted on a tension frame, supplied with counterweight or steel springs to obtain the necessary stretching force.

The joint of the steel band is made by means of single row riveting, with the rivets countersunk and short overlap. The rivet holes are punched with a special punching tool through both ends of the band at the same time. Due to the rivets being countersunk, they remain firm after the heads have been worn away. The bearings for the supporting rollers are carried on pillow blocks easily movable horizontally, so as to facilitate erection and adjustment.

Running of the Band

True running of the steel band depends mainly upon the accurate location of the end pulleys and supporting rollers. These should be exactly in line with each other, the shafts being at right angles to the direction of motion of the band. As an additional precaution, long conveyors are supplied with flanged idlers at intervals of about 65 ft. on the upper strand, and 100 ft. on the lower strand. With terminal pulleys of 40-in. diameter, the distance between the upper and lower strands at the guide roller is about 2 ft. 6 in.

The material conveyed is fed onto the belt by the usual hopper or chute arrangement, and need not be fed in a longitudinal direction, though this, of course, is always advantageous, in order to get material to rest quickly and quietly on the band. The material is delivered from the band either over the end pulley or by means of delivery scrapers. These are constructed of laminated steel plates, and designed so that they can easily be removed from one point to another. The drive of the steel band generally consists of spur gears. The driving gear can be placed either at the charging or discharging end.

The characteristics of the steel band permit the fol-

*See also page 321, THE IRON AGE, Feb. 2.

lowing advantageous applications of the conveyor, not hitherto possible:

1. If the material conveyed is to be discharged at a point other than the end pulley, the expensive and power-consuming throw-off carriages are replaced by a simple delivery scraper or plow.
2. By means of delivery scrapers of special construction, medium sized material can be discharged at several points at the same time.
3. The material to be conveyed need not, as previously mentioned, necessarily be delivered onto the band in a direction parallel to that in which it is running.
4. Sticky materials such as sugar clay, etc., can be discharged easily and perfectly and the band kept clean without any difficulty whatever.
5. Sharp-edged and cutting materials, such as broken glass, can be handled satisfactorily.
6. In special cases supporting rollers may be dispensed with and the loaded strand drawn directly over a timber runner, without unduly wearing the steel band. Under the action of the steel the timber runner becomes highly polished, and the power consumption due to friction is then relatively small.
7. Owing to its rigidity in a transverse direction, the steel band has a larger conveying capacity than textile bands. The edges of the band do not bend down even with considerable load obliquely discharged.
8. The supporting rollers can be made narrower than the band, thus permitting, at reasonable cost, the use of large diameters for the idlers, with correspondingly low power consumption.
9. Low elongation permits considerable distances between the idlers, for the loaded as well as for the empty strand of the band, without excessive local sagging.
10. Insensibility to moisture and variation of temperature permit the use of the steel band conveyor in the open air, though in certain cases it is advisable to give the band a coating of tar or oil.
11. Hot material up to a temperature of 212 deg. Fahr. can be handled safely by the steel band.

Steel Mill Wage Cuts in England

Reports show that in the iron and steel trades of England wages have been cut more heavily than in any one of half a dozen other important fields, with the exception of mining and quarrying, and that the iron and steel workers have made a contribution to general liquidation twice as heavy as the average of all the others. Returns for October, 1921, show the average weekly wages, in 103 steel companies having 90,395 employees, to be £3 8s. 2d., compared with £4 18s. 8d. in October, 1920, and £5 8s. in September, 1920. Returns from 126 companies which employed 171,948 persons in June, 1920, show that at the end of November, 1921, employment was only 82,328, or less than 48 per cent of the previous figure.

A survey made by a labor bureau, covering the first eleven months of 1921, showed that the net reduction in weekly wages of 239,500 iron and steel employees amounted to £431,690, or an average per employee per week of £1 16s. 1d. The survey covered more than 5,300,000 other employees in the engineering and shipbuilding, mining and quarrying, textile, transport, public utility and binding and allied trades, with net reductions amounting to a total of more than £4,500,000, or an average of about 17s. per person per week, this being approximately one-half the reduction of the steel workers.

Engineering Foundation has on the press a report of its seventh year of activities in research connected with various branches of engineering. The book will contain also an abridged report of the extensive investigation of the fatigue phenomena of metals, made possible by a large contribution from the foundation. This investigation was conducted at the Engineering Experiment Station of the University of Illinois. Persons desiring to obtain a copy of this report, when issued, should write to the office of Engineering Foundation, Engineering Societies Building, 29 West Thirty-ninth Street, New York.

A summary is being prepared of the data obtained by the Bureau of Standards on the various carbon and alloy steels which have been tested in the metallurgical laboratories of the bureau, including the effects of normalizing rolled-low carbon steel, the effects of 1.25 per cent of manganese, the presence of 5 per cent cobalt, the addition of 0.4 per cent of molybdenum to carbon chromium steel, and the effect of various heat treatments on their properties. Progress has also been made in determining the effect of time-annealing at blue heat on the properties of cold-rolled boiler plate.

EXTENDING FOREIGN TRADE

Operations Under the Webb-Pomerene Act Are Explained

WASHINGTON, March 6.—Pointing out that approximately 50 "associations" operating under the export trade act (Webb-Pomerene law) have recently filed annual reports with the Federal Trade Commission, and a number of new associations are in the process of organization, Dr. William Notz, chief of the export trade division of the commission, in an article in *Commerce Reports* of Feb. 27, explains how the law operates, its advantages and obstacles exporters face. The act is referred to as being among the first of Federal laws looking toward the stabilization of American trade in the after-war period. Its primary purpose, it is stated, was to facilitate the movement of American goods to foreign markets, to serve as an encouragement to exporters and to enable them to compete successfully in foreign markets with buying and selling combinations of other countries. Under the act "associations" may be formed for the sole purpose of engaging in export trade, these associations to be exempt from the Sherman anti-trust law of the United States, and from a certain portion of the Clayton act, with the proviso that there shall be through the association no restraint of trade within the United States, no restraint of the export trade of any domestic competitor, no enhancing or depressing of prices, or substantial lessening of competition within the United States. Further provision is made for the filing of documents and reports with the Federal Trade Commission, to which office is intrusted the administration of the act.

In explaining the different plans of organizations under the act and their operation, Dr. Notz mentions an association of manufacturers whose subscribing firms contract to do all export business through the association. The association makes all contracts with foreign representatives, and export agents receive all orders and apportion them to members. Members deliver and invoice merchandise to the association, which becomes immediately liable for the sale price. The association assumes all responsibility and risk of shipping, insurance, export documents, credit, etc., and as the organization is purely mutual, these expenses and loss (if any) are prorated among members upon the basis of business done with and through the association.

The advantages of co-operation under the act grow more and more apparent, Dr. Notz says, as the details of operation are perfected. Substantial reduction of overhead has been accomplished through joint advertising and selling and the pooling of administrative expense. Exclusive representation abroad is declared to be an important asset formerly not so readily attainable by the smaller export houses. Distribution of orders among several members of an association makes it possible to complete shipments in less time and with more satisfactory results than formerly. Although figures have not been received for the volume of exportation under the act during 1921, the total volume exported by associations in 1920 was estimated at \$221,000,000; and, it is said, it is undoubtedly true that without such combination only a small percentage of that amount could have been shipped by the member concerns represented. Members of these combinations number about 1000 and are scattered throughout 41 States. Many lines are represented, among them iron and steel, foundry, locomotives, lumber, furniture, general merchandise, etc.

"The export business during the past two years has been beset by many obstacles," says Dr. Notz. "Well-established export houses have found operation difficult, and newly organized associations report that it is 'hard to get started.' But there is on every hand a confidence that when the wheels begin to move they will be able to establish and hold foreign markets for American goods. The best indication of this confidence is found in the fact that new companies are in the process of organization, and export problems are being actively met by definite, constructive development of foreign markets."

Laboratory for Malleable Iron Foundry

Equipment for Running Carbon, Sulphur and Manganese
Determinations Facilitates Control of Product—
Getting Rid of Heavy Gases

To facilitate operation and obtain close control of the product without necessity for long waits, such as were occasioned when the laboratory work was done in a commercial establishment, the Arcade Malleable Iron Co., Worcester, Mass., has installed in a new building laboratory equipment, which is to be expanded when conditions warrant. Except for a microscope, the present equipment is entirely chemical. It is planned, however, later on, to place physical testing equipment in the basement of the present building, space having been allotted there for the future installation of tensile and (probably) torsion machines. It is the plan to use the tension machine also for transverse tests.

The product of the company consists entirely of malleable castings, which go into a large number of industries. Prominent among the industries served are

those making textile machinery, lawn mowers, revolvers and shotguns, wringers, motorcycles and motor trucks, etc. Large numbers of pipe unions are made, while a considerable business has been built up in the line of radiator nipples and in gears. The product has a tensile strength varying under different conditions from 40,000 to 50,000 lb. per sq. in., accompanied by a ductility represented by an elongation of 12 per cent in 2 in. This compares with the malleable specifications of the American Foundrymen's Association of 45,000 lb. tensile strength and 7½ per cent elongation.

Analyses are made from drillings taken from hard iron bars, cast from the air furnace at time of tapping each heat. The samples are sand-blasted before being drilled, to get rid of extraneous material. Drillings are regarded as far better for this purpose than the usual shot dropped into water, for the latter have to be



Carbon Train, Oxygen Tank,
etc., in Office (Above)
Electric Furnace and Sulphur
Group (Right)
Main Laboratory, Showing
Low Draft for Heavy Gases
(Below)



pounded up or crushed, before they can be used, and there is much opportunity for the inclusion of foreign material.

Determination of carbon is made in a Fleming combustion train, which includes a Hoskins electric furnace. This determination can be made in 7 min. The furnace heats the material up to about 2000 deg. Fahr.; while the carbon dioxide separated from the iron at this temperature is caught in the usual manner and determined by weighing, on a Volland & Sons balance.

The sulphur rack, for volumetric determination of sulphur—sulphur by the evolution method—is located in the main laboratory room, while the combustion train is in the office. This sulphur rack is so arranged that it may also be used for igniting precipitates. It includes six Bunsen burners connected on one manifold.

Control of manganese in connection with sulphur is accomplished in the following manner:

The coal pile is staked off in sections and numbered, and each section is analyzed the day before it is used. This plan permits regulating the manganese in the heats according to the sulphur content in the coal. Any section of the pile which shows up fairly high in sulphur is used in the first part of the heat, before the iron has reached the molten state, and when it will not absorb much of the sulphur from the coal. The manganese should be approximately $2\frac{1}{2}$ times the sulphur, in order to absorb from the coal all the sulphur, to form sulphide of manganese, MnS , according to the atomic weights—manganese, 55; sulphur, 32; which produces 87 parts by weight of manganese sulphide for each 32 parts of sulphur.

Thus it can be seen that, if the manganese is much under this ratio, some of the sulphur will not be removed from the iron, and this would cause a composition rim which would make the castings somewhat harder to machine. It would also increase the tensile strength, and slightly decrease the percentage of elongation. Only in extreme cases, however, are these castings so hard and brittle as to be unsuitable for use. Silicon and carbon must also be closely watched, as these two elements have much to do with the physical properties of the iron.

For special work in the study of materials, a small Hoskins electric furnace of rectangular shape has been installed, capable, like the combustion train, of reaching a temperature of 2000 deg. Fahr. This has inside dimensions of $3 \times 4\frac{1}{4} \times 10$ in. Temperature determinations are made by a Hoskins thermo-electric pyrometer,

with a chromel thermo-couple. This may be attached so that it may be used in either room, there being a small sliding window in the wall, as shown in two of our photographs.

An innovation in the bench tops throughout the laboratory lies in the fact that they are made of $\frac{3}{4}$ -in. asbestos boarding, painted with Sherwin Williams acid resisting black paint, instead of the usual slate slabs. The joints are cemented and the cracks filled with a mixture of marble dust and water glass. The combustion hood is lined with the same material. The advantage of this material, aside from its relative cheapness, lies in the fact that it will not stain under any of the acids in use, while slate is not immune from stains.

The hood has not only the customary upper draft into the stack, but also a lower draft. The draft is sufficient to pull out heavy fumes which otherwise would get into the room—such as sulphur and bromine compounds. The hood is arranged so that access may be had from both sides, thus facilitating its use for two or more simultaneous operations.

While the sides of the room are made up of match boarding, as shown, the ceiling is of wall board finished with a non-lead white paint, to avoid discoloration from fumes of hydrogen sulphide. The laboratory has windows on all four sides, each room being thus lighted on three sides. The ceiling lamps are of the nitrogen filled type.

Among the items of equipment is a gas-heated Barnstead still for distilled water, with capacity of one gallon per hour. The sink, together with trap and pipes to the sewer, are of petrified Akron ware, this having great resistance to acids. To accelerate filtering, a suction on the injector principle has a suction pump, with a plunger so arranged that the pump may be cleaned out by the plunger, without dismantling. The Bausch & Lomb microscope is used for examining fractures. It is expected to install later a photo-micrographic instrument in a part of the basement.

Laboratory work consists in examination of raw materials, coals and the product in process of finishing in the air furnaces. There are also a number of special investigations carried on from time to time, and some work is done for outside local concerns, particularly for one plant which is affiliated with the foundry. In connection with the air furnaces, a Leeds & Northrup optical pyrometer is used for temporary determinations.

The building measures 18×32 ft., the office being 11×18 ft. and the main laboratory room 18×21 ft.

MAGNETIC TESTING OF CHAIN*

Apparatus for Determining Depth of Case and Durability of Skid-Chains for Auto Tires

The problem of determining the depth of case in carbonized and case hardened work is one in which the customary non-destructive methods of test are difficult or impossible to apply. In some cases, the surface hardness may be estimated with a scleroscope or a file, or under favorable conditions a Brinell test can be made, but in general, none of these tests is satisfactory on this class of material. A magnetic method which has been applied successfully to a particular product therefore may be of some interest.

The product under discussion is small steel chain in various diameters of wire from 0.192 up to $\frac{3}{4}$ -in., and in short lengths of from 5 to 15 in. It is used as the cross member in automobile tire chains, where it is exposed to the wear of hard roads, and to the shock of pounding over car rails and cobble stones. The result is that if the case is too thin it wears out too fast, and if too thick, it breaks even before the soft chain has worn out. Fortunately, there is an intermediate condition from which reasonable service may be expected.

In order to determine this condition for maximum

service, a test is needed in which any variable which increases the brittleness of the chain will show itself in the direction of increased depth of case. In the present instance, the magnetic property under observation varies with the quenching temperature and the structure of the chain in the desired manner.

The Variables Involved

Resistance to wear and the resistance to shock are in general inversely proportional to each other, and the point of maximum usefulness is highly indeterminate. The final test, the mileage run on the road, is so full of accidental variations, that the average of a large number of records must be considered. This has so far prevented a close study of the effect of small changes in structure. If we consider the depth of case as the only variable, and make the chain from the same wire, carbonize at the same temperature in the same compound for different times, and quench all our chains from the same temperature, we obtain magnetic readings proportional to the depth of case. If then a set of these chains, ranging from thin case to thick are taken off after the first to break has worn through it will be found that the wear is very closely proportional to the magnetic reading. This holds true regardless of the weight of car used or the speed and nature of the road.

When the chains are run until all are broken and the mileage of each is considered, it is found that in general the low reading and the high reading have given about the same result; and somewhere between the two is the longest lived chain. The softer the road,

*A paper presented at the New York Sectional Meeting of the American Society for Steel Treating, March 3. The author, A. V. de Forest, is research engineer American Chain Co., Bridgeport, Conn.

and the lighter the car, and the slower it is driven, the closer will the best chain come to the high reading, or deep case end of the scale. However, this hard end is the more dangerous, for a chain overhard for the use to which it is put may break in a few miles, while the too soft chain will wear out only after a fair length of travel.

The magnetic test, therefore, is used to determine when the chain is unnecessarily soft or dangerously hard. This latter figure is derived entirely from experience, and is only an estimate to meet the worst conditions. It is not yet practical to make chain to suit the temperament of the driver of each car and the paving of the streets he uses, but some day chains may come like tooth brushes, hard, soft and medium, in properly labeled packages.

Major variables involved are the size of chain; the depth of case; the carbon content of the case and its distribution; the composition of the core; the structure of case and core, as determined by the carbonizing temperature and the heat treatment. The effects of each of these factors on the magnetic result have not as yet been too accurately determined. The following points, however, may be of interest. In the carbonized chain, slowly cooled or normalized, the magnetic reading is closely proportional to the depth of case. Here the core is pretty regular in composition and the carbonizing material the same in each instance. When reheated and quenched the magnetic result is higher, the higher the quenching temperature. Furthermore, the magnetic result is higher for a coarse structure as quenched from the pot, than for a finer structure quenched from the same temperature, as is obtained by reheating and re-quenching. So far the magnetic result has given a pretty close idea of the "brittleness" of the chain, whatever that may mean.

If now another variable is brought in, the drawing temperature results are not as good. A draw at 450 deg. Fahr. lowers the magnetic reading more than it affects the life of the chain. At 550 deg. Fahr., the same thing is true. However, in practice, drawing has not so far proved generally advisable so this effect is not a factor in this case.

The Apparatus Described

The magnetic apparatus itself is a simple form of inductance bridge, operating on 60 cycle commercial current. A rather peculiar type of separately excited galvanometer is used as an indicator. A small rheostat and ammeter control the current to operate. In this case about 0.2 amperes at 110 volts are used. Resistance coils control the sensitivity of the instrument, and the deflections can be adjusted to any desired limits. An adjustable resistance is used to balance the galvanometer and is altered to compensate for different sizes of specimen or to change the scale of the instrument. Either deflection or null method can be used. The deflection method is ordinarily sufficiently accurate. The magnetizing coil may be of almost any size. The one in question will operate on 1/16-in. wire, chain formed of 3/8-in. wire, or bar stock up to 1 1/4 in. in diameter. The whole outfit is easily portable and needs no setting up beyond connection to an alternating current lighting circuit.

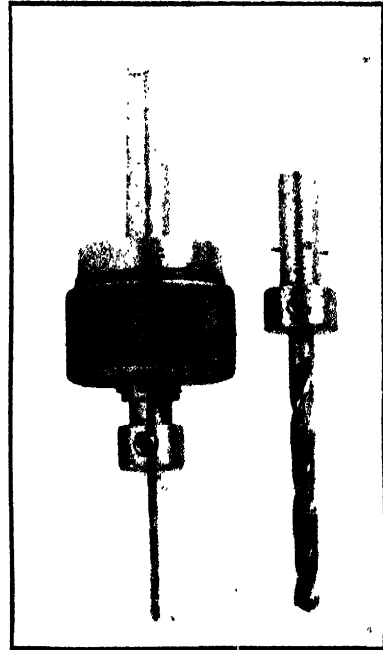
It has been found that the introduction of a rapid and non-destructive test enabled the testing of a vastly greater number of samples, and a much closer control over the factors affecting the problem. It enables experiments to be conducted intelligently on time of heat, temperature, shape and material of pots or retorts, method of packing, arrangement of furnace, carbonizing mediums, and all the troubles giving rise to the far-famed irregularities of case hardened work. Also, by giving quantitative results, it allows a better interpretation of service tests on the finished product.

Last but perhaps most important of all, it affords justice to the heat treating force, for careful and intelligent operation can be accurately appreciated and carelessness properly censured. The result is that much greater interest is taken in the quality and uniformity obtainable under routine conditions, and all concerned with this frequently abused department can share the satisfaction of a good job well done.

New Drill and Tap Chuck

A friction drive, quick-change positive safety drill and tap chuck, having a capacity of 1/8 to 3/8 in. straight shank drills and 1/8 to 3/8 in. taps has been placed on the market by the Save All Tool Co., Waltham, Mass. The new chuck is known as the No. 12 Save All and is shown in the accompanying illustration. It is built along lines suggested in the company's quick-change drill chuck for drills with taper shanks.

The safety device consists of a pin held in place by a pointed screw which positions in a groove in the pin. When the work exceeds the capacity of the tool, the pin shears off and can be removed by loosening the screw and inserting a new pin, a feature intended to eliminate



Friction-Drive Quick-Change Positive Safety Drill and Tap Chuck

breaking and burning of drills, taps, reamers, or other tools used in a chuck of this type. The drill or tap is held in a collet which slips into the chuck when the sleeve of the latter is raised.

Will Discuss Trade Associations

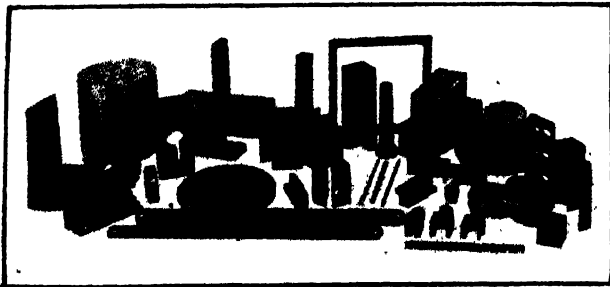
WASHINGTON, March 7.—Correspondence between Secretary of Commerce Hoover and Attorney General Daugherty regarding the legal status of trade association has brought so pointedly to the front the necessity of complete understanding of the functions, methods, and accomplishments of national trade organizations that this subject is to be made an important feature of the convention of the National Association of Manufacturers to be held in New York, May 8, 9 and 10. This will afford an opportunity for the compilation of a volume of authentic information regarding the work of national trade organizations and the association has sent out a questionnaire to its members in order to develop an elaborate study of the work of trade associations. The questionnaire, among other things, asks as to the type and percentage of industries represented, the character of the membership of associations, whether composed of individuals, firms or corporations, etc., purposes and scope and authority of the departments of the trade organizations.

The Chamber of Commerce of Bridgeport, Conn., recently appointed a merchants' committee to make a survey of all available manufacturing floor space in the city, now vacant, with a view to bringing additional industrial concerns to the city. There are several factories and plants, now idle, which were erected during the war and used by wartime factories, and it is the desire of the committee to fill as many of these as possible.

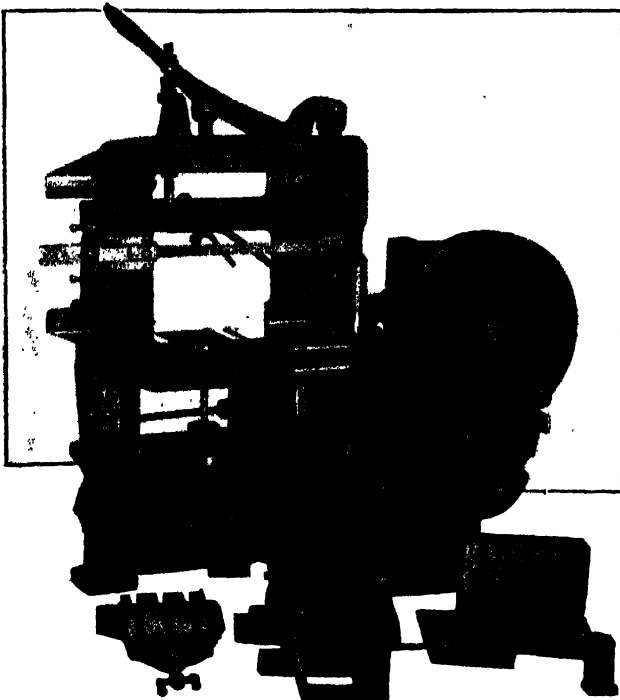
Universal Shaping Saw

Because of added features of design the universal shaping saw shown in the illustration, a recent development of the Peerless Machine Co., Racine, Wis., is adaptable to a much wider range of work than covered by the usual hacksaw machine. Specimens of the work are shown in a separate illustration.

Machine-tool standards of construction are followed in order that the machine may accomplish with a hacksaw blade the various classes of work illustrated. Bearings are liberally proportioned and placed far apart, causing variations to be decreased instead of increased. The saw blade is carried by a four-sided frame, permitting the blade to be placed under proper tension without danger of distorting the bearings. The saw frame is reciprocated by a crank and connecting-rod mechanism, and during the draw or cutting stroke the



Group View Above Shows Various Classes of Work Done on the Universal Shaping Saw, Shown Below. An angle fixture is used for blocking out and a cross-feed fixture for finishing the work



connecting rod is approximately parallel with the line of travel of the blade. This is intended to give a direct pull and permit cutting with the crank angle such that the cutting speed is reduced to a minimum for the cycle of motions, although maximum for the work being handled. During the return stroke the change in angularity of the crank causes the blade to be returned to the starting point at high speed. Three changes of cutting speed are provided.

A feature is the power-feed mechanism provided. At the end of the draw or cutting stroke a cam on the crankshaft actuates a lever which raises the frame on which the saw frame reciprocates. This lifts the blade clear of the work on the non-cutting stroke. After the saw is returned the same cam and lever serves to lower it to the cutting position. At the same time, a second cam on the crank shaft becomes operative and through

a link and lever mechanism, and a ratchet and pawl, a feed worm which meshes with a rack connected to the bearing frame by which the saw frame is carried, is turned in such a way that the worm pulls the rack and the saw frame down.

The repetition of this cycle of movements at the beginning of each cutting stroke of the saw blade provides for feeding the saw into the work at a predetermined rate of speed. Adjustment of this speed is by means of a small hand wheel near the floor at the front of the machine. When the cut has been completed the feed worm is tripped automatically out of engagement with the rack. A spring then lifts the saw frame to the up position and stops the machine. This arrangement makes it unnecessary for operator to watch the progress of the work because he is notified when the cut has been completed by the stopping of the machine.

For angle cutting operations a fixture is furnished on which the work to be cut may be easily clamped to either the horizontal or vertical face. Another fixture adding to the range of the machine is a crossfeed mechanism which is secured to the table of the saw. A piece of work can be secured to this fixture and fed transversely under the reciprocating saw which acts very much the same as a shaper tool and provides for producing a smooth finish on any rough surface that requires the performance of a second operation of this character.

The equipment includes pump, piping and reservoir, which provides cooling solution to the blades. The machine has a capacity for work 6½ in. square and takes blades from 10 to 14 in. The speed variations are 132, 85, and 50 strokes per min. The floor space occupied is 24 by 43 in., and the weight, with standard vise, 750 lb.

Complaint of Mitsui & Co. Not Sustained

WASHINGTON, March 7.—Passing upon the complaint of Mitsui & Co., Ltd., exporters of Seattle, Wash., against the Director General, C. B. & Q. Railroad, et al., the Interstate Commerce Commission has handed down a decision holding that the rate of 85c. per 100-lb. charged on 18 carloads of bar iron and steel shipped from Terre Haute, Ind., to Seattle, for export between July 1, and Dec. 31, 1918, was not unreasonable. It also was held that the complainant was not damaged as a result of any undue prejudice that may have existed and the complaint was dismissed. It was maintained by the complainant that the rate was unreasonable to the extent that it exceeded the export rate of 75c. maintained from Chicago.

The commission was asked to require the establishment of the same rate from Terre Haute as from Chicago and grouped points. The decision points out that the Pittsburgh group rate applied from Terre Haute when the shipments moved. The complainant's principal contentions were that the maintenance of the Pittsburgh rate from Terre Haute, more than 400 miles nearer Seattle, resulted in undue prejudice to Terre Haute, and that by reason of its location the latter town was entitled to the Chicago group rate. To support this argument, the complainant relied upon the decision of the commission in the Inland Steel Co. case in which the commission found that the application of the same rate on iron and steel articles in carloads from Chicago, Terre Haute, Vincennes, Ind., and Pittsburgh to the Pacific Coast ports for export was unduly prejudicial to Chicago, Terre Haute, and Vincennes to the extent that the rate from those points exceeded a rate of 6.5c. lower than the rate maintained from Pittsburgh. The Director General of Railroads was the only defendant and as Federal control had terminated no order was issued.

The American Railway Engineering Association will hold its annual convention at the Congress Hotel, Chicago, March 14 to 16, inclusive. At the same time the National Railway Appliances Association will hold an exhibition of railroad supplies and devices at the Coliseum in the same city.

Sectional Meeting of Steel Treaters

Eastern Chapters Hold First Technical Session in New York

—First Public Presentation of Two Important Developments

THE first attempt of the American Society for Steel Treating to hold a sectional meeting was an unqualified success. On March 3 at the McAlpin Hotel, New York, about 200 members from 14 chapters, embraced in the Eastern territory of the society, registered and attended two enthusiastic technical and social meetings in the afternoon and evening. The membership of these chapters approximates 1000.

The object of the directors in planning such meetings was to bring together, four times each year, members of various chapters in localities where a national convention is less likely to be held, as well as to promote the aims of the organization professionally and socially. The meeting held last week fully met these expectations in the presentation of a group of interesting papers, fairly liberally discussed, and in the realization of social and other features, which were impressive. There is the added advantage that at such meetings the national officers and directors can get into more intimate contact with each chapter.

At the afternoon session, which was called to order by George L. Norris, chairman New York chapter, and later turned over to Irving L. Cowdrey, chairman Boston chapter, five papers were presented, all by the authors.

Magnetic Testing of Chain

One of the most interesting of these and one which presented for the first time a new development in magnetic testing was entitled, "The Magnetic Testing of Small Case-Hardened Chain," by A. V. De Forest, metallurgist American Chain Co., Bridgeport, Conn. This is published practically in full elsewhere in this issue. It marks a new application of non-destructive testing and enables a distinction to be made between chain that is properly hardened to insure the best results, as automobile wheels on the average roadway and those that are either too deeply case-hardened and hence brittle, or too little hardened and hence soft.

The author in response to a question as to whether chrome-vanadium alloy steels had been tried for such chain, in view of the fact that the hardening treatment would be simpler, stated that such material had not proved enough better to compensate for the extra cost. Mr. De Forest also stated, in response to questions, that regular 13 per cent manganese alloy steel had not been tried out by his company nor the 1.25 per cent manganese alloy steel. It was the author's opinion, as to the future possibilities of magnetic testing in general, that it would probably be possible to correlate results and perfect apparatus so that at least two properties of steel might be determined by magnetic apparatus. The actual apparatus was exhibited and the testing of chain was demonstrated.

Mass in Heat Treatment

E. J. Janitzky, metallurgist Illinois Steel Co., South Chicago, presented his paper, "New Developments on the Influence of Mass in Heat Treatment," which supplements a paper on the same subject presented at the annual convention in Indianapolis last September. It is abstracted elsewhere in this issue and covers an application of his formula, previously applied to carbon steels, to certain alloy steels. Mr. Janitzky commented on Sir Robert Hadfield's criticism of his first paper, showing to his own satisfaction that the criticisms were unfounded.

New Heat-Resisting Alloy

A new heat-resisting alloy was expounded in a paper by G. R. Brophy, metallurgist research laboratory General Electric Co., Schenectady, N. Y., entitled "Calite—A New Heat-Resisting Alloy." This new

material is an alloy of nickel, chromium, iron and aluminum and is offered as castings for heat-treating equipment. The contained aluminum oxidizes under service, forming a protection coating which is a factor in bestowing certain properties. According to the author:

Calite resists oxidation up to 1300 deg. C. (2372 deg. Fahr.), but 1200 deg. C. (2200 deg. Fahr.) is recommended for indefinite service. The protective oxide formed is tight and does not snap off even on quenching from high temperatures. Quenching after 100 hr. at 1200 deg. C., calite lost but 0.03 gram per sq. cm. exposed, while the best heat resisting base metal alloy other than calite lost 0.56 gram under the same conditions. The same samples were run at 1300 deg. C. for an additional 25 hr. Calite lost 0.0003 gram, the other 0.09 gram per sq. cm. exposed. From these figures it appears that calite is 20 times as resistant at 1200 deg. C. and the only base metal alloy to stand at temperatures higher. At 900 deg. C. or ordinary operating temperatures, the loss per square centimeter was measured in 1/10 mg., or for all practical purposes, no loss.

Calite is practically noncorrosive. Samples have been polished and run in a spray of saturated sea salt solution at 100 deg. Fahr. for 200 hr. and at the end of this time still retained a perfect polish. So-called stainless steel will last but a few hours in this test. For fittings exposed to salt atmosphere calite should be excellent.

Twenty-five per cent sulphuric acid dissolves calite rapidly; hydrochloric acid slowly and nitric hardly at all. Forty-eight hours in 25 per cent nitric acid, the metal lost 0.0004 gram per sq. cm. exposed. Acetic acid has no effect. In general, the physical properties are as follows:

Melting point, deg. Fahr.	2,777
Softening temperature, deg. Fahr.	2,500
Working temperature, deg. Fahr.	2,200–2,370
Specific gravity	7.03
Weight per cu. in., lb.	0.25
Brinell hardness, annealed	286
Scleroscope hardness, annealed	40
Thermal conductivity, per cent of pure iron	25
Transverse stress, 1 in. square bar, lb. per sq. in.	4,250
Tensile stress, lb. per sq. in.	36,800

Calite cannot be machined in the cast condition, nor cut with oxy-acetylene. Any change of dimension or finish must be done by grinding. It is more resistant to oxidation at high temperatures and will stand higher temperatures than any base metal alloy tested. Its first cost is low and operating cost lower than other non oxidizing alloys. Boxes have been run for 1500 heat hours and at the end of that time were still in the best condition. Measurements of these boxes show no warpage or growth. The oxide coating is no heavier now than after the first heat.

Many questions were put to Mr. Brophy during the course of which it developed that this alloy is particularly adapted to the glass industry in that its use does not destroy glass, that it can be poured to a thinness of 3/16 in. and that in oil-fired annealing furnaces boxes made of this alloy act as a baffle, even high sulphur oil having no effect. The author acknowledged that there was much yet to be learned about the new alloy in order to overcome some of its apparent defects and to develop some of its manifest properties.

Cutlery of Stainless Steel

"Stainless Steel in Cutlery Use" was the subject of a paper by R. G. Hall, research engineer R. Wallace & Sons Mfg. Co., Wallingford, Conn. An abstract of this paper will be published in a later issue of THE IRON AGE. The author, however, states that, in studying data on this subject from many sources, "there seems to be a great divergence of opinion as to practically all essential points, including the exact chemical specifications and a very wide range of opinion as to the subsequent handling and heat treatment." As to the analysis Mr. Hall recommends "the carbon content to be between 0.30 and 0.45 per cent and the chromium between 13 and 15 per cent. Doctor Hadfield recom-

mends 13 per cent and the Brearley patents call for chromium between 9 and 16 per cent, while Elwood Haynes has covered in his patents up to 16 per cent." It is the opinion of the author and others that nothing is gained in stainless characteristics or corrosion by exceeding 15 per cent chromium. Phosphorus and sulphur should be below 0.03 per cent, with silicon and manganese about 0.30 and 0.50 per cent respectively.

This paper was read by the author and not pre-printed. It deals with the main features involved in the forging, heat treatment and finishing of this alloy to form knife blades in particular; the tests for stainless qualities are also discussed. In all there are about 40 operations through which these blades pass during their manufacture.

In response to some questions Mr. Hall said that he had no data as to ratio of stainless qualities before and after heat treatment but believed these were better after hardening; that the Crocus finish can be applied to chromium steels despite statements to the contrary; that there is not much difference as to which polishes better, carbon or chromium steels, and that for the stain test, copper sulphate is used and if the steel will stand this test for 2 min., it will stand anything.

Cold Headed Bolts

"Cold Headed Bolts—Their Metallography and Heat Treatment" was the subject of a paper by V. E. Hillman, metallurgist Crompton & Knowles Loom Works, Worcester, Mass., which the author presented in abstract. He said in part:

The term, cold work, implies that energy is expended on the metal when its temperature is below the critical range. The microstructure of the metal prior to the application of cold work consists of an aggregate of crystalline grains or cells, each grain being a structural unit. It may suffer rupture or deformation; it may be enlarged, elongated, stressed or restored to its normal size and shape. When the metal is subjected to mechanical pressure, the crystals are crushed and intimately mixed. Cold work has an embrittling effect upon the metal and the grains, which were originally equiaxed, are elongated, assuming a rope appearance resembling fibre. In brief the grains lose their original identity.

Conclusions: Various degrees of distortion may be found in the same bolt. Certain regions undergo slight deformation, whereas other sections undergo extreme distortion.

Annealing at 1150 deg. Fahr. will remove the weakening effects of cold work.

Irrespective of the degree of cold work, crystallization will not take place below 1280 or above 1380 deg. Fahr.

If the temperature of the furnace reaches the hazardous zone, 1280 to 1380 deg. Fahr., however, crystallization will take place only in those areas which have been slightly strained.

Annealing above the critical range, 1650 deg. Fahr., is preferable.

In this range of temperature 1625 to 1675 deg. Fahr., and regardless of the degree of strain, crystallization will not result.

In the discussion which followed emphasis was placed on the importance of grain growth as a factor and exceptions were taken to some of the author's statements.

Doctor Mathews Made an Honorary Member

The evening session was one that will be remembered for some time by those present. Besides the delivery of an illustrated paper on "Perfecting a Drop Forging" by J. H. G. Williams, assistant works manager Billings & Spencer Co., Hartford, which outlined some difficulties in making a certain product, and an illustrated lecture by B. H. De Long, metallurgist Carpenter Steel Co., Reading, Pa., descriptive of the company's various equipment for making high grade tool steels by the open-hearth, electric and crucible processes, there were two features of marked interest.

Early in the session the meeting was temporarily turned over by the chairman, A. W. F. Green, chairman Philadelphia chapter, to the national president, F. P. Gilligan, secretary-treasurer, Henry Souther Engineering Co., Hartford, who presented to Dr. John A. Mathews, president Crucible Steel Co. of America, and a member of the New York chapter, an engraved certificate of honorary membership, in which was ex-

pressed a brief appreciation of Doctor Mathews' work in the manufacture and heat treatment of alloy steels as well as of his pioneer work in electric steel. The certificate was graciously accepted by Doctor Mathews in a brief speech.

Colonel White Honored

The surprise of the evening was introduced by W. H. Eisenman, national secretary, Cleveland, who was given temporary charge of the meeting after the presentation of the paper by J. H. G. Williams. Mr. Eisenman reviewed briefly the developments which led up to the amalgamation of the two heat-treating societies in 1920 into the present organization, of the untiring efforts of Col. A. E. White, the first president of the amalgamated society, to whom should be given the major credit for the carrying on of the difficult negotiations. Calling Colonel White to his side, Mr. Eisenman presented a large mahogany chest of sterling silverware to Mr. White as a token of the entire organization's appreciation of the services he had rendered, indicating that the ware was sterling because of the sterling character and sterling zeal in work of the recipient.

Colonel White, completely taken by surprise, said in accepting it that he felt there were many others engaged in that work more deserving than he and then recounted that, while in the service at Washington, he had advocated 100 per cent heat treatment of shells but had been unsuccessful because of the conviction of others in power that there were not enough men, skilled in heat treatment, to carry such a program through. Colonel White said he knew the situation to be such in Cleveland, Detroit and Chicago, that there were enough such men there, but he did not know how it was in the East, though he believed this to be true also. After leaving the service and knowing that there were two heat-treating technical organizations, he became convinced there should be but one and so worked to that end, ably seconded by the untiring aid of the secretary and others.

The Dinner and Next Meeting

A social feature of the day was the informal dinner at the Yates Hotel where over 100 gathered. The menus were unique in that each course was expressed in language embodying heat treatment adjectives such as water-quenched celery, oil-tempered olives, case-hardened tenderloin beef, sorbitic peas, over-heated potatoes, etc.

The next sectional meeting will be held in Pittsburgh, May 25 and 26, under the auspices of the Pittsburgh chapter. All papers are to be presented by Pittsburgh men and the extra day will be largely taken up with visits to steel plants. If other chapters are as successful as the New York chapter in handling the first meeting of this character, then subsequent sectional meetings will be a regular feature.

The Interstate Commerce Commission has set April 6, as the date for a hearing in connection with an investigation regarding power brakes and appliances for operating power brake systems on railroads. It is the purpose to determine whether and to what extent power brakes and appliances now generally in use upon the locomotives and cars are adequate. It also is intended to determine what improved appliances are available for use and what improvements may or should be made.

It has been pointed out that a busy blooming screw-down motor, which raises and lowers the top roll of a blooming mill, is sometimes called upon to reverse as many as 22,000 times in 24 hr. This works out at more than 15 times per minute throughout the entire period, and makes it clear that the necessity for starting and stopping very quickly is a paramount consideration in its design and operation.

Lewis R. Sackett, Samuel A. Stape and John B. Hall, all of Columbia, Pa., have formed the S. and S. Mfg. Co. capitalized at \$10,000, to manufacture steel castings.

Roberts Oven Coke in Blast Furnace Use

Analysis of Results Obtained in Practice—Low Fuel Consumption Despite High Ash Content of Coal

BY M. W. DITTO

SUPPLEMENTING the illustrated description, on page 580, THE IRON AGE, March 2, of the Roberts coke ovens in use at the Granite City (Ill.) plant of the St. Louis Coke & Chemical Co., the following, from a report by Charles R. Holzworth, general superintendent of the company, has many points of interest:

The preceding calculations were made as follows, assuming that the solution losses in all cases are relative:

Case No. 1—No. 6 Furnace (South Works)

1890 lb. coke per ton of pig, containing 4 per cent carbon.

Analysis of Coke		Slag	
Ash	11.0 per cent	Ratio, ———	= 1.25
Moisture	2.5 per cent	Stone	
Vol. matter	1.0 per cent	Carbon required to melt slag	
Fixed carbon	85.5 per cent	at 4 lb. slag per 1 lb. car	
Carbon in coke, 1616 lb.		814	
Stone, 611 lb.		bon, ———	= 204 lb.
Slag, 814 lb.		4	
		Carbon in pig, 90 lb.	

The remaining carbon used to smelt pig iron is 1616 lb. — (204 + 90) = 1322 lb. One lb. carbon was used 2240 to smelt — = 1.69 lb. pig. 1322

Case No. 2—Frances Furnace (Using Roberts Oven Coke)

1875 lb. coke per ton of pig, containing 4 per cent carbon.

Analysis of Coke		Slag	
Ash	13.0 per cent	Ratio, ———	= 1.25
Moisture	2.5 per cent	Stone	
Vol. matter	1.0 per cent	Carbon required to melt slag	
Fixed carbon	83.5 per cent	at 4 lb. slag per 1 lb. car	
Carbon in coke, 1567 lb.		1401	
Stone, 1121 lb.		bon, ———	= 350 lb.
Slag, 1401 lb.		4	
		Carbon in pig, 90 lb.	

The remaining carbon used to smelt pig iron is 1567 — (350 + 90) = 1127 lb. One pound carbon was 2240 used to smelt — = 1.95 lb. pig. 1127

Case No. 3—Frances Furnace

(Assuming 11 per cent ash in coke and 611 lb. stone.)

Analysis of Coke		814 lb. slag will require	
Ash	11.0 per cent	= 204 lb. carbon.	4
Moisture	2.5 per cent	4 per cent carbon in iron will	
Vol. matter	1.0 per cent	require 90 lb. carbon.	
Fixed carbon	85.5 per cent	2240 lb. pig will require car-	
611 lb. stone.		bon equivalent to Case No.	
Slag		2240	
Ratio, ———	= 1.25 = 814	2 or ———	= 1149 lb.
Stone		1.95	
lb. slag.			

Therefore, carbon required is 1149 lb. plus 204 lb. plus 90 lb. equals 1443 lb. per ton pig. Coke required 1443 = 1688 lb. per ton pig. 0.855

Production

The amount of carbon burned at the tuyeres under like conditions, and for the same wind, is constant. The production will then increase in an inverse ratio 1875 to the coke per ton of pig, thus — × 488 tons (Case No. 2) = 542 tons.

However, as we have increased the fixed carbon in our coke by 2 per cent, we will slow up the furnace correspondingly, if same wind is blown, by 2 per cent

———— = 2¼ per cent. 542 tons pig 83.5 per cent fixed carbon × (100 per cent — 2¼ per cent) = 530 tons.

Our low fuel consumption on a high ash coke and excessive amount of stone per ton of pig is greatly due to the quality of our coke, which burns almost in-

stantaneously to CO at the tuyeres, with the result that a large amount of hearth heat is developed where it belongs, and can be used most economically. With a slower burning coke, the zone of combustion extends higher into the bosh of the furnace, and oftentimes above the mantle. This is noticeable in many furnaces, by the rapid erosion of the lining at this point. With the higher zone of combustion, much of the heat that should be used in the hearth enters the shaft (where already there is plenty, due to the reaction of CO on ore) and is dissipated in the waste gas from the furnace.

With our quality of coke developing a large amount of hearth heat, we carried a 2.30 burden, consisting of 10,000 lb. of coke, 22,000 lb. of ore, 1000 lb. of scrap and 6000 lb. of stone. The ore mixture consisted of 25 per cent Mesabi, 15 per cent Menominee, 40 per cent Marquette and 20 per cent Iron Mountain. The last two—the Marquette and local Iron Mountain—amounting to 60 per cent of the burden, are very refractory, the Iron Mountain especially containing some magnetite, yet our top temperature averaged only 264 deg. Fahr. without water. This is contrary to the general belief that a refractory mixture is always accompanied by high top temperature. As explained above, this is due to the concentrated heat of combustion in the hearth of the furnace, permitting a heavy burden to be carried.

Our flue dust loss was 88 lb. per ton of pig, which, at first thought, might be considered due to the low percentage of Mesabi used, and the comparatively low wind blown, which averaged 34,200 cu. ft. at 60 deg. Fahr. after all time lost on stops and checks was deducted. While this is partly responsible, yet in a larger way the concentrated zone of fusion confined entirely in a well-designed low bosh is more responsible.

Hanging, slipping and other irregularities of operation, that produce most of the flue dust made, are almost unknown to us, because our zone of fusion is in the bosh of the furnace, rather than extending into the shaft, as in many cases, causing the above irregularities.

In connection with this, it is evident, from the attached sheet, that increased wind did not increase the flue dust loss materially, as one would expect when the wind was increased gradually from 31,025 cu. ft. on the first of the month, to 37,850 cu. ft. by the last of the month, in bringing the furnace up to capacity.

Further evidence of good economy of fuel consumption is conclusive in the analysis of the top or waste gas, which showed:

CO ₂	14.1 per cent
CO	24.3 per cent
H ₂	3.2 per cent
CH ₄	.2 per cent
N ₂	58.0 per cent
CO	
Ratio, ———	1.72 per cent
CO ₂	
B.t.u. value, 92.	

In conclusion, it is well to summarize the important characteristics of our coke, which are conducive to the lowest fuel consumption, even approaching that of charcoal used in the early days of furnacing:

1. Absence of cross fracture, combined with uniformity of size.
2. Uniformity of cell structure.
3. Tough cell structure, permitting a heavy burden.
4. High speed of combustion—approaching that of charcoal.
5. Concentration of heat of combustion in hearth, where it can be used most economically.
6. Low transfer of hearth heat to shaft.

7. Low top temperature—longer contact of ore with reducing gas, which means maximum stack efficiency.
8. Low waste gas analyses, low thermal loss.
9. Low flue dust loss—more regular settling and lower gas velocity.
10. High pig production with low fuel consumption.

From this report it will be seen that the practice on this type of coke is comparable with blast furnace practice throughout the United States, and it is felt that with more experience a considerably better showing than the above will be made.

The only reason for using the present coals is the fact that, with coal from practically every section of Illinois, it was found that the two coals mentioned run more uniformly in ash and sulphur.

It is difficult as yet to make a comparison of the gas yields from these coals, and the amount possible to recover, as compared to the coking coals, as there has never been an opportunity of running over a long period on a coking coal to find out the relative amount of heat required compared to the Illinois coals. However, in short tests it is found that the coking coals can be pushed at least 2 hr. earlier with the same heat in the coke oven chamber than the Illinois coals, and, based upon present practice, everything indicates that the Illinois coal does not submit to the coking process on as economical a use of fuel gas as the coking coals.

Machine for Filing Edges of Strip Steel

A strip metal filing machine for use in cold rolling mills in filing the edge of strip steel after it has been slit into narrow strips has been brought out by the D & C Engineering Co., Cleveland. It is said to be the first machine of the kind to be placed on the market, although some strip mills are using machines of their own design for use in their own plants.

Cold-rolled strip steel after being slit has rough square edges. When used for springs, hacksaw blades and some other purposes, edges that are half round, oval or of some other shape are required.

After being slit and coiled the steel is placed on a spool and mounted on the spindle shown at the left of the machine, the end of the strip being passed through a clamp at either end of the machine and is gripped by a coiler at the other end. The coiler draws the strip steel through the machine, past a series of 15 files. The machine has semi-circular cast iron heads mounted in pairs on two rods, the two heads forming a circle. On one side the heads are secured to a rod by set screws. On the other side they are affixed to a movable shaft operated by a lever so that the heads may be opened. A sliding fit of two heads under spring tension is provided.

A file holder mounted on each head carries a file $1\frac{1}{4}$ in. wide, $2\frac{1}{4}$ in. long and $\frac{1}{4}$ in. thick, which will cut on both faces. These files are adjustable in any position within 180 deg., and by setting the files in the proper position the desired shaped edge is obtained. The metal passes through the machine in a straight line instead of over and under the files, as in other designs. When a new coil is to be inserted the operator pulls on the lever which opens the 15 heads, and reverses the lever to close the heads. The coiler is arranged for drawing the strip steel through the machine at a speed of 100 to 125 ft. per min., which is the speed at which the steel can be filed. The machine weighs 1000 lb. and is simple in construction and easy to adjust. Its capacity is any gage steel up to 3 in. wide.

The machine was designed by E. W. Duston, formerly chief engineer of the Blake & Johnson Co., Waterbury,

No cause for this difference has yet been determined, but it is believed that it is due to the difference in the physical and chemical structures of the two coals. However, it is known that as large surplus gas yields can be obtained from the use of Illinois coal as can be secured from the coking coals.

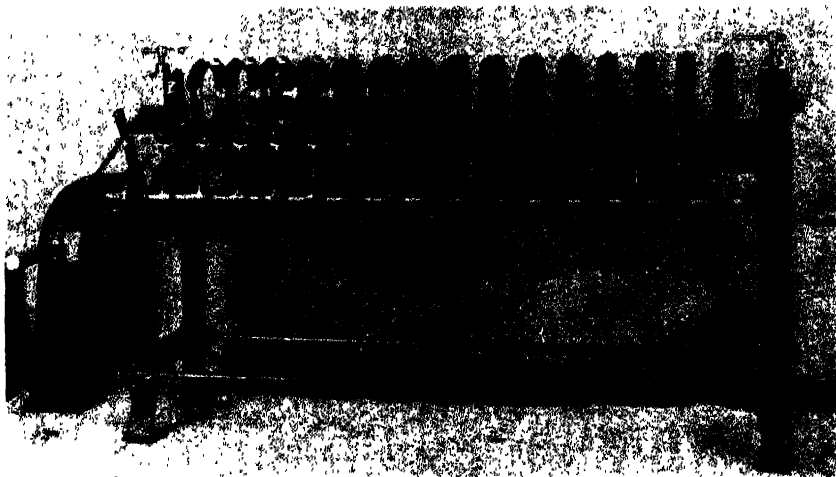
The plant of the St. Louis Coke & Chemical Co. was designed to discharge its waste gases at 750 deg. Fahr., and the question of heat recovery from the waste gases is a question of areas and weight of brick exposed to waste gas and air. From the practice established it is felt that the recuperator is as efficient as the regenerator, and gives much better operating conditions in the ovens, due to the fact that there is no reversal of the flow of air or gases through them. While there is no prejudice in their favor, it is evident from the operating results obtained in this plant that they will give entire satisfaction.

It is interesting to note that the results obtained with coke made from 100 per cent Illinois coal, so far during the month of February, show that better practice can be obtained than was obtained upon the mixed coal for the month of January, the largest day being 544 tons of iron on 1755 lb. of coke. Another significant thing is that the rich gas from 100 per cent Illinois coal is running 600 B.t.u. and over.

Conn., but now associated with the D. & C. Engineering Co.

Reducing Iron Ores with Carbon Monoxide

A laboratory study of the time rate of reduction of iron oxides by carbon monoxide is under way at the Minneapolis station of the Bureau of Mines. The reducing gas employed will be 35 per cent CO and 65 per cent N₂. The iron oxide will be obtained from the higher grade Lake Superior shipping ores and the reducing gas will be driven through the ore bed at such rates of speed as obtained in blast furnace operation—



Machine for Filing ti
is coiled, placed on a

Edges of Cold-Rolled Strip Steel After Slitting. The steel
spool and mounted on spindle shown at left. The strip passes
through the machine in a straight line

i. e., about 25 ft. per sec. The rate of the reaction is known to depend primarily upon the gas velocity and the size of the ore particles. To a lesser extent the reaction will depend upon the temperature and the composition of the reducing gas. It is only when conditions of the experiment approximate blast furnace conditions that the laboratory results will have a technical application. Previous workers in this field have invariably used extremely low gas velocities and have used carbon monoxide without dilution in nitrogen. The greater number of them have also sought to obtain equilibrium conditions and no reaction rates. This investigation is undertaken by the Bureau of Mines to supply the need of data which may be of practical use.

Machine for Staybolt Threading

The Warner & Swasey Co., Cleveland, has brought out a staybolt threading machine, made up of its No. 4 turret lathe with a special attachment instead of the regular turret slide and saddle. When not used for staybolt threading the regular turret slide and saddle may be replaced and the machine used for the production of the many miscellaneous studs and bolts necessary in railroad shops.

The machine handles stays of the crown, button-head, or swivel type up to 40 in. in length and for any size of thread, larger or smaller self-opening die heads being used as the situation demands. Present-day practice seems to lead principally toward the use of upset forgings and an increasing number of taper-head staybolts. It is claimed that in a test the button head shown in the illustration was taper formed under



Special Attachment Used for Staybolt Threading, Instead of Regular Turret Slide and Saddle

the head and the thread cut on the end and under the head at the rate of one per min.

In operating the machine, the rough forging is passed through the back of the forward die head to insert in the square collet in the automatic chuck. The die has an enlarged hole in the shank and the chasers an especially large opening movement. After being chucked the staybolt carriage is fed forward until the end of the bolt is supported in the steady rest between the two heads. The head is then formed by the forming cutter on the cross slide, while the other end is supported in the steady rest. Then the staybolt carriage is fed forward, the die heads, operated by the cams on the rear bar, close automatically and cut the threads.

As soon as the die heads reach the end of the cams both heads open. The cams may be made to cut any type thread desired, as the action of the head is dependent upon the contour of the cam. The carriage is then brought back and is ready for the next staybolt. The die heads are placed so that they cut the thread on the end and under the head in continuous lead. The thread on the end is cut without any previous machining.

Phosphor-Copper from Phosphate Rock

General contact is maintained by the Ithaca, N. Y., field office of the Bureau of Mines with the metallurgy of non-ferrous alloys in general and copper alloys in particular. Plans have been made for experimental study of two problems as soon as the other work in progress will allow.

(a) Study of the preparation of phosphor copper by electric smelting direct from phosphate rock. Phosphor copper is an essential material in the production of many high grade bronzes, and is made from elemental phosphorus by different methods, in which there may be loss of phosphorus, danger of fire and of phosphorus poisoning. Besides the possibility of a cheaper method of producing phosphor copper, a study of its preparation by electric smelting should throw light on some problems in the theory of the reduction of phosphatic ores.

(b) The Bureau of Mines is continually in receipt of requests for information in regard to the preparation of such alloys as that of 50 per cent copper and 50 per cent lead. On account of the apparent need for information on melting and casting technique and because it is quite possible that present methods might be improved, a study of the problem is planned.

Chicago Foundrymen's Club

The Chicago Foundrymen's Club will convene on March 11 at the City Club, Chicago. A dinner will be held at 7 p. m. and the meeting will start at 8 o'clock. E. W. Smith, the Crane Co., Chicago, a veteran foundryman, will read a paper on molding sand, its characteristics, the sources of supply and his experiences with it. The discussion will be participated in by R. E. Kennedy, assistant secretary American Foundrymen's Association and secretary of the joint committee on molding sand research of the National Research Council and the American Foundrymen's Association; R. A. Bull, chairman of this joint committee; C. S. McNeal of the Garden City Sand Co., Chicago, and H. S. Vrooman, another veteran sand man.

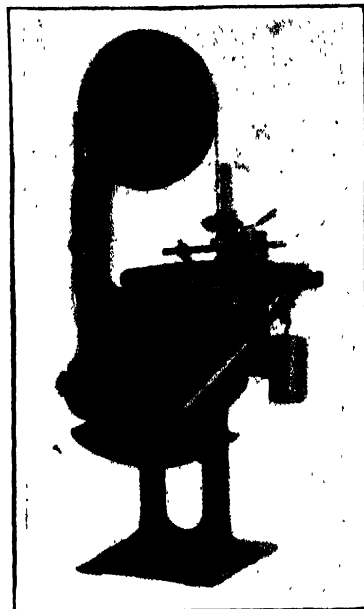
Metal-Cutting Band Saw

The band saw shown in the accompanying illustration is a recent addition to the line of the Clark Tool Works, Inc., Belmont, N. Y., and is intended for general machine-shop use. In general design it is very much the same as the company's brass-cutting machine.

Bearings are designed to require little attention, the lower bearings being lubricated from the gear box and the upper-wheel bearings packed in grease. The machine is equipped with a moveable carriage and a gravity feed. The vise for holding the work is mounted on the carriage in such a way that by loosening a cap screw it can be turned to permit holding the work at any angle to the saw. This adjustment is for cutting angles. By removing the cap screw the vise can be lifted off, leaving a smooth table 20 by 24 in. for use when cutting plates or irregular shapes.

The table is pivoted in the center and can be swung to allow long bars to clear the saw on the opposite side, and the saw guides are mounted on the table and swing with it, thus holding the saw at right angles at all times. With this construction, it is claimed, the saw is never twisted except when cutting of long pieces and then only enough to clear the opposite side.

The machine has two speeds, which are controlled by a handle on the gear box. The capacity is given as 6 by 12 in. An adjustable ball-bearing stock stand is included in the equipment.



The Two Speeds Are Controlled by Handle on Gear Box

The Summermill Tubing Co., Bridgeport, Pa., manufacturer of steel and non-ferrous metal tubing, reports increasing business. Orders received in the first two months of 1922 are in excess of those received in the last four months of 1921. The company finds that prices of its products are becoming more stabilized and customers are satisfied to book orders ahead.



The Receiving Bay, Which Is Under Cover, Is Commanded by a Traveling Crane, and the Platforms at the Wall on the Left Open into the Ends of the Parallel Factories

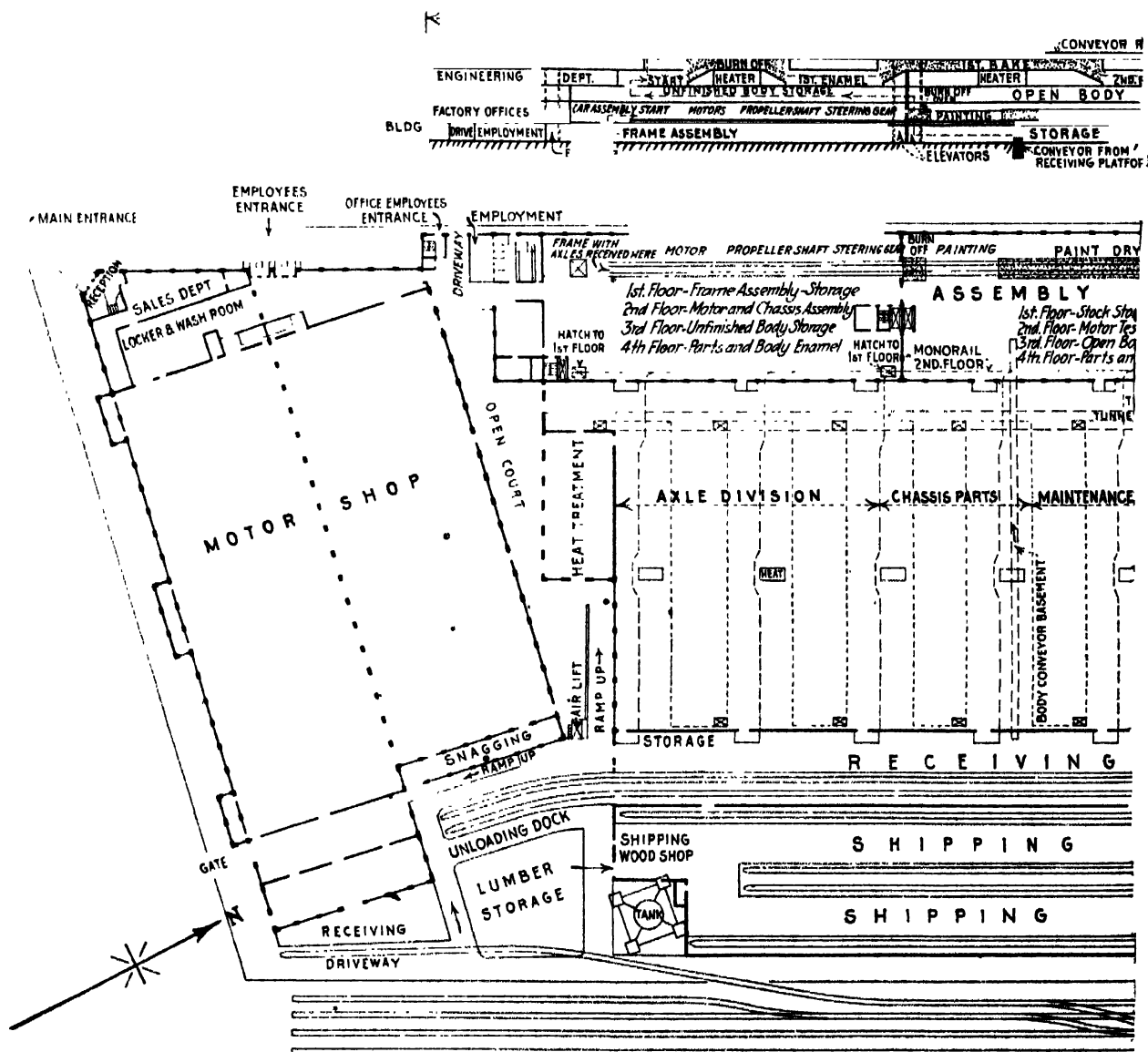
Designing a Modern

What Is Involved in Relations
Many Services Now
Future in Indust

BY PAUL L. BATTEY*

LATE in the summer of 1919 the Willys Corporation undertook the enlargement of the plant of the Duesenberg Motors Corporation at Elizabeth, N. J., having acquired that property together with additional adjacent land, for the manufacture of a new six-cylinder motor car, in the usual four body types. It was the intention to make the complete car in this plant with the exception of rough castings and forg-

*Consulting engineer, 123 West Madison Street, Chicago. Becoming associated in 1901 with the Arnold Co., he has devoted himself since then to the design and construction of industrial plants. The present paper is based on an address he made before the New York section of the American Society of Mechanical Engineers.



PLAN OF THE AUTOMOBILE MANUFACTURING WORKS AT

The Accompanying Longitudinal Sectional Elevation Together
the Continuous Steps in Manufacturing Procedure in This
16 Hr. on 49 Acres of

Automobile Plant

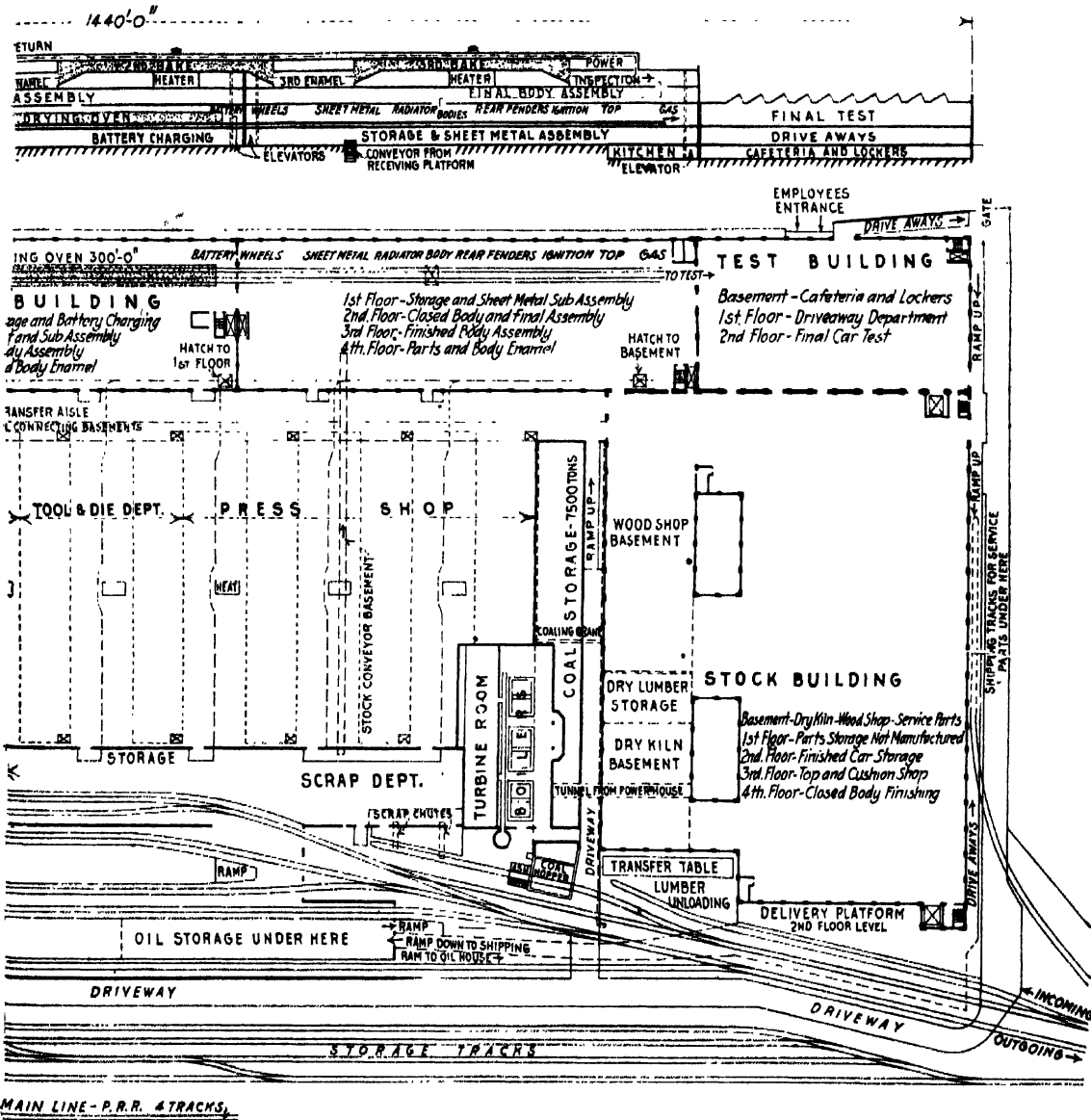
of Departments and in the
Demanded—View of the
rial Developments

ings and the bodies for the closed types, together with a few miscellaneous specialized items. The car is in the medium price class, but of superior quality and durability.

The writer was retained to design the plant and supervise its construction and the instructions were substantially to provide the most modern and efficient plant possible for the manufacture of 250 cars per day of 8 hr., or 500 cars per day in two 8-hr. shifts. Preliminary layout plans were prepared just previous to Sept. 1 and upon that date the final detail plans were begun. In the latter part of October proposals from



The Base of the Ramp from the Stock Building Ends at the Shipping Dock. At the far end this communicates with the additional loading platform at the right, all under cover, and on the other side of the wall on the right is the incoming receiving bay



MAIN LINE - P.R.R. 4 TRACKS

ELIZABETH, N. J., BUILT ORIGINALLY FOR THE WILLYS CORPORATION

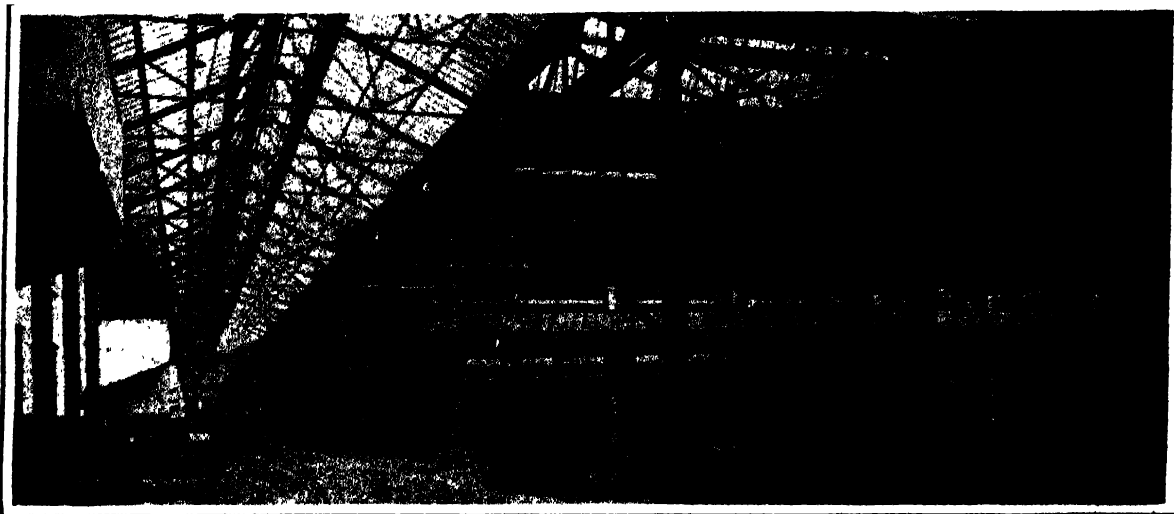
with the Plan Serves without Detailed Description to Indicate
Plant Designed for a Daily Production of 500 Cars in
Factory Floor Space

contractors were received and the first week in November construction was started with the force organized for maximum expedition. The plant was 90 per cent complete eleven months later, when, the business depression of 1920 and the resulting financial difficulties caused a delay extending to the present time. During the past year, however, the work progressed upon an extremely limited scale—the plant now being practically complete with the exception of a portion of the manufacturing equipment.

The dominant factor in the design of such plants is simplicity and the degree to which it is carried is the true measure of successful accomplishment. The sim-

tion. In other words install as little as possible and work it as much as possible. This is always the realization of maximum economy.

There are many secondary factors logically grouped under these two of primary importance the detail consideration of which forms the analysis of any industrial problem their "relativity" being generally as elusive as Einstein's. In this particular instance it is proposed to discuss the relation of these factors in their practical application. Such analyses are like problems in calculus with many variables some frequently refusing to "stay put" even long enough to complete the analysis as we are all familiar with the ever impending factor



The Manufacturing Bays Terminate in a Transfer Aisle Served by a Crane Which May Take Material Through Hatchways from the Basement-Tunnels and Which Deliver to the Platforms Opening into the Assembly Building at the Left

ple way is always the most efficient because it is the more direct and requires the least effort; of least cost in operation and investment and of compelling psychology with both management and men.

The teammate of simplicity is usefulness or the use factor which introduces the time element and represents a two-fold economy in that a high use factor not only spreads annual fixed charges but reduces them through the lower depreciation rate on long-lived equipment. Therefore the designer should mentally measure the number of hours each day an item may be used in operation, the maximum hourly output and its character as to length of life and chance of obsolescence.

The writer has become accustomed to thinking of simplicity and usefulness as complementary factors represented by parallel scales; the maximum of simplicity at zero; the maximum of usefulness at 100 per cent. An analysis leading to points of widest divergence on these scales roughly represents the best solu-

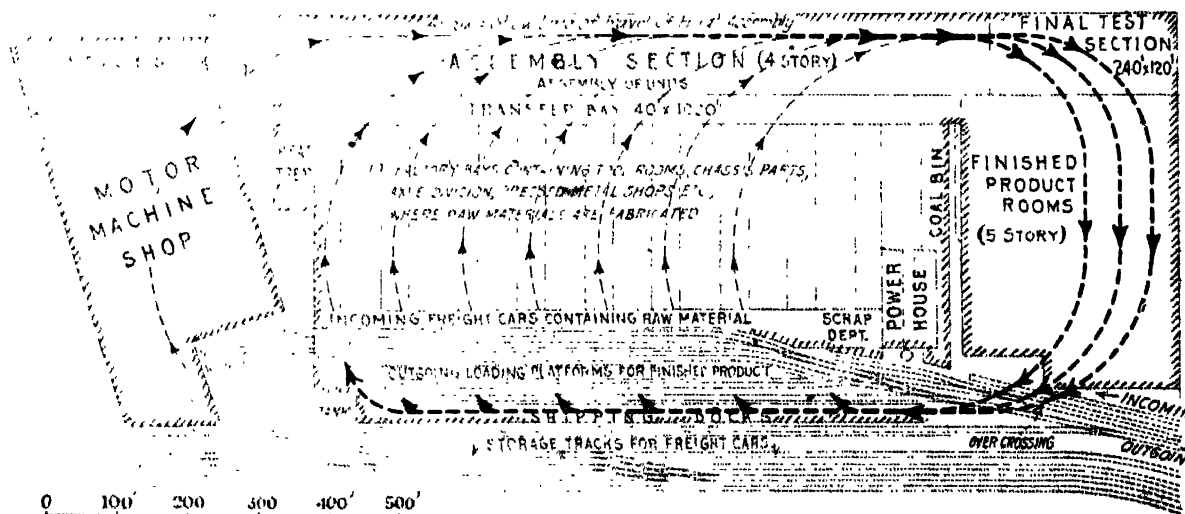
tion. of the client's change of mind upon important predictions.

General Product Routing

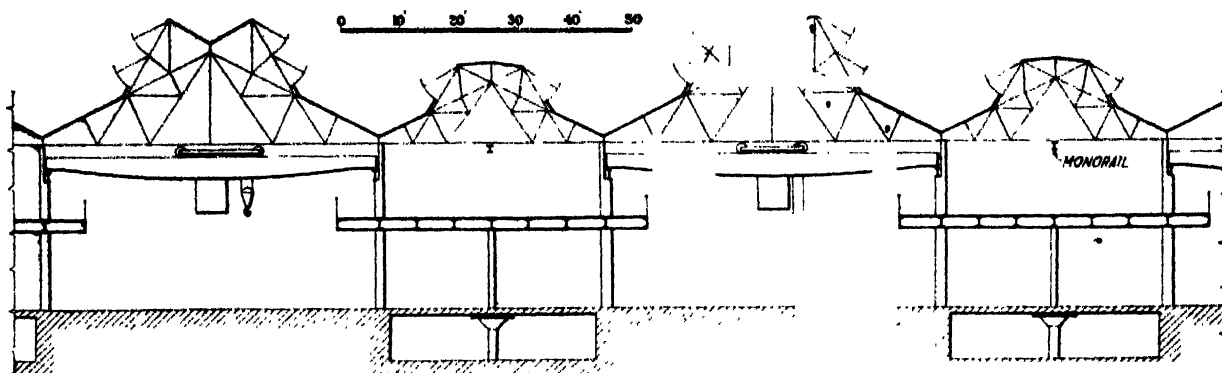
A glance at the general routing plan shows it to be roughly a simple right-hand turn of a spiral. Everything is under cover from receipt of the raw materials to the shipping of the finished product and, as will be noted, the entire plant is contained in one building.

This, to provide for the required capacity, is of unusual magnitude, approximately one-third of a mile long by one-eighth of a mile wide, facing the Lincoln Highway between New York and Philadelphia, and in the rear abutting the main line tracks of the Pennsylvania Railroad entering New York.

The building covers a ground area of 18 acres upon a property site of 25 acres. The total floor space is a little over 2,100,000 sq. ft., or nearly 49 acres. Sixty-five per cent of this area is of fireproof, reinforced con-



The Scheme of Flow of Materials Through the Works and to the Shipping Platforms Is Indicated by This Diagram



General Construction of the Parallel Manufacturing Bays Extending Between the Receiving Bay and the Four-Story Assembly Building. There are 19 such bays, alternately 40 and 60 ft. wide. The 10-ft. bays have balcony floor and a basement space on the level of the receiving bay containing conveyors

crete flat slab construction. The remainder of the new construction is of non-inflammable material throughout, with steel superstructure and concrete tile roof decks. The original Duesenberg building on the south approximately 280 x 500 ft. is of slow-burning mill construction with a saw-tooth roof over the manufacturing area.

The raw materials enter the plant by a track leading directly from the Pennsylvania Railroad drill track and the finished product leaves over a separate track, thus eliminating any interference in the shipping facilities as far as switching is concerned. There is covered track space on the plant property for 80 cars of incoming material spotted ready for unloading and for 60 cars of finished product at the shipping docks. Estimating that one-third of the finished cars will be driven away, the railroad facilities provide for the entire requirements with a single switch on the part of the rail-

Parallel with and immediately next to this, and lying along Newark Avenue, is the assembly building, and continuing northward is the test building. Then to the east along the north end of the property is a large building designated as the stock building, which serves several purposes. The assembly, test and stock building sections are of reinforced concrete construction. The 120 x 1200 ft. assembly building is of four stories and the 120 x 240-ft. test building on the north of two stories and basement, with provision for three more stories. The stock building, 320 x 400 ft., contains four stories and a basement open on three sides, the second floor connecting with the shipping docks by means of a ramp passing over the incoming and outgoing railroad tracks with full 22 ft. clearance.

There was naturally a considerable slope in the property from the front on Newark Avenue to the rail-



The Typical 60-Ft. Bay in the Manufacturing Shop, Showing the Fan Heater Units on the Balconies of the 40-Ft. Bays

road company every day, thus simplifying the transportation factor as much as possible.

The Pennsylvania Railroad has provided immediately adjacent to the plant a storage yard for about 125 cars so arranged with cross-overs as to facilitate switching operations, and about one-half mile to the north of the plant site lies the big Waverly yard of the Pennsylvania, greatly amplifying the available railroad facilities. With the exception of the always desirable switch connection to a second railroad, which was impossible at this site, the transportation facilities are quite as satisfactory as it is possible to provide.

Departmental Arrangement

The factory is divided by fire walls and departmental arrangement into (1) three parallel 60 ft. bays on the east for receiving and shipping. (2) Nineteen 60-ft. and 40-ft. manufacturing bays lying at right angles to the receiving bay, which together with the old Duesenberg building on the south, constitutes the parts manufacturing department. There is a 40 ft. bay, parallel with the receiving bay, serving as a transfer aisle between departments and for intermediate storage of finished parts.

road at the rear—this amounting to a little over 10 ft.—and in order to utilize this to the best advantage and to avoid an expensive grading proposition, the receiving and shipping level was made 10 ft. below the street level. There is also provided on the same level as the receiving floor a considerable area of basement space lying under the alternate 40-ft. bays of the manufacturing section, these basement sections leading from the receiving bay to a connecting tunnel 15 ft. wide lying under the finished parts transfer aisle, this also connecting directly with the basement of the stock building, which is on the same level. This arrangement provides for a complete system of sub-grade internal transportation with contiguous and well distributed storage areas for the several departments.

Detailed Departmental Routing

It will be noted in the detailed plant layout and sections that practically all of the facilities for enameling, painting and varnishing are located on the top floor of the building, to get as far away from dust and dirt of the street level as possible and to minimize fire hazard from these operations. As this could thus be accomplished without seriously increasing the length of travel



Spn

the Balconies Serves to Give an Idea of the Universal Clamping System Employed for Hanging Shafting

of the parts, it was possible to arrange the baking ovens on the roof with inclined approaches from the flow-coat rooms on the fourth floor, thus heat trapping the ovens.

For the motor parts shop, castings and forgings are received in the south end of the receiving bay and on the extension of these tracks which are protected from the weather by overhead shelter.

When taken direct to the motor assembly department on the second floor, they are handled in standard containers by the monorail system, by platform elevator, or by transfer aisle crane and landing decks. A careful study was made of all the various parts entering into the construction of the car and a size and shape of container was chosen which is as universally applicable to all required purposes as possible—it being considered vitally important that all material in process of manufacture should be maintained in mobile units and never piled or binned directly, except where absolutely necessary in a few isolated cases. Standard steel tote boxes of a size which makes up in multiple units to fill the standard container unit, certain combinations being worked out for the various classes of material giving suitable loads for truck, hoist or crane and to simplify as far as possible the checking of stock material for inventory purposes.

These manufacturing bays consist of alternate high bays 60 ft. wide by 40 ft. double deck or balcony bays, the balcony extending on each side into the 60 ft. bay, which contains the crane, thus providing crane transportation for both ground and balcony levels throughout. These departmental bay cranes move at right

angles to the receiving bay, at the dividing wall of which the runway starts, extending to the transfer aisle for finished material. They may move any machine weighing up to 10 or 12 tons direct to the maintenance department and back, thus to shorten the time it is out of service.

In the north end of the receiving bay immediately adjacent to the press shop is located the scrap department. The basements under the 40-ft. manufacturing bays make it possible to deliver much of the scrap from machining operations to the basement floor by means of chutes into scrap trucks. Track space for two cars is provided immediately adjacent to the scrap department with platform for box car loading and overhead gravity chutes from an elevated deck inside the building served with the crane for such scrap material as can be loaded in this manner in open or closed cars.

For such finished materials as may come to the receiving bay to be moved directly to the assembly building, two continuous apron conveyors are provided passing through the basements under the manufacturing bays and via inclined tunnel up to the ground floor of the assembly building.

The plant is not at all dependent upon the monorail system and overhead traveling cranes for handling finished parts from manufacturing departments as ample provision is made for moving materials in containers by trucks, and therefore certain thoroughfares are provided, but careful attention has been given to placing these in locations of least interference with the manufacturing and stocking of parts.

(To be concluded)



There Are Two Chain Conveyor Assembly Units in the Assembly Building, Each Approximately 1050 Ft. Long. They are designed to move about 4 ft. per min., thus completing a car assembly in a little over 4 hr.

BETWEEN MILLSTONES

Midvale Steel & Ordnance Co. Tells What Is the Trouble with Business

The sixth annual report of the Midvale Steel & Ordnance Co. shows the very great change that has taken place since the preceding report was made. In the report for 1920 the opinion was expressed that at least the first half of 1921 would be required for the adjustment to normal of the excessively high freight rates. "Events have shown," says the report for 1921, "that we were unduly optimistic, as the entire year has elapsed and the steel business is still being ground between the upper and the nether millstones of high freight rates and low selling prices for steel products." Continuing, the report says:

"Steel prices have been liquidated to the pre-war level. This is shown by the following statement of base prices, f.o.b. Pittsburgh, of our standard products:

C. per Lb.	Plates	Shapes	Bars
1909.....	1.42	1.42	1.33
1910.....	1.47	1.45	1.44
1911.....	1.31	1.32	1.26
1912.....	1.33	1.32	1.29
1913.....	1.50	1.50	1.55
Five-year average..	1.406	1.402	1.374

"The present selling price of these three standard products is about 1.40c. Steel products have been liquidated to a lower point than most other standard commodities.

"The effect of abnormal freight rates on the consumer of steel products has been to increase both the cost of manufacture (which, manifestly, must be reflected in the selling price eventually), and the prices at point of consumption. While the cumulative amount of freight charges in a ton of steel is always an important item, the rise in the last few years has been alarming. To New York, for example, in 1913, transportation amounted to \$10, or 30 per cent of the delivered price of a ton of plates; to-day it is \$19.07, or 53½ per cent of the price paid by the consumer. This has localized his sources of supply and thus materially limited his opportunity to purchase in competitive markets.

"Wage rates at the mills and furnaces during the

war period and later were advanced approximately 180 per cent. This rate has since been substantially reduced, but is still 47 per cent higher than the pre-war rate.

"As compared with the complete liquidation in selling prices and partial liquidation in labor, freight rates on the materials which must be assembled for the production of steel are still substantially at war levels.

"Railroad prosperity and national prosperity are one and inseparable. We are certain that high freight rates are the principal factor in preventing a return to normal conditions, not only in the steel business, but also in the general business of the country. The railroads claim that they cannot reduce rates unless they are relieved from the oppressive restrictions imposed by the Federal Government and the States. We will not now venture to predict when this situation will be remedied. It is certain, however, that until adjustments are made to conform to peace conditions, no industry in which transportation is a large factor can prosper. This is particularly true of industries which handle large quantities of raw materials.

"Every individual interested in the prosperity of the country at large should urge his representatives in the State Legislature and in Congress to throw their influence into the scale against all artificial restrictions imposed by these agencies which hamper the free operation of economic laws."

The table giving the average number of employees and the expenditures for labor from ore to finished product shows that the pay roll for 1920 was \$58,828,739 compared with \$31,521,531 in 1916 and \$21,860,985 in 1921. The average number of employees ranged from 38,375 in 1917 to 14,432 in 1921, while the average wages per employee per year ranged from \$2,161 in 1920 to \$1,015 in 1916, while for 1921 the amount was \$1,515. Of the six years covered by the table, the shipments were heaviest in 1917 when they reached 1,614,373 tons, and lowest in 1921, when they amounted to 509,849. The inventory at the close of 1921 was \$36,319,212, compared with \$45,393,834 at the end of 1920. The net loss for the year 1921 was \$5,313,173, compared with the net income of \$12,424,919 for 1920. The surplus at the close of 1921 was \$53,551,936, compared with \$59,865,449 at the end of 1920. Cash in banks and on hand at the end of 1921 was \$4,336,125, compared with \$27,684,921 at the end of the year 1920.

TARIFF PLANS

Manufacturers' Association Would Assess Duties in a New Way

WASHINGTON, March 7.—Sponsored by the Manufacturers' Association of New Jersey, Senator Frelinghuysen, of New Jersey, has introduced a bill in the Senate which would assess specific duties on all imports, according to the difference in "conversion costs" here and abroad. The authority for determining these "conversion costs" would devolve on the Tariff Commission to operate under the direction of the Secretary of Commerce, assisted by a body of advisers comprised of bankers, manufacturers, agriculturists, economists, and labor leaders.

The association has announced that it had determined on a nation-wide campaign "to remove the tariff from politics and to urge the enactment of a non-partisan measure based on scientifically appraised specific duties." The bill has created some interest and is being given study by members of Congress, but it is not believed it will be given any serious consideration with a view to urging its adoption in the near future. To do so would require a sweeping change in the plan of the Administration with respect to the Fordney tariff bill, which has been for a number of months, and still is, before the Senate Committee on Finance after passing the House last fall. As is known, delay in reporting this bill is due to differences of opinion as to the basis of valuation for fixing import duties.

The bill introduced by Senator Frelinghuysen is explained in an elaborate statement of the Manufac-

turers' Association of New Jersey and the program laid before members of the House Committee on Ways and Means and the Senate Committee on Finance by J. Philip Bird, president of the association, and Julius Forstmann, of Forstmann & Huffmann Co., Passaic, N. J., members of the association's tariff committee. They have emphasized the necessity for immediate passage by Congress of some temporary tariff bill that will afford protection to American manufacturers while a scientific measure is being prepared.

It is known that Secretary of Commerce Hoover does not favor the idea of having the Tariff Commission operate under his direction. Apparently Mr. Hoover feels that he already has enough duties to perform without having thrust upon him the responsibility of the work of a tariff commission.

The Aluminum Goods Mfg. Co., Manitowoc, Wis., with branch factories in Two Rivers, Wis., Newark, N. J., and St. Louis, has informed its employees that it has arranged for an increase in the amounts of the policies they hold under the corporation's group insurance plan. The new plan will be effective as of Jan. 1, although just announced. Under the plan an increase of \$100 is made in the amount in all classes, with a new class added giving employees under 45 years who have been in the company's service five years or longer \$1,500 of insurance; between 45 and 54, \$1,000, and between 55 and 59, \$700. Female employees are insured regardless of age. Since the institution of the group insurance plan, the company has paid more than \$30,000 in claims on 47 deaths among employees of its five plants.

Mass in the Heat Treatment of Steel

A Suggested Formula for Calculating the Brinell Hardness from Given Data—Applicable to Alloy and Carbon Steels

IN the paper dealing with the influence of mass in heat treatment, read at the Indianapolis convention of the American Society for Steel Treating, and published in the October, 1921, issue of the society's *Transactions*, the author confined himself to data taken on a 0.45 per cent carbon steel, as published by the British Engineering Standards Association in its report No. 75, dated October, 1920. In the paper it was shown that the hardness-mass formula is:

$$B = \frac{nC}{(D-d)} + b$$

which B is the Brinell hardness of any section, n is a factor which is constant for each steel of a particular analysis.

C represents the product of the diameter and surface per pound of steel of any round section.

D is the diameter of the section, the hardness of which is desired.

b is the vertical asymptote of the curve.

normalized Brinell hardness of the steel.

The object of the present paper is to show that the same general formula that was used for plain carbon

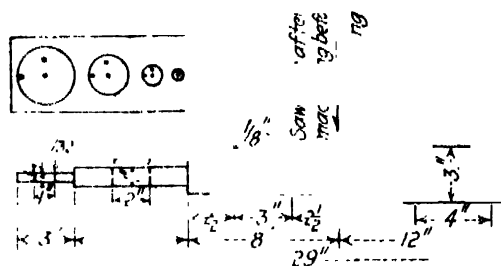


Fig. 1—Standard Test Specimen for Determining the Influence of Mass in Heat Treatment. In the upper left-hand corner are shown cross sections of the four diameters, indicating the points at which Brinell measurements were taken.

steel is applicable to structural alloy steels; also that this formula holds good for the "midway" Brinells, that is, Brinell hardnesses taken half way between the centers and outsides of rounds on their cross sections.

In his previous paper, the author pointed out that n is a factor which is constant for each steel of a particular analysis, and which appears to be, for plain carbon steel, the square of the hardening capacity of the steel in question. As the variable d is a function of the factor n , it is obvious that n is the salient point of the formula.

From experiments soon to be described on two nickel steels, one chrome-nickel steel and from data given by the British Engineering Standards Association on a 5 per cent nickel case-hardening steel, it became apparent that the factor n for structural alloy steel is twice the square of the hardening capacity, or more generally expressed, a multiple of the square of the hardening capacity, thus:

$$n = 2 \left(\frac{B_m}{b} \right)^2 \text{ in which}$$

B_m is the maximum Brinell hardness which can be developed in the steel.

b is the normalized Brinell hardness of that steel.

Thus, for a 0.32 per cent carbon, 3.25 per cent nickel steel,

$$n = 2 \left(\frac{532}{196} \right)^2 = 14.73$$

*A paper presented at the New York Sectional Meeting of the American Society for Steel Treating, March 3. The author, E. J. Janitsky, is metallurgical engineer, Illinois Steel Co., South Chicago, Ill. In this paper the author has answered the criticisms of Sir Robert Hadfield on his previous paper, which appear on page 396 of the February issue of *Transactions*.

For an 0.42 per cent carbon, 3.15 per cent nickel steel,

$$n = 2 \left(\frac{600}{217} \right)^2 = 15.27$$

For an 0.34 per cent carbon, 1.20 per cent nickel, 0.56 per cent chromium steel,

$$n = 2 \left(\frac{555}{217} \right)^2 = 13.08$$

For an 0.17 per cent carbon, 5 per cent nickel case hardening steel,

$$n = 2 \left(\frac{388}{187} \right)^2 = 8.6$$

The specimen used to make these experiments is shown in Fig. 1. It is composed of four sections, each nicked circumferentially as indicated, so that, at the nicks, the diameters of each of the sections respectively is approximately 0.5, 1.0, 2.0 and 3.0 in. It is best to cut the specimen into two parts before quenching, as this facilitates handling; cutting should be done at the junction of the 2 and 3-in. sections as shown in Fig. 1. After quenching the test pieces should be broken at the nicks and the fractured surfaces ground. Brinell hardness numbers should then be obtained on three places of the ground cross sections, thus, close to the surface (circumferential), midway and in the center. In a 0.5-in. round there will be little or no variation in hardness between the center and the outside, but it is obvious that as the section grows larger this difference becomes greater. Ordinarily after quenching the 3-in. round can be cut with a saw in which case, of course, it is not necessary to fracture it.

It will be noted in all of the following tables that the hardness of the 0.5-in. section is not calculated. The 0.5-in. section is used only to obtain the maximum hardness which can be developed in the steel. A section of this diameter has been chosen to determine the maximum Brinell hardness because it is the smallest one which can be treated practically and brinelled on the cross section. A smaller section is liable to crack

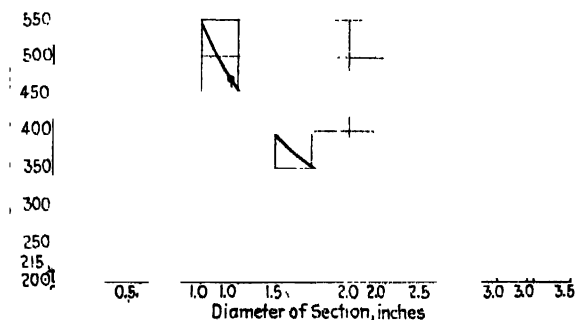


Fig. 2—Water Quench Curve Showing Relation of Brinell Hardness to Diameter of Section. After determining the Brinell hardness of a 1-in. section, for example, locate this point on the curve and, using the same horizontal scale, read off the Brinell hardness of other sections.

in drastic quenching and does not allow the Brinell hardness of it to be obtained.

When a section of steel is quenched, a section so small that it has on quenching a perfect martensitic structure, the quenching of a smaller section will not give a higher Brinell hardness than that obtained in the section just mentioned. Thus, in alloy steels of the structural type, this largest section at which the maximum Brinell hardness can be obtained is on a section having a diameter somewhere between 0.5 and 1.0 in. Therefore it is not to be expected that the theoretical curve will pass through the point corresponding to the actual Brinell hardness obtained for 0.5 in.

The following tables give actual and calculated data of the center and midway Brinell hardness of sections whose diameters are shown:

(1) *Nickel steel, 3.50 per cent, quenched in water at 1450 deg. Fahr.*—The composition of the steel was carbon, 0.32; manganese, 0.56, and nickel, 3.25 per cent.

$B_m = 532$, $b = 196$, thus

$$n = 2 \left(\frac{B_m}{b} \right)^2 = 14.73$$

Center Data

$$\text{for 1 in., } d = 1 - \frac{(14.125) (14.73)}{430 - 196} = 0.111$$

$$B = \frac{(14.125) (14.73)}{D - 0.111} + 196$$

The following results were obtained:

Diameter of section, inches	Actual Brinell hardness	Calculated Brinell hardness
0.50	532	532
0.73	430	430
1.00	302	306
2.00	348	268

Midway Data

$$n = 14.73$$

$$\text{for 1 in., } d = \frac{(14.125) (14.73)}{430 - 196} = 0.260$$

$$B = \frac{(14.125) (14.73)}{D - 0.260} + 196$$

The following results were obtained:

Diameter of section, inches	Actual Brinell hardness	Calculated Brinell hardness
0.50	532	532
0.879	532	532
1.00	477	477
2.00	302	315
3.00	255	272

(2) *Nickel steel, 3.50 per cent, quenched in water at 1450 deg. Fahr.*—The composition of the steel was carbon, 0.42; manganese, 0.61, and nickel, 3.15 per cent.

$B_m = 600$, $b = 217$, thus

$$n = 2 \left(\frac{B_m}{b} \right)^2 = 15.27$$

Center Data

$$\text{for 1 in., } d = 1 - \frac{(14.125) (15.27)}{540 - 217} = 0.332$$

$$B = \frac{(14.125) (15.27)}{D - 0.332} + 217$$

The following results were obtained:

Diameter of section, inches	Actual Brinell hardness	Calculated Brinell hardness
0.50	600	600
0.826	600	600
1.00	540	540
2.00	321	346
3.00	286	298

Midway Data

$$n = 15.27$$

$$\text{for 1 in., } d = 1 - \frac{(14.125) (15.27)}{555 - 217} = 0.362$$

$$B = \frac{(14.125) (15.27)}{D - 0.362} + 217$$

The following results were obtained:

Diameter of section, inches	Actual Brinell hardness	Calculated Brinell hardness
0.5	600	600
0.925	600	600
1.0	555	555
2.0	340	349
3.0	302	300

(3) *Chrome-nickel steel quenched in water at 1535 deg. Fahr.*—The composition of the steel was carbon, 0.34; manganese, 0.50; nickel, 1.20, and chromium, 0.56 per cent.

$B_m = 555$ and $b = 217$; thus

$$n = 2 \left(\frac{B_m}{b} \right)^2 = 13.08$$

Center Data

$$\text{for 1 inch, } d = 1 - \frac{(14.125) (13.08)}{477 - 217} = 0.289$$

$$B = \frac{(14.125) (13.08)}{D - 0.289} + 217$$

The following results were obtained:

Diameter of section, inches	Actual Brinell hardness	Calculated Brinell hardness
0.50	555	555
0.826	555	555
1.00	477	477
2.00	340	325
3.00	286	285

Midway Data

$$n = 13.08$$

$$\text{for 1 inch, } d = 1 - \frac{(14.125) (13.08)}{495 - 217} = 0.336$$

$$B = \frac{(14.125) (13.08)}{D - 0.336} + 217$$

Diameter of section, inches

Actual Brinell hardness

Calculated Brinell hardness

0.5	555	555
0.826	555	555
1.0	495	495
2.0	340	328
3.0	302	286

(4) *Nickel case hardening steel, 5 per cent, quenched in water at 1580 deg. Fahr. and retempered in water at 1400 deg. Fahr.* (From British Report).

The composition of the steel was carbon, 0.17; manganese, 0.34, and nickel, 6.0 per cent.

$B_m = 388$, $b = 187$, thus

$$n = 2 \left(\frac{B_m}{b} \right)^2 = 8.6$$

$$\text{for } 1\frac{1}{4} \text{ in., } d = 1.125 - \frac{(14.125) (8.6)}{363 - 187} = 0.435$$

$$B = \frac{(14.125) (8.6)}{D - 0.435} + 187$$

The following results were obtained:

Diameter of section, inches	Actual Brinell hardness	Calculated Brinell hardness
0.6875	388	388
1.04	388	388
1.125	363	363
1.50	321	300
2.125	277	259

In regard to the formula, it would appear that the Brinell hardness of the steels in the annealed state should be taken for b ; however, as we do not deal with sections of indefinite diameter, the value used for b is that of the steel in the normalized condition. It seems to answer the purpose of the formula better for engineering purposes.

It is also obvious that in the case of specimens drawn or quenched in different media, the same procedure should be followed as that in this paper. It is not necessary to calculate the Brinell hardness for sections drawn or quenched in different media, if the water quench curve for that particular steel is at hand. It is only necessary to obtain the Brinell hardness of say, a 1-in. section, fix this point on the water quench curve and using the same scale, read off the Brinell hardnesses of other sections, as shown in Fig. 2.

Attention is called to the fact that the results given in this paper are not averages of a number of tests. They represent a single result of one investigator. If this experiment would be carried out by a number of investigators and the results averaged, still closer checks between the actual and calculated values would be expected.

In concluding the author wishes to state that whereas the first paper was a demonstration of the hyperbolic tendency of the curve of the physical properties of steel sections of the same analysis, this paper endeavors to cover the practical application when one is confronted with the mass problem.

Experiments on Sponge Iron

At Minneapolis, the Bureau of Mines is making a study of the properties of steel made in an electric furnace from sponge iron. The steel has been furnished by the California Electric Steel Co., Los Angeles. Chemical and microscopic analyses are being made. The effect of heat treatment on the physical properties of this steel will then be determined by the usual tests for tensile strength, elasticity, hardness, etc.

At the Northwest station of the Bureau of Mines, Seattle, Wash., a study is being made of the melting of sponge iron. In work recently performed foundry iron has been made by melting sponge iron. The maximum amount of carbon introduced was 3.00 per cent. Further work is being undertaken in which the attempt is made to introduce more carbon. Other tests are to be made with the idea of producing low-carbon and high-carbon steels. All of these tests will necessitate the control of the introduction of carbon and silicon and of removing sulphur and phosphorus.

At Seattle the preparation of sponge iron is being undertaken by the Bureau of Mines with two objects in view: First, to supply sponge iron for copper precipitation, and, second, for melting and conversion into the most suitable iron or steel product.

Progress of Steel Making in Australia

Member of Queensland Parliament Tells What Has Been
Accomplished and Speaks of Prospects—
Iron Ore Is of High Grade

BY RANDOLPH BEDFORD*

I AM glad to accept the invitation of the editor of THE IRON AGE to write, while in New York, a short statement concerning the iron and steel trade of Australia and its projected extensions.

The history of iron smelting and steel production in Australia is the history of a few men putting up a long and gallant fight against ignorant opposition, and against the stupid and slipshod methods that belong to free trade.

To the end of 1886 the greater quantity of the pig iron produced in New South Wales from local ores was the output of Sandford's iron works at Lithgow, stated by the proprietor at 21,880 tons. The Fitzroy furnace's only record is 3242 tons; but it was in blast intermittently for years prior to that record, and must have produced more than the record. This much is certain: that up to 1901 the total iron product from New South Wales ores was under 30,000 tons.

True to the free trade of the time, even if Australia could make iron, it was still too thick-headed to manufacture iron into articles, and a lot of the New South Wales pig was sold to San Francisco. Mac-Condray & Co., of San Francisco, wrote in 1868:—"The parcels of your pig iron received here have given great satisfaction. We can dispose of 300 tons a month, and it would command from \$2 to \$4 a ton more than any other iron imported into California."

Broken Hill Development

The development of Broken Hill has had tremendous effect on general Australian developments of industries and men. Its general operation has trained Australian engineers, as its zinc problem has educated Australian chemists. It developed the local industry of making coke—which used to come from Germany; and its educative influence can be found on every notable mining field in Australia to-day. At Newcastle it is the key industry to most industries of the land; it has attracted to itself satellite industries working up its by-products such as that of tar from the coke ovens; and it has grouped around it wire and wire netting factories with galvanized iron and nail factories, and tin plate factories to come.

In the extension of its coke ovens and the ability to supply customers with surplus waste gases for power, a tremendous extension of its business has come; grouping around it industries in no way allied to it, and rapidly erecting Newcastle into the position of the Pittsburgh of the Commonwealth.

The great rich iron deposits of Australia are many, but there are none better than the Broken Hill Proprietary Co.'s iron mines of the Iron Knob and Iron Monarch at Spencer's Gulf (S. A.). The Iron Knob ore bulks 68 per cent, metallic iron and has 10,000,000 tons in sight. That is to be read with the fact that the hematite deposits of Lake Superior average 50 to 55 per cent and bear a railage of 1000 miles to the coal of Pittsburgh. To make a ton of pig iron requires these varying quantities of ore in the countries named:

United States (nearly).....	2 tons ore to 1 ton pig
Sweden and Russia.....	2 tons ore to 1 ton pig
Britain and Germany.....	2.4 tons ore to 1 ton pig
France and Belgium.....	2.7 tons ore to 1 ton pig
All native British ores.....	3 tons ore to 1 ton pig
Iron Knob (Australia).....	1.5 tons ore to 1 ton pig

The 1921 output of the Broken Hill Company's works at Newcastle (New South Wales) included 251,417 tons pig, 219,973 tons steel ingots and 8723

tons billets, and 176,000 tons rails, bar, rod, plate and structural steel.

Australia's Importations

Yet Australia, suffering under an inadequate tariff, imported in 1919-20 manufactures of steel to the value of \$29,000,000. Some of this was Belgian—and some of that was suspected of German origin. Until we can overhaul that value by local production, Australia would prefer to do that business with the United States of America which has money to buy our products in return. The preference to Britain should be extended to preference to the English-speaking countries. At the moment we are importing from Japan general merchandise in such volume that it is disquieting; for rightly or wrongly most Australians believe that every dollar sent to Japan gives Japan another cartridge or two for the white man.

In the State of whose Legislature I am a member (Queensland) the steel shortage of the war impelled us to move for the establishment of State steel works because private enterprise had neglected it largely because of low duties. Besides the Newcastle steel works of the Broken Hill Proprietary Company, the State of New South Wales houses the important Hoskin's works at Lithgow. Combined these ironmasters could not then meet the demand and small steel foundries were during the war buying scrap iron up to \$30 per ton.

Great Iron Deposits

Yet every State has great iron deposits. Beginning in the South, Tasmania has great iron reserves at Blythe River and Penguin, by the sea; Victoria at Nowa Nowa (at present inaccessible for production in quantity); New South Wales at Carcoar, Cadia and other places connected by railroad with the sea; South Australia at Iron Knob, which supplies Newcastle; Queensland at Biggenden, Cloncurry, Iron Island and other places, and West Australia at Yampi Sound. The Queensland Government has a vast coal-field now being connected by railroad with the deep water port of Bowen (about 17 days distant from San Francisco) and our Parliament has passed a bill providing for the establishment of State steel and iron works at Bowen. Contemporaneously the State Government secured by private purchase and by concession from the West Australian Government the iron deposits of Yampi Sound, situated in latitude 16° 8' South and longitude 123° 45' East. The largest ships afloat can enter or leave Yampi at any time of the tide.

The deposits are in the form of huge beds of dense solid steel-gray crystalline hematite, and there are roughly 15,000,000 tons on Cockatoo Island above high water mark. On Coolan Island there are 70,000,000 tons above high water mark; recoverable without any removal of over-burden. Other ore bodies represent 15,000,000 tons—a total of 100,000,000 tons above high water in sight—which probably represent a hundredfold of the quantity to be developed by mining.

The ore is very even in quality and very free from deleterious qualities. Phosphorus is below the limit of 0.05 per cent allowable for acid open-hearth treatment, or 0.10 per cent allowable for acid Bessemer ores.

The method of working will be by heavy charges of explosives breaking thousands of tons at a shot, blowing out the width of the ore body clean from the footwall, and throwing the ore down to near sea-level, whence it can be loaded to the ships. The proposition is that ships shall load ore at Yampi, transport it to

*Member of the Parliament of Queensland, Australia.

the State coal fields at Bowen, and take back loading of coal to Java en route to Yampi for further cargo. The value of the ore is best shown by these comparisons.

Analyses of Well-Known Hematites in Comparison with Yampi

	Metallic Iron Per Cent	Sulphur Per Cent	Phosphorus Per Cent
Lake Superior, average, 1909.....	58.45	0.06	0.91
Newfoundland (Bell Island), average 1910-1912.....	51.88	0.018	0.70 to 0.85
Cuba (Dalquiri), average 1907.....	57.80	0.18	0.034
Brazil, 9 analyses.....	63.01 to 69.35	0.01 to 0.03	0.010 to 0.184
France (Pyrenees), average 1 year.....	57.28	0.33	0.009
England (Cumberland), 6 representative analyses.....	48.81 to 62.11	0.004 to 0.02	0.009 to 0.022
Spain (Bilbao), Rubio.....	50.84	n. d.	0.029
China (Hanyang).....	60.0 to 62.0	0.05 to 0.012	0.05 to 0.25
India (Oressa).....	64.0 to 69.0	0.021 to 0.036	0.048 to 0.135
Algiers, 5 analyses.....	43.35 to 57.10	0.017 to 0.045	0.009 to 0.035
Yampi, 7 analyses.....	68.99 to 60.91	0.01 to 0.07	0.008 to 0.062

Analyses of coal of the Bowen field are as hereunder. The largest seam is the Bowen averaging 18 ft. in thickness; and others are the Garrick averaging 7 ft. 6 in., and the Denison seam from 3 to 6 ft. thick.

Bowen Seam

Moisture ..	0.11 per cent	
	0.1 per cent	0.105 per cent mean
Volume hydrocarbons..	21.0 per cent	
	20.6 per cent	20.9 per cent mean
Ash ..	11.98 per cent	
	11.96 per cent	11.97 per cent mean
Fixed carbons by difference ..		67.025 per cent mean
		100.00 per cent mean
Sulphur ..	0.98 per cent	
	0.84 per cent	
Mean ..	0.96 per cent	

Garrick Seam

Moisture ..	0.11 per cent	
	0.11 per cent	11.0 per cent mean
Volume hydrocarbons..	21.8 per cent	
	22.2 per cent	22.0 per cent mean
Ash ..	13.7 per cent	
	13.66 per cent	13.68 per cent mean
Fixed carbons by difference ..		100.00 per cent mean
Sulphur ..	1.2 per cent	
	1.4 per cent	
Mean ..	1.3 per cent	

In San Francisco I was told that steel manufacture on the Pacific Coast would be established if a new supply of cheap coke should offer. In the making of coke at Bowen as one of the activities of steel production in Australia, there will probably be found the means to bring our two countries in close association in trade as already they are allied by a strong and continuously increasing sentiment.

Steel Mill Employment Increases

WASHINGTON, March 7.—The iron and steel industry, with an increase of 7256 employees, or 2.2 per cent, showed a larger gain in employment in February over January than any other of the 14 industries reporting to the United States Employment Service, except the vehicles for land transportation. In this case the gain was 11,149 employees, or 6.5 per cent. All but two industries, textiles and their products and paper and printing, showed gains. The total net gain, however, was only 8894 employees, or 0.57 per cent, the total gain of 28,131 being offset by a decrease of 19,237 in the two industries showing losses. Of this decrease, 19,152 was in the textile industry and is attributed to the strike.

An increase of 2471 was made in metal and metal products, and of 2452 in railroad repair shops. Iron and steel towns showing gains in February over January were Johnstown, Pa., 1960, or 22.5 per cent; Cleveland, 3806, or 5.5 per cent; Birmingham, Ala., 1130, or 5 per cent; New York, 2744, or 1.9 per cent; Pittsburgh, 1215, or 1.7 per cent. Decreases were shown by Youngstown, Ohio, 679, or 2.4 per cent; Philadelphia, 953, or 0.96 per cent; Chicago, 842, or 0.5 per cent.

IRON AND STEEL MOVEMENTS

More Than One-Quarter of All Water Traffic Consists of Ferrous Materials

In a volume of commercial statistics for 1920, the statistical division of the Board of Engineers for Rivers and Harbors has published a volume of more than 1400 pages, showing the movements of export and import tonnage and of river and canal tonnage for a vast quantity of materials. The table showing the movements of iron and steel gives both the imports and exports in foreign commerce, and the receipts and shipments in domestic commerce, for the year 1920, with comparative figures for 1919. The table gives the movement by ports on the Atlantic, Gulf and Pacific coasts and on the Great Lakes, the latter being domestic shipments, mainly of iron ore. The table gives also the movements on canals, on the Mississippi River and on rivers of the Atlantic, Gulf and Pacific coasts.

It may be pointed out that the total iron and steel movement shown, amounting in 1920 to 189,617,864 net tons, is 36½ per cent of the entire movement for the year of the twelve principal products, aggregating 523,267,141 net tons. It is also 27 per cent of the 703,675,131 tons of all products moved by water. The principal information regarding movements of iron and steel for the two years will be found in the appended table.

Movement of Iron and Steel by Water (Net Tons)

	1919	1920	Increase, Per Cent
Imports: Atlantic coast.....	471,030	637,548	35.3
Gulf coast		32,046	...
Pacific coast	2,905	47,469	...
Great Lakes		124,340	...
Total	473,935	841,403	77.5
Exports: Atlantic coast.....	135,656	(c) 903,634	566.2
Gulf coast	(a) 210,664	300,225	42.5
Pacific coast	403,156	238,401	-40.9
Great Lakes		1,281,795	...
Total	749,476	2,724,055	263.5
Total foreign commerce.....	1,223,411	3,565,458	191.5
Domestic receipts: Great Lakes	51,584,356	63,993,374	24.0
Seacoasts	1,122,646	334,660	-70.2
Rivers and canals.....	10,111	337,295	...
Total	52,717,112	64,665,329	22.7
Domestic shipments: Great Lakes	52,019,248	63,301,034	21.7
Seacoasts	160,686	298,396	85.7
Rivers and canals.....	160	439,647	...
Total	52,180,094	64,039,077	22.7
(b) Total domestic commerce..	105,612,629	186,052,406	76.2
Total movement recorded...	106,836,040	189,617,864	77.5
Adjusted movement*	54,029,725	96,591,661	78.5

*Eliminating all known duplications; consists of total foreign commerce added to one-half the domestic figures.

(a) Includes 75,870 tons of river movement.

(b) Includes local traffic not segregated.

(c) Includes 51,274 tons of river movement.

Newport Company Will Not Move

Officials of the Newport Rolling Mill Co., Newport, Ky., state that it is not the intention of the company to move from Newport. During the height of the strike troubles the desirability of moving the plant was considered, but with the re-establishment of order in the strike zone and the assurance that the operations of the company will not be interfered with, the consideration of moving the plant to some other city was dropped. Communications from approximately 35 cities from all sections of the United States, offering the company various inducements to locate their plant in these cities, were received.

The sixth annual meeting of the American Gear Manufacturers' Association will be held at the Hotel Lafayette, Buffalo, April 20 to 22, inclusive.

FEBRUARY PIG IRON OUTPUT

A Gain of 5,151 Tons Per Day Over January

Seventeen Furnaces Blown In, Five Blown Out

The steady increase in the pig iron production of the country which characterized the last few months of 1921, but which came to a standstill in January, was resumed in February with decided impetus. The production in February was 5151 tons per day larger than that in January which contrasts with a decline in January from December of 133 tons per day and a gain in December over November of 6013 tons per day. As in January the feature of the February production was the relatively high output of steel-making pig iron which showed an increase of 4697 tons per day over January.

The production of coke and anthracite furnaces for the 28 days in February amounted to 1,629,991 gross tons, or 58,214 tons per day, as compared with 1,644,951 tons, or 53,063 tons per day in January, a 31-day month. Owing to an error in the returns of one furnace, the January figures have been revised upward from those published Feb. 9. The output last month was larger than the March output last year and was only 307,266 tons less than in February, 1921.

The total number of furnaces in blast on March 1 was 138 as compared with 126 on Feb. 1. This number is just twice the number of furnaces in blast on Aug. 1, 1921, at the low point in the depression, when only 69 were operating. The capacity of the 138 furnaces in blast March 1 is estimated at 59,080 tons per day, as contrasted with a capacity of 53,305 tons per day for the 126 furnaces in blast Feb. 1. In February 17 furnaces were blown in and 5 were blown out.

Of the manganese-iron alloy output in February of 8540 tons, spiegeleisen constituted 4930 tons and ferro-manganese 3610 tons, the latter being a decided decline from the January output of 5644 tons.

Daily Rate of Production

The daily rate of production of coke and anthracite pig iron by months, from February, 1921, is as follows:

Daily Rate of Pig Iron Production by Months—Gross Tons				
		Steel Works	Merchant	Total
February 1921	.....	58,060	11,127	69,187
March	.....	42,691	8,777	51,468
April	.....	33,854	5,914	39,768
May	.....	33,054	6,340	39,394
June	.....	29,414	6,050	35,464
July	.....	23,086	4,803	27,889
August	.....	26,037	4,743	30,780
September	.....	27,189	5,661	32,850
October	.....	33,365	6,850	40,215
November	.....	37,960	9,223	47,183
December	.....	41,173	12,023	53,196
January, 1922	.....	42,130	10,933	53,063
February	.....	46,827	11,387	58,214

The figures for daily average production, beginning with January, 1916, are as follows:

Daily Average Production of Coke and Anthracite Pig Iron in the United States by Months Since Jan. 1, 1916—Gross Tons							
	1916	1917	1918	1919	1920	1921	1922
Jan.	102,746	101,643	77,799	106,525	97,264	77,945	53,063
Feb.	106,456	94,473	82,835	105,006	102,720	69,187	58,214
Mar.	107,667	104,882	103,648	99,685	108,900	51,468	
Apr.	107,592	111,165	109,607	82,607	91,327	39,768	
May	108,422	110,238	111,175	68,002	96,312	39,394	
June	107,053	109,002	110,793	70,495	101,451	35,464	
July	104,017	107,820	110,354	78,340	98,931	27,889	
Aug.	103,346	104,772	109,341	88,496	101,529	30,780	
Sept.	106,745	104,465	113,942	82,932	104,310	32,850	
Oct.	113,189	106,550	112,482	60,115	106,212	40,215	
Nov.	110,394	106,859	111,802	79,745	97,830	47,183	
Dec.	102,537	92,997	110,762	84,944	87,222	53,196	

Among the furnaces blown in during February were the following: One Donner furnace in the Buffalo district; No. 2 Swede furnace in the Schuylkill Valley; No. 1 Clairton, No. 3 Duquesne furnaces and No. 2 Lucy furnace of the Carnegie Steel Co. and one Monessen furnace of the Pittsburgh Steel Co. in the Pittsburgh district; one Johnstown furnace of the Cambria Steel Co. and the Perry furnace in Western Pennsylvania; No. 1 furnace of the National Tube Co. and the Dover furnace in Central Ohio; No. 4 Joliet furnace of the Illinois Steel Co., No. 11 Gary furnace and No. 1 Madeline furnace in the Chicago district; Detroit furnace B in Michi-

gan; No. 4 Ensley furnace of the Tennessee Iron & Railroad Co. and the Alabama City furnace of the Gulf States Steel Co. in Alabama. The Adrian furnace, reported blown out in January, was in blast and is included in the February totals.

Among the furnaces blown out during February were the following: The Northern furnace of the Witherbee Sherman Co. in New York; the Saucon furnace of the Thomas Iron Co. in the Lehigh Valley; Newcastle No. 1 of the Carnegie Steel Co. in the Shenango Valley; Mary furnace in the Mahoning Valley and one Madeline furnace in the Chicago district.

Output by Districts

The accompanying table gives the production of all coke and anthracite furnaces for February and the three months preceding:

Pig Iron Production by Districts, Gross Tons

	February (28 days)	January (31 days)	December (31 days)	November (30 days)
New York	105,708	110,867	126,734	91,535
New Jersey	3,947	4,642	5,026	4,525
Lehigh Valley	29,094	31,296	31,388	30,020
Schuylkill Valley	44,674	42,144	41,450	35,850
Lower Susquehanna and Lebanon Val- leys	26,074	28,227	26,106	19,356
Pittsburgh district	388,698	382,407	390,908	337,851
Shenango Valley	52,402	54,234	52,793	50,555
Western Penna.	61,459	45,511	56,593	67,432
Maryland, Virginia and Kentucky	22,222	22,858	18,917	14,754
Wheeling district	69,865	75,576	72,660	44,966
Mahoning Valley	172,136	190,436	188,391	165,562
Central and North- ern Ohio	187,918	161,160	167,307	156,767
Southern Ohio	30,568	31,892	15,534	13,893
Illinois and Indiana	273,444	287,313	299,180	252,566
Mich., Minn., Mo., Wis. and Colo.	51,233	48,236	37,149	20,059
Alabama	109,667	121,073	117,886	108,125
Tennessee	882	825	1,064	1,665
Total	1,629,991	1,638,697	1,649,086	1,415,481

Capacities in Blast March 1

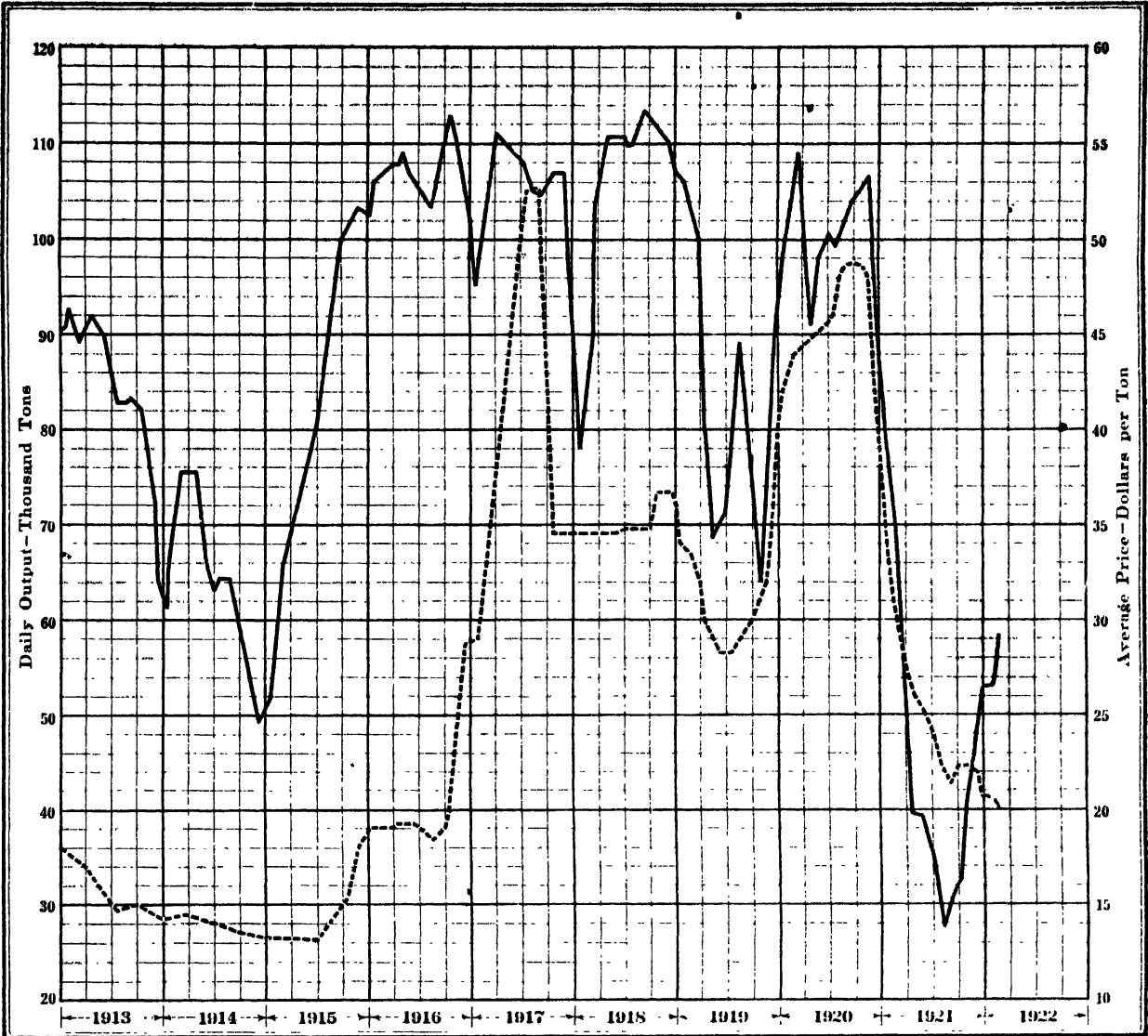
The following table shows the number of furnaces in blast, March 1 in the different districts and their capacity, also the number and daily capacity in gross tons of furnaces in blast Feb. 1:

Coke and Anthracite Furnaces in Blast

Location of Furnaces	Total Stacks	March 1		Feb. 1	
		In Blast	Capacity per Day	In Blast	Capacity per Day
<i>New York:</i>					
Buffalo	22	9	3,750	8	3,300
Other New York....	4	0	....	1	220
New Jersey	4	1	140	1	150
<i>Pennsylvania:</i>					
Lehigh Valley	18	3	1,000	4	1,010
Spiegel	2	0	....	0	....
Schuylkill Valley...	15	5	1,725	4	1,360
Lower Susquehanna.	10	1	440	1	400
Lebanon Valley	8	2	410	2	430
Ferry and Spiegel.	2	1	80	1	80
Pittsburgh District.	55	30	14,000	27	12,500
Ferry and Spiegel.	4	2	225	1	140
Shenango Valley ...	19	4	1,880	5	2,230
West, Pennsylvania.	26	7	2,440	4	1,465
Maryland	6	1	475	1	435
Wheeling District ...	15	5	2,490	5	2,430
<i>Ohio:</i>					
Mahoning Valley ...	28	12	6,000	13	6,330
Central and Northern	26	14	6,100	12	5,250
Southern	16	8	1,090	3	1,020
Illinois and Indiana...	42	19	10,200	17	9,270
Mich., Wis. and Minn..	11	3	1,200	2	540
Colorado and Missouri.	6	2	720	2	800
<i>The South:</i>					
Virginia	16	0	....	0	....
Kentucky	7	1	320	1	300
Alabama	41	12	4,415	10	3,615
Tenn., Ga. and Texas..	16	1	30	1	30
Total	419	138	59,080	126	53,305

Diagram of Pig Iron Production and Prices

The fluctuations in pig iron production from 1913 to the present time are shown in the accompanying chart. The figures represented by the heavy line are those of daily average production by months of coke and anthracite iron. The dotted curve on the chart represents monthly average prices of Southern No. 2 foundry pig iron at Cincinnati, local No. 2 foundry iron at furnaces in Chicago, and No. 2X at Philadelphia. They are based on the weekly quotations of THE IRON AGE.



The Full Line Represents the Daily Production of Pig Iron and the Dotted Line Is the Average of the Price Per Ton of No. 2 Southern Pig Iron at Cincinnati, Local No. 2 Iron at Chicago and No. 2X Iron at Philadelphia

Production of Coke and Anthracite Pig Iron in the United States by Months, Beginning Jan. 1, 1918—Gross Tons

	1918	1919	1920	1921	1922
Jan.	2,411,768	3,302,260	3,015,181	2,416,292	1,644,951
Feb.	2,319,299	2,940,168	2,978,879	1,937,257	1,629,991
Mar.	3,213,091	3,090,213	3,375,907	1,505,522	
Apr.	3,288,211	2,178,218	2,739,797	1,193,041	
May	3,446,412	2,108,056	2,985,682	1,221,221	
June	3,323,791	2,114,863	3,043,540	1,064,833	
July	3,420,988	2,428,541	3,067,043	861	
Aug.	3,389,585	2,743,388	3,147,402	954,193	
Sept.	3,418,270	2,487,965	3,129,323	985,529	
Oct.	3,486,941	1,863,558	3,292,597	1,246,676	
Nov.	3,354,074	2,392,350	2,934,908	1,415,481	
Dec.	3,133,617	2,633,268	2,703,855	1,619,086	
TU yr.*	38,506,047	30,582,878	36,414,114	16,543,686	

*These totals do not include charcoal pig iron. The 1920 production of this iron was 323,396 tons.

Production of Steel Companies—Gross Tons

Returns from all furnaces of the United States Steel Corporation and the various independent steel

Production of Steel Companies—Gross Tons

	Total Production—			Spiegeleisen and Ferromanganese		
	1920	1921	1922	1920	1921	1922
Jan.	2,232,455	1,932,169	1,306,045	23,957	22,228	6,874
Feb.	2,181,679	1,625,695	1,311,170	28,038	29,013	8,540
Mar.	2,480,668	1,323,443		35,275	41,294	
Apr.	1,968,542	1,015,621		27,628	24,310	
May	1,128,720	1,024,678		33,407	9,232	
June	2,209,770	883,312		34,751	4,536	
July	2,230,567	715,664		36,789	5,524	
Aug.	2,254,943	807,144		36,985	3,878	
Sept.	2,247,250	815,692		39,546	3,289	
Oct.	2,392,644	1,034,312		34,786	3,902	
Nov.	2,150,075	1,138,789		26,944	3,525	
Dec.	2,047,167	1,276,381		28,023	3,953	

companies, as well as from merchant furnaces producing ferromanganese and spiegeleisen, show the follow-

ing totals of steel making iron, month by month, together with ferromanganese and spiegeleisen. These last, while stated separately, are also included in the columns of "total production."

Large Furnace Output

The blast furnace of the Weirton Steel Co., Weirton, W. Va., on Feb. 25 produced 823 gross tons of pig iron, thus coming within a couple of tons of the record mark established a few years ago by No. 1 furnace of the Pittsburgh Steel Co., which made 825 gross tons of pig iron in one day. In both instances these yields were possible by the charging of a good deal of scrap. On the straight ore charge, the best record recently was made in the new furnace of the Trumbull-Cliffs Furnace Co., Warren, Ohio, which tapped 715 tons in one day. For the two weeks ended March 5, the 600-ton furnace of the Weirton Steel Co. averaged 723 tons.

The Hardinge Co., 120 Broadway, New York, has acquired the business of the Coal Washing Equipment Co., Pittsburgh. The Coal Washing Equipment Co. did not have its own factory, its equipment being made in other shops on a contract basis, but the Hardinge Co. will now manufacture this equipment in its own plant at York, Pa.

At the regular monthly meeting of the Detroit Chapter of the American Society for Steel Treating on Feb. 27, F. H. Helrigel, Motor Products Co., discussed heat treating as applied to sheet steel.

PITTSBURGH BASE HEARING

It Is Resumed at Minneapolis—Testimony Remembers That at Milwaukee

MINNEAPOLIS, MINN., March 6.—The second of a series of hearings on the Pittsburgh basing point practice was opened before Examiner J. W. Bennett of the Federal Trade Commission on March 1. The testimony taken thus far is similar to that brought out in the Milwaukee hearing. In each case the witness explained the effect of "Pittsburgh plus" on his particular business and the alleged handicap it placed upon him in competing with Eastern companies. Melvin Ovesrud, mechanical engineer of the Twin City Forge & Foundry Co., Stillwater, Minn., was the first to offer testimony. He asserted that despite the fact that his company is closely related to the Minneapolis Steel & Machinery Co., it lost contracts with that company because it could not meet the competition of Eastern drop forge shops. In supplementing Mr. Ovesrud's testimony, H. E. White, traffic counsel for the Western Association of Rolled Steel Consumers, presented evidence to show how the Western forge shop is handicapped at various points of delivery. He stated that the advantage of the Pittsburgh shop over the Stillwater plant on forgings delivered at destination was \$11.30 per ton at Duluth, Minn.; \$12.20 at Waterloo, Iowa; \$16.30 at Peoria, Ill.; \$16.60 at Racine, Wis.; \$14.80 at Janesville, Wis.; \$21.60 at Muskegon, Mich., and \$18.90 at Cadillac, Mich.

E. J. Ellertson, assistant secretary of the Russell Grader Mfg. Co., Minneapolis, testified that his company, which did \$2,000,000 worth of business in 1921, was under a severe disadvantage because of "Pittsburgh plus." The graders manufactured are 75 per cent steel, some graders containing as much as 5200 lb. of steel each. He stated that some of the steel bought came from Steelton, Minn., but until recently the company paid the freight on it as though it came from Pittsburgh. He asserted that this additional freight charge blocked the company's efforts to obtain Eastern business and handicapped it throughout the country. Mr. White testified that because of the Pittsburgh basing point practice the company was at a disadvantage of 47c. on each 100 lb. in bidding against a Cleveland manufacturer at Chicago, 43c. at Milwaukee, 20½c. at Des Moines, Iowa; 17½c. at Omaha, and 12½c. at Duluth.

H. C. Baldry, vice-president of the Flour City Ornamental Iron Co., Minneapolis, declared in his testimony that the company's fence plant had been closed in 1912 because of the handicap of "Pittsburgh plus." He asserted that at one time as many as 300 men were employed in this department of his company, but that Cleveland and Cincinnati competitors had such an advantage because of a "fictitious and excessive" freight charge that the company had to discontinue the manufacture of the product.

G. A. Stockland, secretary of the Stockland Road Machinery Co., Minneapolis, declared that the increased manufacturing cost in the "Giant" type of Stockland grader attributable to "Pittsburgh plus" was \$24.73. He asserted that Eastern competitors were able to maintain warehouses in Minneapolis and compete on even terms notwithstanding the great distance they had to ship their finished products. On shipments to Canada, Mr. Stockland said, Minneapolis manufacturers paid a double duty. This point was brought out in greater detail in testimony by Mr. Ellertson, who used a Galion, Ohio, manufacturer of road machinery, and the Russell Grader Mfg. Co. as examples. The rate from Pittsburgh to Galion, he said, is 28c. per 100 lb., and the rate from Galion to Regina, Sask., is \$1.63½c., making a total freight charge to the Galion manufacturer of \$1.91½c. The freight from Pittsburgh to Minneapolis is 66c. and from Minneapolis to Regina \$1.01½c., making a total of \$1.67½c. It seems apparent, he asserted, that Minneapolis enjoys a differential of 24c. per 100 lb. over its Galion competitor, but such is not the case. The Canadian duty is based on the price of the machine f.o.b. fac-

tory, and in the case of Minneapolis the price necessarily includes "Pittsburgh plus," with the result that the duty on the competing Galion machine is 30c. less, and the net advantage of the Galion manufacturer in Regina is therefore 6c. Mr. Ellertson also testified that the Galion competitor can ship within a few miles of Minneapolis and compete with his company on even terms. If prices on steel were definitely on a Chicago or Duluth base instead of a Pittsburgh base, he declared, Minneapolis manufacturers would be able to ship half way to Galion and compete on even terms.

The hearing at Minneapolis will probably continue throughout this week, after which the commission will take testimony in Chicago, Duluth and Birmingham.

Sligo Iron & Steel Co. Sold

Max Solomon, iron and steel scrap, Oliver Building, Pittsburgh, was the successful bidder for the plant and property of the Sligo Iron & Steel Co., Connellsville, Pa., which was sold at a trustees' sale, Feb. 8. Beside the plant, which has an annual capacity of about 70,000 tons of iron and steel bars, plates and sheets, there are about 15 acres of land. The plant contains 19 single puddling furnaces, six 4-door heating furnaces, one open annealing furnace; a 20-in. 3-high, 2-stand muck bar mills, a 16-in. 3-high 1-stand roughing, a 16-in., 3-high, 1-stand and a 16-in., 2-high, 1-stand finishing mills, a 16-in., 2-high, 1-stand bullhead, 12-in., 3-high, 1-stand roughing mill, a 9-in., 3-high, 3-stand and a 9-in., 2-high, 1-stand guide mills, a 24-in. x 66-in., 2-high roughing and a 24-in. x 60-in. 3-high finishing plate mills, one drop hammer, one shingling hammer and two forge fires. Rated annual capacity of the plant is 7000 tons of muck bar, 40,000 tons of iron and steel bars and 24,000 tons of plates and sheets. Mr. Solomon has not yet announced his intentions with regard to his purchase.

New Steel Warehouse in Philadelphia

A new steel warehouse will be opened at Third and Venango streets, Philadelphia, about April 1 under the name of R. B. Fritch & Co. R. B. Fritch is president, W. F. Hays, treasurer, and A. T. Green, secretary. Mr. Fritch was purchasing agent for 16 years with R. D. Wood & Co., and treasurer of Southwark Foundry & Machine Co., Philadelphia, until he formed the Provident Engineering Co., the interest which he is relinquishing to form the new company. The company will stock merchant bars and shapes, sheets, wire and in addition carry foundry supplies. The new warehouse will be well equipped as to shipping facilities, having a railroad siding. It is the intention to maintain trucks for local delivery.

An excellent opportunity for American manufacturers of agricultural machinery to introduce their equipment in Ireland will be afforded by the annual Agricultural Spring Show of the Royal Dublin Society, to be held at Ballsbridge, Dublin, on May 16-18, according to a letter received by the Agricultural Implement Division of the Department of Commerce from Joseph Connolly, Irish trade commissioner to the United States. This show is attended by practically all those who are interested in agriculture in Ireland, and it is believed that substantial sales of American implements and machinery will follow if these products are on display. Allocation of sites for exhibits will be made soon. Interested American manufacturers should apply promptly to the secretaries of the Royal Dublin Society, Dame Street, Dublin, Ireland.

Work of rebuilding the plant of the Standard Slag Co., Youngstown, Ohio, at the blast furnace in Sharpsville, Pa., of the Shenango Furnace Co., was started last week. It will replace the old plant destroyed several months ago by fire, and will be larger in capacity, having two bins instead of one. The main building will be of steel construction. Additional equipment and slag crushing machinery will be installed, furnished by the Allis-Chalmers Mfg. Co.

CONTENTS.

March 9, 1922

Submarine Cutting Torch Under Water	637
Broken Siphon Pipe Burned Off by Electric Torch Under 50 Ft. of Water—Great Advance in the Art of Submerged Metal Cutting	
Novel Applications for Thin Steel Bands	640
Special Advantages Follow Their Use for Power Transmitting and Conveying Purposes—Questions of Tension Important	
Laboratory for Malleable Iron Foundry	643
Equipment for Running Carbon, Sulphur and Manganese Determinations Facilitates Control of Product	
Sectional Meeting of Steel Treaters	647
Eastern Chapters Hold First Technical Sessions in New York—First Public Presentation of Two Important Developments	
Roberts Oven Coke in Blast Furnace Use	649
Analysis of Results Obtained in Practice—Low Fuel Consumption Despite High Ash Content of Coal	
Designing a Modern Automobile Plant	652
Relations of Departments and the Many Services Now Demanded—View of the Future in Industrial Developments	
Mass in the Heat Treatment of Steel	658
A Suggested Formula for Calculating the Brinell Hardness from Given Data—Applicable to Alloy and Carbon Steels	
Progress of Steel Making in Australia	660
Broken Hill and Other Developments—Deposits of Iron Analyzed—General Prospects	
February Pig Iron Output	662
A Gain of 5151 Tons Per Day Over January—Seventeen Furnaces Blown in, Five Blown Out	
Further Gains in Iron and Steel Exports	692
January Best Month Since April—Gains in Wire, Wire Rods, Galvanized Sheets, Tin Plate and Rails	
Labor Notes	642, 661, 686, 690, 691
Webb-Pomerene Act Explained	642
Magnetic Testing of Chain	644
New Drill and Tap Chuck	645
Will Discuss Trade Associations	645
Universal Shaping Saw	646
Complaint of Mitsui & Co. Not Sustained	646
Machine for Filing Edges of Strip Steel	650
Reducing Iron Ores with Carbon Monoxide	650
Machine for Staybolt Threading	651
Phosphor-Copper from Phosphate Rock	651
Metal-Cutting Band Saw	651
Midvale Annual Report	657
Manufacturers' Association Tariff Plans	657
Experiments on Sponge Iron	659
Iron and Steel Movements by Water	661, 694
Pittsburgh Base Hearing	664
Editorials	666
A Good Tin Plate Year—Steel and Commodity Prices—An Advance in Magnetic Testing—What of the Size of Factories.	
Correspondence	668
Verse Relating to Sciences.	
February Ingot Output Increases	669
Lower Extras on Wide Plates	682
Foreign Trade Notes	683, 684
Blast Furnace Investigation	684
Iron Ore Rates Controversy Resumed	686
Investigation of Alabama Ore District	687
Association Meetings	651, 668, 669, 686
Federal Trade Commission Cannot Compel Cost Reports	689
Testimony in Railroad Rates Investigation	691
The New Patent Law	693
President's Plan for Merchant Marine	695
Industrial Finance	696
Iron and Steel Markets	670
Comparison of Prices	671
Prices Finished Iron and Steel f.o.b. Pittsburgh	685
Non-Ferrous Metal Market	687
Personal Notes	688
Obituary Notes	689
Machinery Markets and News of the Works	698
New York Jobbers' Prices	706

ESTABLISHED 1855

THE IRON AGE

EDITORS:

A. I. FINDLEY

WILLIAM W. MACON

GEORGE SMART

CHARLES S. BAUR, Advertising Manager

Member of the Audit Bureau of Circulations and of
Associated Business Papers, Inc.

Published every Thursday by the IRON AGE PUBLISHING CO., 239 West 39th Street, New York

I. J. Frank, President

PRINTED IN U. S. A.

George H. Griffiths, Secretary

Owned by the United Publishers Corporation, 242 West 39th
Street, New York. H. M. Sweetland, Pres., Charles G. Phillips,
Vice Pres., A. C. Pearson, Treas., E. J. Frank, Secy.

PRINCIPAL OFFICES: Chicago: Otis Building; Pittsburgh:
Post Building; Boston: 419 Units Building; Philadelphia:
1129-1122 Widener Building; Cleveland: Guardian Building

Detroit: 317 West Fort St. Cincinnati: Mercantile Library
Bldg. Buffalo: Elliott Square Building. Washington: 816
Fifteenth St., N. W. San Francisco: 320 Market St.
London, Eng.: 11 Haymarket, S.W.1.

Subscription Price: United States and Possessions, Mexico,
Cuba, Shanghai, \$6.00; Canada, \$8.50; Foreign, \$12.00 per
year. Single copy 50 cents.

Entered as second class matter, June 18, 1879, at the Post Office at New York, New York, under the Act
of March 3, 1879.

A Good Tin Plate Year

It is well established now that 1922 will be a good tin plate year, possibly even a record year. It is not sufficient explanation of the conditions to say that tin plate is an article of common everyday consumption by the great mass of the people and is therefore not subject to ups and downs. There is more in the matter than that. Thirty years ago, when the production of tin plate in the United States really began, the material was also an article of everyday consumption. There were heavy imports from Wales and the average price over a period of years had not been unreasonably high. Our annual consumption then was about ten pounds per capita, while lately it has been running over twenty-five pounds. The production in a good year is from four to five times the imports of thirty years and more ago, for in addition to the increase in per capita consumption the population has grown and we now export tin plate. We exported as much tin plate in 1918 as we imported in 1886, when we were drawing all our supplies from abroad.

There are several reasons for the growth in tin plate consumption. Of course it is an advantage to have the sources of production within our own borders, instead of depending on imports, but it is a fact that the country was well served, in the matter of deliveries, when it was depending upon South Wales. Prices were fairly steady and the "Big Four" New York importing houses (Phelps, Dodge & Co.; Bruce & Cook; Dickerson, Van Dusen & Co., and Robert Crooks & Co.) maintained stocks that could readily be drawn upon.

The next argument commonly adduced is that methods of sterilizing food products have been so improved that there is a much wider demand. The improvements are not denied, but the foods prepared in tin plate containers a quarter century and more ago were pretty good, nevertheless. Another argument is that machinery for making containers has been greatly improved, whereby the cost is lessened. That also is true, but tin cans were rather cheap even thirty years ago.

The greatest influence in increasing the consumption of tin plate is the large development in its use in packing articles other than the fa-

miliar food products of twenty and thirty and more years ago. The time was when the chief employment of tin plate was in "the canning crops," but that is no longer the case. Tin plate is one of the modern conveniences. People buy articles in tin plate containers that do not have to be so packed, but which are much more attractive when so prepared.

Tin plate production first exceeded a half million gross tons in 1906, while it was in 1915 that the million-ton level was reached. Since then the output has not fallen as low as a million tons, with the probable exception of last year, the official report for which will perhaps show about 900,000 tons. That was a year of liquidation of stocks of goods prepared in tin plate containers and of restricted consumption on account of the persistence of high prices at retail for the prepared articles. The record year was 1917, with an output of 1,512,146 gross tons.

In the first two months of this year production of tin plate was between 225,000 and 250,000 tons, or almost one-sixth of the record annual production. Since it is not usual for the mills to run at their full rate at that time of year, the augury for a heavy year's production is excellent, and there is also the factor that the relation of mill shipments to production was high in the two months. The chief hindrance to a record production this year is the relative lightness of exports of tin plate and of oil in tin plate containers. This handicap may disappear, while heavy domestic consumption is certain.

In the ups and downs of the foreign trade of Great Britain, the rôle of pig iron is conspicuous. An analysis of the official data for 1913, 1920 and 1921 shows that whereas British exports of pig iron were approximately 22 per cent of the total iron and steel exports in 1913, by 1920 they had fallen to 18 per cent and by 1921 to only 8 per cent. As to imports the comparison is still more striking: In 1913 imports of pig iron into Great Britain were only 10 per cent, in 1920 they were 21 per cent, but in 1921 the percentage was no less than 41. Before the war Great Britain was the chief exporter of pig iron. The coal strike early in

1921 was largely responsible for the reversal in pig iron movements. Meanwhile no one may venture to suggest how readily or rapidly the 1913 ratios may again be reached.

Steel and Commodity Prices

With the additional declines that have occurred in finished steel prices in the past fortnight the average price, according to THE IRON AGE composite, stands at 120, using the average in 1913 as 100, according to the practice of the Bureau of Labor with its index number representing commodities in general. The bureau's index, which is of prices at wholesale, was 148 for January and has shown scarcely any change for more than six months.

It is admitted that steel manufacturers are not making money, but they are presumably getting a new dollar for an old, and perhaps are earning something against their overhead. No doubt, on the average, the mills are not getting their full cost in their present selling prices, i.e., they are losing part or all of their overhead expense.

If steel were not being made very economically, conditions would be still worse. There are the handicaps of a low operating rate, which unavoidably greatly increases unit cost, together with wages, freight rates and taxes at much higher levels than before the war. Any guess at steel mill costs and selling prices based upon the known conditions would be at a higher level than is actually shown. The necessary inference is that the steel industry is making efficient use of its facilities, apart from the known handicaps.

The industry has made great progress in recovering from the conditions imposed by the war and the soft labor times of 1920. This, however, is no new showing for the steel industry. Since the outset the industry has been increasing in efficiency, whereby it has balanced many handicaps that have arisen, such, for instance, as the decreasing iron content of the ores available, as compared with the Lake Superior ores used in the eighteen-nineties.

It may be of interest to recall that on Aug. 24, 1911, THE IRON AGE published an editorial making a comparison somewhat similar to the one made above. The index numbers of the Bureau of Labor and Bradstreet were quoted, showing that at that time steel prices were lower, relative to commodity prices, than in 1906-7 or the period of very low prices in 1897. The comparison between prices in 1897 and prices in 1911 showed an increase of 30 per cent for steel, and increases for commodities in general of 40 per cent according to Bradstreet and 46 per cent according to the Bureau of Labor.

The steel industry cannot control all its costs. It cannot make fuel costs, freight rates or tax rates; but the things it cannot control are things that producers of other commodities cannot control either. Apparently the industry will still be able to make a good showing, in economy and efficiency, by comparison with industries in general. There is no danger that the use of steel

will be restricted at any point on account of the price comparing unfavorably with prices of other commodities. Rather, steel is likely to forge ahead and develop new uses. To-day a given quantity of commodities will buy more steel than in 1911 and in 1911 it would buy more than in 1897. That is an achievement. We do not make progress in everything. Who will assert that mail service, for instance, is notably better than ten years or twenty-five years ago? There are industries that are not rendering nearly so good service as they used to render, while steel is doing much better.

An Advance in Magnetic Testing

Magnetic testing has now been applied for determining the efficacy of case hardening. More than that, it has been applied in a practical way that suggests broad possibilities. Announcement of the development was made at the meeting last week to discuss steel treating problems and covered the perfection of an apparatus used for testing the case hardness of small chain. Briefly, by empirically determining the maximum and minimum depths of case in chain corresponding to poor results, an approximate standard is established by which it is possible to determine magnetically the depth of case which will give the longest life for definite conditions. This has already afforded a test basis which is being applied commercially.

This principle may, in the not distant future, be applied to other properties of steel. The designers of the apparatus are making just such predictions and assert that it will be possible to correlate the tensile strength or ductility as easily by magnetic tests as the case hardness of steel. All that appears necessary is the determination of maximum and minimum limits within which the material will be satisfactory and use these for the fixing of a standard. There are those who do not appreciate that this is really the principle on which most specifications are now based. New apparatus will not be needed, it is claimed. The application of the magnetic testing idea to case-hardened chain is after all merely a step in the development of non-destructive testing for which there has long been a demand.

What of the Size of Factories

Consolidations of several small plants into one large one and of large ones into still larger have been reflected from time to time in the census returns of manufactures. This tendency toward larger manufacturing units has been brought out afresh by the census figures for 1919, some of which have now become available. The total number of manufacturing establishments is given as 290,105, with 9,096,372 wage earners. The average number of wage earners per establishment works out at 31.4, as compared with 25.5 in 1914 and 24.6 in 1909.

As might be expected, the great bulk of employees are to be found in the larger plants. It happens, however, that the number of these larger

plants has also proportionately increased. Thus, those plants employing more than 50 wage earners, which numbered only 8.9 per cent of the total in 1909 and 1914, have now gone up to 9.95 per cent. And the number of wage earners employed in such plants has increased from 74 per cent of the total in 1909 to 76.3 per cent in 1914 and 80.5 per cent in 1919.

This fact is brought out more strikingly when we consider that, in 1919, the number of employees in plants employing more than 50 was 2.85 times the number in smaller plants; in 1914 the number in the larger plants was 3.22 times those in the smaller plants; in 1919 the number in the larger plants was 4.13 times the number in the smaller plants. This general tendency seems to be especially concentrated in the still larger plants, for it is found that the number of employees in plants having more than 500 wage earners has practically doubled between 1909 and 1919, while the number in plants having less than 500 employees has gained only 15 per cent and the number in plants having no more than 50 employees has gained only 3.3 per cent in the ten years.

It may be pointed out, as a matter of particular interest to the steel industry, that there are more of the largest plants—those having over 1000 wage earners each—in Pennsylvania than in any other State. The number of such plants is 142 in Pennsylvania, with 368,002 employees; Massachusetts stands second with 118 plants and 244,045 employees; New York is third with 106 plants and 226,236 employees. Both Michigan and Ohio have more than 200,000 employees in such plants, while New Jersey and Illinois, with about 171,000 men each, occupy sixth and seventh places respectively. This seventh position for Illinois appears surprising, in view of the number of large plants in and about Chicago, and particularly in view of the importance of Chicago from the iron and steel standpoint, based upon the location there of such big units as the Illinois Steel Co., the International Harvester Corporation, the Inland Steel Co. and the Steel & Tube Co. of America.

That the tendency is still toward large concentration of manufacturing capacity does not follow. A belief is growing that more account must be taken hereafter in industrial undertakings of the human element. The modern factory has done well to make conditions pleasant for the employee, but it has not done as much for his open-air living in the hours out of the factory. It is saying nothing new to emphasize that the more diversified the industries in a given community, the less likelihood of labor disturbances through such causes as idleness in any one industry. The flattening of the curve of unemployment is a result, and there is a better feeling the year 'round in the community as a whole.

If there is much in the contention of industrial students that the pendulum is now swinging in the direction of decentralization, it seems reasonable to believe that new enterprises and the amalgamations which are forming out of the present stress will consider locating in the small rather than the large cities. There seems to be a size of town below which the feeling prevails that opportunities do not exist in such number as to

encourage the ambitious to remain. The larger the city the wider is the natural belief in chances for benefit, but a realization of the congestion growing out of the massing of large plants in overcrowded centers may put the smaller center in a new light. The gradual building of large power stations, as proposed by the super-power project for the East, the tying of these and water power developments together, and the improvement of our highways with the realignment of transportation are among the factors which are calculated to influence the decentralization movement, but most of all it will probably come as the result of a definite program of industrial engineers and promoters and from the appreciation on the part of the wage earner that self-advancement may actually be attained, without sustaining the high cost and unsatisfactory conditions of living in the largest cities. Owing to the costs involved, decentralization of existing plants would naturally proceed slowly, but so far as the workers are concerned, any movement away from largest centers will come largely as the result of appreciation of what life means in its broadest terms.

CORRESPONDENCE

Verses Relating to Sciences

To the Editor: I am making a collection of verses, whose subject matter relates to the sciences, or to their co-related branches of engineering, with the intention of publishing at some future date an anthology of such verse. It has occurred to me that there may be among your readers many who have verses of this character in their possession, and who would be willing to contribute them to this collection. Will you kindly grant me space for this appeal to your readers to send to me copies of such verses, together with the necessary details of authorship, place of publication (if previously published) at my address Box 130, Massachusetts Institute of Technology, Cambridge, Mass.? Such verses sent to me will be greatly appreciated and duly acknowledged.

CHARLES E. RUBY.

Steel Electrical Engineers to Meet

Approaching meetings of the Association of Iron and Steel Electrical Engineers include the following:

March 13, Cleveland: "Protective Relays for Generators and Transmission Lines."

March 15, Chicago: "Plant of Acme Steel Goods Co."

March 18, Pittsburgh: "Synchronous Motors in Mines and Steel Mills."

March 25, Birmingham: "Lubrication of Mill Motors" and "Electric Power Distribution in Steel Industry." At Youngstown: "Bent Tube vs. Straight Tube Boilers."

Sale of Winnisimmet Ship Yard, Inc.

The plant of the Winnisimmet Ship Yard, Inc., Chelsea, Mass., has been sold. The real estate and the marine railway and the marine railway equipment were purchased by H. F. Winslow of 30 State Street, Boston, for \$200,000—plus \$52,452 of unpaid taxes; and 1692 lots of personal property realized \$55,684, hence the total sale amounted to \$308,136. The attendance at the sale was an unusually representative business one and of size. It came from all parts of the country and Canada.

FEBRUARY INGOT OUTPUT

Increase Over January 9.33 Per Cent — Yearly
Rate Nearly 27,000,000 Tons

The steel ingot statistics of the American Iron and Steel Institute show that 30 companies which in 1920 produced 84.20 per cent of the total, had an output in February of 1,742,345 gross tons as compared with 1,593,482 tons in January. The increase in February over January was 148,863 tons or 9.33 per cent. This contrasts with an increase in January over December of 166,389 tons, or 11.6 per cent. Estimating the production of other companies on the basis of the 30 companies (though it is probable the small companies did not equal the rate of the larger ones), the total output of ingots in February was 2,069,292 tons or 86,220 tons per day, counting 24 working days for February. The January output on the same basis was 75,700 tons per day, which makes the February output a gain of 10,520 tons per day.

In the table below, the output of Bessemer and open-hearth works is separated and the figures for 1920 by months are included:

Monthly Production of Steel Ingots by 30 Companies Which Produced About 84.20 Per Cent of Total in 1920—Gross Tons

	Open Hearth	Bessemer	All Other	Total
January, 1920 ..	2,242,758	714,657	10,687	2,968,102
February	2,152,106	700,151	12,867	2,865,124
March	2,487,245	795,164	16,640	3,299,049
April	2,056,336	568,952	13,017	2,638,305
May	2,251,544	615,932	15,688	2,883,164
June	2,287,273	675,954	17,463	2,980,690
July	2,135,633	653,888	13,297	2,802,818
August	2,299,645	695,003	5,784	3,000,432
September	2,300,417	693,586	5,548	2,999,551
October	2,335,863	676,634	3,485	3,015,982
November	1,961,861	673,215	3,594	2,638,670
December	1,687,162	649,617	3,586	2,340,365
Total, 1920	26,197,843	8,112,753	121,656	34,432,252
January, 1921 ..	1,591,281	608,276	3,629	2,203,186
February	1,295,863	450,818	2,796	1,749,477
March	1,175,591	392,983	2,404	1,570,978
April	1,000,053	211,755	2,150	1,213,958
May	1,047,810	216,497	1,543	1,265,850
June	808,286	193,644	1,476	1,003,406
July	689,489	113,312	575	803,376
August	915,334	221,116	1,621	1,138,071
September	908,381	265,152	1,207	1,174,740
October	1,269,945	345,837	1,028	1,616,810
November	1,294,371	363,912	1,718	1,660,001
December	1,129,174	296,380	1,539	1,427,093
Total, 1921	13,125,578	3,679,682	21,686	16,826,946
January, 1922 ..	1,260,809	331,851	822	1,593,482
February	1,393,158	348,571	616	1,742,345

The February ingot production was at yearly rate of 26,814,420 tons, counting 311 operating days to the year. This compares with a rate in January of 23,542,500 tons and with 11,857,186 tons in July, the low point for 1921.

The increase of 10,520 tons per day in the ingot output of all companies reporting in February over January contrasts with an increase of 5151 tons per day in the February pig iron output over January.

March Meetings of Mechanical Engineers

Among meetings scheduled for March by various sections of the American Society of Mechanical Engineers may be mentioned the following:

March 10—Newark, N. J., "Die Castings." Joint meeting with Society of Automotive Engineers. Providence, R. I., Society rooms, Leo Loeb, Day & Zimmerman, Philadelphia, "Heat Balance in Power Plants." Richmond, Va., Murphy's Hotel, E. J. Willis, "History of Steam Power"; H. G. Johnson, "Gas Manufacture and Distribution"; H. D. Savage, "Pulverized Fuel"; W. A. Ludwick, "Coal Tar By-Products" and "Lubrication."

March 13—Boston; joint meeting with students of technical schools. Major W. E. Hoke, "Precision in Machine Tool Work."

March 14—Hartford, Conn., Hartford Electric Light Co., "Conveyors," by a representative the Lamson Co.; "Furnace Combustion," by a representative of the Sanford Riley Stoker Co.; both illustrated.

March 16—Meriden, Conn., "Leather—Its Uses in Industrial Plants."

March 17—Chicago, Charles Piez, "The Landis Award." Philadelphia, Towne Scientific School, W. L. Saunders, "Forty-Six Years Out of College." Afternoon inspection Delaware plant Philadelphia Electric Co. Film from Sanford Riley Stoker Co., showing combustion in a boiler furnace.

March 20—New Haven, Conn., Taft Hotel, "Human Element in Industry," President Dexter S. Kimball in the chair. J. J. Callahan, "Heart Power"; J. E. Bennett, "How Poor."

March 21—Detroit; joint meeting with Affiliated Technical Societies of Detroit. Philadelphia, Engineers' Club, joint meeting with A. I. E. E. and A. S. C. E. Hydro-electric symposium with special reference to Chippewa-Queenston (Ontario) development. Atlanta, Carnegie Library, R. V. Wright, speaker.

COMING MEETINGS

March

National Association of Waste Material Dealers. March 14 and 15. Annual meeting, Hotel Astor, New York. Secretary, Charles M. Haskins, Times Building, New York.

Refractories Manufacturers' Association. March 15, 16 and 17. Annual meeting, Chicago. Secretary, F. W. Donahoe.

Taylor Society. March 16 to 18. Midwinter meeting. City Club, Philadelphia. Managing director, Dr. H. S. Person, 29 West Thirty-ninth Street, New York.

April

National Federation of Construction Industries. April 3, 4 and 5. National conference, Drake Hotel, Chicago. Association headquarters, Drexel Building, Philadelphia.

National Metal Trades Association. April 19 and 20. Annual meeting, Hotel Astor, New York. Secretary, Louis W. Fischer, Peoples Gas Building, Chicago.

American Gear Manufacturers' Association. April 20, 21 and 22. Annual meeting, Hotel Lafayette, Buffalo. Secretary, F. D. Handlin, Earle Gear & Machine Co., Philadelphia.

American Supply and Machinery Manufacturers' Association and Southern Supply & Machinery Dealers' Association. Joint Meeting. April 24 to 26, Birmingham. F. D. Mitchell, 253 Broadway, New York, is secretary of the American association and A. M. Smith, Smith-Courtney Co., Richmond, Va., is secretary of the Southern association.

Society of Industrial Engineers. April 26 to 28. Spring meeting, Hotel Statler, Detroit. George C. Dent, business manager, 327 S. La Salle Street, Chicago.

American Electrochemical Society. April 27 to 29. Spring meeting, Baltimore. Acting secretary, Dr. Colin G. Fink, 110 Park Avenue, New York.

May

Iron and Steel Institute. May 4 and 5. Annual Meeting. Quarters of Institution of Civil Engineers, London, England. Secretary, George C. Lloyd, 28 Victoria Street, S. W., London.

The National Supply and Machinery Dealers' Association. May 8, 9 and 10. Seventeenth annual convention, Marlborough-Hillemheim Hotel, Atlantic City. Secretary, T. James Fernley, 505 Arch Street, Philadelphia.

American Society of Mechanical Engineers. May 8 to 10. Spring meeting, Atlanta, Ga. Secretary, Calvin W. Rice, 29 West Thirty-ninth Street, New York.

National Association of Manufacturers. May 8, 9, and 10. Annual Convention, Waldorf-Astoria Hotel, New York. General Offices, 50 Church Street, New York.

National Foreign Trade Council. May 10 to 12. Convention, Philadelphia. Secretary, O. K. Davis, 1 Hanover Square, New York.

National Sheet Metal Contractors' Association. May 15 to 19. Convention and exposition, Cadle Tabernacle, Indianapolis.

National Association of Purchasing Agents. May 15 to 20. Annual convention and exposition, Exposition Park, Rochester, N. Y. Secretary, H. R. Haydon, 19 Park Place, New York.

American Iron, Steel & Heavy Hardware Association. May 23 to 25. Annual meeting, Hotel Washington, Washington. Secretary, A. H. Chamberlain, Marbridge Building, New York.

American Society for Steel Treating. May 25 and 26. Sectional meeting, Pittsburgh. Secretary, W. H. Elsenman, 4600 Prospect Avenue, Cleveland.

Iron and Steel Markets

FOCUSING ON PRICES

Attempts to Stabilize on Higher Levels

Operations Steady—February Iron and Steel Production at 35 Per Cent Above 1921 Rates

Definite efforts are now being made to stiffen steel prices. In a market still strongly in buyers' hands and not many mills with more than a month's business ahead, the leading Pittsburgh independent, which in recent weeks made a drive for current business, announced late on Monday a return to a basis of 1.50c., Pittsburgh, for plates, shapes and bars. The immediate effect has been to make buying at 1.35c. difficult and to focus on 1.40c. as a minimum for the heavy tonnage products.

The action, so far as it may now be gaged, has accentuated the disinclination of mills to consider forward buying at to-day's prices. It follows the refusal of several steel bar makers to take less than 1.40c., and on May 7 the leading Chicago independent put its heavy tonnage items up \$2 a ton.

Attempts to break through wire and sheet prices have proved unsuccessful. Some sheet makers are now selling the heavier blue annealed sheets on the straight sheet basis instead of the plate basis, as was the case in meeting competition with plate makers.

The first week of March has shown no general increase in operations. The Carnegie Steel Co. is to blow in another blast furnace next week, and one each will go in for the Republic and the Cambria companies for their Bessemer plants. Chicago remains a notably active center. The Illinois Steel Co. increased ingot production in the week from 55 to 63½ per cent.

No concern is shown over the impending coal strike. A substantial gain in bookings of wire products is credited to the recent stabilization of prices. In fuel, buying has been of an ordinary character, and prices are not much more than 25c. or 30c. above the low bases of January.

February pig iron production was 1,629,991 tons, or 58,214 tons per day. January's total for the 31 days was 1,644,951 tons, or 53,063 tons daily. Of the total daily increase of output of February over January, namely, 5151 tons, 4697 tons or over 90 per cent represented the gain of steel making furnaces.

On March 1 there were 138 furnaces in blast, operating at a rate of 59,080 tons per day, against 126 furnaces active on Feb. 1, at a daily capacity of 53,305 tons. A total of 17 furnaces was blown in, five of these merchant furnaces, and five went out of blast in the month, of which two were merchant furnaces.

The production of steel ingots for February, on a basis of the compilations of the American Iron and Steel Institute, indicates a total of 86,220 tons per day against 75,700 tons per day in January. The February rate was 26,800,000 tons per year, which is 35 per cent above the actual production of 1921 and the February rate of pig iron making, 22,250,000 tons, is likewise 35 per cent above the output of last year.

Buying of pig iron in the East has continued. In the New York district orders for about 20,000 tons of various grades were placed. Eastern Pennsylvania furnaces pretty generally have advanced prices and the market is firmer, but concessions are still made. At Chicago the withdrawal from the market of the steel works furnace which had been an active seller has had a steadying influence. In the South, the general selling price has receded 50c. to a basis of \$15, Birmingham. Stocks of Alabama pig iron declined from 157,000 tons Feb. 1 to 134,000 tons March 1.

THE IRON AGE composite pig iron price is now \$18.25 per gross ton against \$18.10 a week ago.

Competition in fabricated steel lines remains keen. On the 23,000 tons for the New York Central's bridge across the Hudson River, the notably low bid of \$68.60 per ton, fabricated and erected, was received. Upward of 15,000 tons of steel structures was put under contract, including tanks involving chiefly plates. New work totals about 16,000 tons, including a 6000-ton bridge for the Northern Pacific.

Little fresh railroad equipment work appeared. The Chicago & Northwestern is inquiring for 2750 cars, the Norfolk & Western for 2000 to 4000 70-ton steel cars and the Monon for 20 locomotives. In rails, 5000 tons for the Buffalo, Rochester & Pittsburgh was placed with a Buffalo mill.

Automobile makers of Detroit are operating at 55 to 75 per cent of capacity. An inquiry has come from that center for 2000 tons of sheets.

The agricultural implement makers have been heard from chiefly for orders to round out stocks in preparation for production.

Pittsburgh

PITTSBURGH, March 7.

The most interesting development of the week is the announcement of the Jones & Laughlin Steel Co., issued late yesterday afternoon, restoring the quotation of the early part of the year of 1.50c. on bars, plates and shapes. Officials of the company state that practically all lower quotations which have been out against these products have been withdrawn, and that 1.50c. now is the price either on old inquiries or new ones. The Carnegie Steel Co. has made no announcement yet of a change either in its prices or its sales policy and while it is possible that this company as well as the other independent companies may follow the advance, no definite developments yet have taken place other than that a Buffalo steel maker is reported to have withdrawn all outstanding quotations on hot rolled steel. Plates, shapes and bars at recent selling prices not only were considerably below producing costs but also well below the 10 year pre-war average. The move to put prices up, therefore, may be looked upon as an effort to reduce losses, and to bring these products more nearly in alignment with the prices of other lines of finished steel. The price has not been in effect long enough nor are a sufficient number of makers quoting this figure to give it standing as a quotation. Such business as has been done lately in plates, shapes and bars has in but few instances been at above 1.35c., Pittsburgh.

Betterment in steel business is well sustained and while there still is considerable doubt that the present upswing in the demand will prove long lived, it is a fact

A Comparison of Prices

Advances Over the Previous Week in Heavy Type, Declines in Italics

At date, one week, one month, and one year previous

For Early Delivery

Pig Iron, Per Gross Ton:	Mar. 7, 1922	Feb. 28, 1922	Feb. 7, 1922	Mar. 8, 1921
No. 2X, Philadelphia...	\$21.20	\$20.34	\$21.34	\$27.84
No. 2, Valley furnace...	19.00	19.00	19.00	26.00
No. 2, Southern, Cin'ti...	19.50	20.00	20.00	29.50
No. 2, Birmingham, Ala.†	15.00	15.50	15.50	25.00
No. 2 foundry, Chicago*	20.00	19.50	18.50	26.00
Basic, del'd, eastern Pa...	19.84	19.84	19.84	27.26
Basic, Valley furnace...	17.75	17.75	17.75	25.00
Bessemer, Pittsburgh...	20.96	21.46	21.46	28.93
Malleable, Chicago*	20.00	20.00	18.50	26.50
Malleable, Valley...	19.00	19.00	19.00	26.00
Gray forge, Pittsburgh...	20.71	20.71	20.96	26.96
L. S. charcoal, Chicago...	28.00	28.00	30.50	38.50
Ferromanganese, seaboard	62.50	62.50	58.35	90.00

Rails, Billets, etc., Per Gross Ton:

O.-h. rails, heavy, at mill.	\$40.00	\$40.00	\$40.00	\$47.00
Bess. billets, Pittsburgh...	28.00	28.00	28.00	38.50
O.-h. billets, Pittsburgh...	28.00	28.00	28.00	38.50
O.-h. sheet bars, P'gh...	29.00	29.00	29.00	40.00
Forging billets, base, P'gh	32.00	32.00	32.00	43.50
O.-h. billets, Phila...	33.74	33.74	33.74	49.24
Wire rods, Pittsburgh...	36.00	36.00	36.00	52.00
Skelp, gr. steel, P'gh, lb...	1.40	1.40	1.50	2.35
Light rails at mill...	1.40	1.40	1.50	2.35

Finished Iron and Steel,

Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Iron bars, Philadelphia...	1.71	1.76	1.81	2.70
Iron bars, Chicago...	1.55	1.55	1.60	2.60
Steel bars, Pittsburgh...	1.35	1.35	1.40	2.00
Steel bars, Chicago...	1.50	1.50	1.55	2.38
Steel bars, New York...	1.73	1.73	1.78	2.38
Tank plates, Pittsburgh...	1.35	1.35	1.40	2.10
Tank plates, Chicago...	1.50	1.50	1.55	2.48
Tank plates, New York...	1.73	1.73	1.78	2.48
Beams, Pittsburgh...	1.35	1.35	1.40	2.10
Beams, Chicago...	1.50	1.50	1.55	2.48
Beams, New York...	1.73	1.73	1.78	2.48
Steel hoops, Pittsburgh...	1.80	1.80	1.90	2.80

*The average switching charge for delivery to foundries in the Chicago district is 70c. per ton.

†Silicon, 1.75 to 2.25. ‡Silicon, 2.25 to 2.75.

The prices in the above table are for domestic delivery and do not necessarily apply to export business.

Sheets, Nails and Wire,	Mar. 7, 1922	Feb. 28, 1922	Feb. 7, 1922	Mar. 8, 1921
Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Sheets, black, No. 28, P'gh	3.00	3.00	3.00	3.85
Sheets, galv., No. 28, P'gh	4.00	4.00	4.00	5.00
Sheets, blue an't'd, 9 & 10	3.25	2.25	2.25	3.00
Wire nails, Pittsburgh...	2.40	2.40	2.40	3.00
Plain wire, Pittsburgh...	2.25	2.25	2.25	3.00
Barbed wire, galv., P'gh...	3.05	3.05	3.15	3.85
Tin plate, 100-lb. box, P'gh	\$4.60	\$4.60	\$4.75	\$7.00

Old Material, Per Gross Ton:

Carwheels, Chicago...	\$15.50	\$15.00	\$15.00	\$17.00
Carwheels, Philadelphia...	16.00	16.50	16.50	18.00
Heavy steel scrap, P'gh...	15.00	15.00	13.50	14.00
Heavy steel scrap, Phila...	12.00	12.00	12.00	13.00
Heavy steel scrap, Ch'go...	11.75	11.50	11.25	13.00
No. 1 cast, Pittsburgh...	15.75	16.00	16.00	22.00
No. 1 cast, Philadelphia...	17.00	16.50	16.50	19.00
No. 1 cast, Ch'go (net ton)	13.75	13.50	13.00	15.75
No. 1 RR. wrot, Phila...	15.00	15.00	14.50	17.00
No. 1 RR. wrot, Ch'go (net)	11.25	10.75	10.50	12.00

Coke, Connellsville, Per Net Ton at Oven

Furnace coke, prompt...	\$3.25	\$3.25	\$2.75	\$4.50
Foundry coke, prompt...	4.25	4.25	3.75	5.50

Metals,

Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Lake copper, New York...	13.00	12.75	13.50	12.75
Electrolytic copper, refinery	12.75	12.50	13.25	12.25
Zinc, St. Louis...	4.02 1/2	4.55	4.50	4.85
Zinc, New York...	4.07 1/2	4.90	4.85	5.20
Lead, St. Louis...	4.40	4.40	4.40	4.00
Lead, New York...	4.70	4.70	4.70	4.00
Tin (Strait), New York...	29.00	29.75	32.00	28.00
Antimony (Asian), N. Y.	4.24	4.35	4.40	5.20

Composite Price, March 7, 1922, Finished Steel, 1.998c. Per Lb.

Based on prices of steel bars, beams, tank plates, plain wire, open-hearth rails, black pipe and black sheets	These products constitute 88 per cent of the United States output of finished steel.	Feb. 28, 1922, 1.998c. Feb. 7, 1922, 2.019c. Mar. 8, 1921, 2.771c. 10 year pre-war average, 1.689c.
---	--	--

Composite Price, March 7, 1922, Pig Iron, \$18.25 Per Gross Ton

Based on average of basic and foundry iron, the basic being Valley quotation, the foundry an average of Chicago, Philadelphia and Birmingham	Feb. 28, 1922, \$18.10 Feb. 7, 1922, 18.10 Mar. 8, 1921, 25.64 10-year pre-war average, 15.72
--	--

that in a number of products the mills have at least a month's business in sight. This is true of sheets and tin plate and the bookings of the wire manufacturers have gained substantially as a result of the stabilization in prices. There is an impression that the Jones & Laughlin Steel Co. accumulated a fair-sized backlog in the hot-rolled products before taking its recent action with regard to prices.

The railroads are evincing more interest in track material as the spring approaches, although making a strong effort to get prices down. Structural activities are showing more life and taking the general situation as it applies to the Pittsburgh district, it must be said that conditions are fairly satisfactory.

Activity still is lacking in the pig iron market outside of foundry grades and there is an utter absence of concern over the impending coal strike. Instead of an exerted demand for fuel in anticipation of a shortage, buying is of a most ordinary character and prices do not average much more than 25c. to 30c. a ton above the low point of January. Consumers generally are well

stocked, most of them having at least a month's supply in reserve, while a good deal of coal lately has been mined and current supply is more than sufficient for the present demand.

The scrap market still shows a strong tone due to purchases by dealers against recent sales in this and nearby districts, amounting to between 30,000 and 40,000 tons.

Plant activities have not changed greatly in the past week. The Carnegie Steel Co. is warming up one of its Isabella furnaces, at which it will be making iron by next week, while the Republic Iron & Steel Co. and the Cambria Steel Co. each are about ready to start up a furnace on Bessemer iron in connection with heavier operations of Bessemer converters. It is reported that a Valley furnace which is nearing the end of its supply of ore will go out of blast early in April.

Pig Iron.—There is a fairly good market in foundry iron, due to demands from radiator and sanitary ware interests, in addition to which producers report that shipping instructions against standing orders are more

insistent. One sanitary ware company has just closed for about 1000 tons of foundry iron, paying \$19, Valley furnace, for No. 2 grade. Furnaces outside the Valley also have obtained \$19 for the base grade, and there is considerable doubt that less than that price now can be done. Interest in the steel making grades is almost nil. The general asking price on basic is \$18, Valley furnace, but there has been no business here recently at above \$17.75. Valley furnace interests continue to quote Bessemer at \$19.50, but there is doubt that this price can be done since small lots have been sold for less, while the Cambria Steel Co. a short time ago took business at \$19, Johnstown, or \$20.96, delivered Pittsburgh, common rate points.

Iron and Steel Bars.—The advance to 1.50c., base, just announced by the Jones & Laughlin Steel Co., has not yet found any response among other makers. We note a sale of 800 tons of bars running 0.40 to 0.50 carbon, but reports about the price paid are conflicting. One is that the business was done at 1.30c., and the extra for carbon waived, and another that the price was 1.35c., plus the extra \$1 per ton for the carbon. Meanwhile several makers who have refused to go below 1.40c. still are holding to that figure. Reinforcing bar inquiries generally are for small tonnages. The R. R. Kitchen Co., Wheeling, W. Va., has the contract for a 10-story reinforced concrete office building to be erected in Wheeling, but has not yet put out the inquiry for the bars required. Inquiry for iron bars is reported to be somewhat better than it was recently.

We quote Valley furnace, the freight rate for delivery to the Cleveland or Pittsburgh district being \$1.96 per gross ton:

Basic	\$17.75 to \$18.00
Bessemer	19.00 to 19.50
Gray forge	18.75
No. 2 foundry	19.00
No. 3 foundry	18.75
Malleable	19.00

Ferroalloys. The market does not change much. While small tonnages of 80 per cent ferromanganese are being moved at \$62.50 Atlantic seaboard, for domestic material, large tonnage consumers are hesitating about placing orders at that figure, and apparently are finding accommodation at less money. The American Steel Foundries has an inquiry out for from 200 to 300 tons of this material. No German ferromanganese is being offered at present because most German makers have been out of production in the past few weeks on account of labor troubles. The latest advice is that there has been a resumption, but until an exportable surplus has been built up, German makers probably will remain out of the market. Interest in spiegeleisen has dwindled following the recent purchases by Youngstown and Canton, Ohio, consumers. The New Jersey Zinc Co. will blow in a furnace on spiegeleisen at Hazard, Pa., March 15. Spot supplies of spiegeleisen are very limited and no official announcement has been made with regard to forward deliveries. The market for 50 per cent ferrosilicon is dull and nominal.

We quote 78 to 82 per cent ferromanganese, \$62.50 c.i.f. Atlantic seaboard for domestic and English. Average 20 per cent spiegeleisen, nominal; 16 to 18 per cent, \$30 to \$35, delivered Pittsburgh or Valleys; 50 per cent ferrosilicon, domestic, \$56 to \$60 furnace, freight allowed. Bessemer ferrosilicon is quoted f.o.b. Jackson and New Straitsville, Ohio, furnaces as follows: 10 per cent, \$36.50; 11 per cent, \$39.80; 12 per cent, \$43.10; 13 per cent, \$47.10; 14 per cent, \$52.10; silvery iron, 6 per cent, \$25; 7 per cent, \$28; 8 per cent, \$27.50; 9 per cent, \$29.50; 10 per cent, \$31.50; 11 per cent, \$34; 12 per cent, \$36.50. The present freight rate from Jackson and New Straitsville, Ohio, into the Pittsburgh district is \$1.06 per gross ton.

Steel Skelp.—The going quotation on steel pipe skelp is 1.40c., but inquiries generally are for small tonnages and it is probable that sizable tonnages could be placed for less.

Wire Rods.—The recently established price of \$36 for the base size of soft rods has found some basis in sales, and as a result of a steadier market in the finished products, orders and specifications again are on the increase. Prices are given on page 685.

Wire Products.—A firm stand by makers at \$2.40 base per keg for nails and \$2.25 base per 100-lb. for bright and annealed wire has given buyers some con-

fidence in the stability of the market and this finds reflection in larger orders and specifications. The demand is well distributed among the different products and the manufacturers are looking forward hopefully to a fairly good spring business. Concessions from established minimum quotations are practically unheard of because of advices to branch offices that no consideration would be given to orders carrying lower prices. Mills in this district are operating at about 60 per cent of capacity.

We quote wire nails at \$2.40 base per keg, Pittsburgh, and bright basic and Bessemer wire at \$2.25 base per 100 lb., Pittsburgh.

Billets, Sheet Bars and Slabs.—Open market activities are limited. Such demands as are coming out for the various forms of steel usually are for one or two carloads and early delivery is specified in all instances. There is no change in prices. Re-rolling billets still are available at \$28 Pittsburgh, or Youngstown, for 4-in. and larger, while the common quotation on small billets is \$29, Pittsburgh or Youngstown. The market on sheet bars still is commonly regarded as \$29, Pittsburgh or Youngstown, with freight rates equalized to point of consumption. A few small sales of forging billets have been made at \$32 Pittsburgh.

We quote 4 x 4-in. soft Bessemer and open-hearth billets at \$28; 2 x 2-in. billets, \$29; Bessemer and open-hearth sheet bars, \$29; slabs, \$28; forging billets, ordinary carbons, \$32, all f.o.b. Youngstown or Pittsburgh mills.

Steel Rails.—The market on light sections rolled from billets hardly is quotable on sales at more than 1.40c., base, although the Carnegie Steel Co. still is quoting 1.45c. Demand is lighter than it has been, but there is a fairly large aggregate tonnage in the small orders coming from coal mine operators for prompt shipment. Light rails rolled from old standard sections still are readily available at 1.35c. base mill. The local standard rail unit of the Steel Corporation has enough business in sight to keep it steadily engaged until about July 1. This year's bookings were about 100,000 tons while unspecified tonnages, carried over from last year, amounted to about 50,000 tons. The Baltimore & Ohio Railroad is reported to have withdrawn a recent inquiry for 17,000 tons.

We quote 25 to 45-lb. sections, rolled from new steel, 1.40c. base; rolled from old rails, 1.35c. base; standard rails, \$40 per gross ton mill for Bessemer and open-hearth sections.

Iron and Steel Pipe.—Orders for merchant steel pipe show a well sustained betterment, but it is commented upon that jobbers still are placing only such tonnages as they see a probable need for. The fact that considerable uncertainty as to the course of prices still exists tends to make jobbers cautious about anticipating their needs. As the spring approaches, more interest is being shown in oil country goods and inquiries for line pipe are more numerous. Among the latter are three lines out of the Wyoming field calling for a total of about 125 miles of 6-in. and 8-in. pipe. These are expected to be closed before long, as is also the order for 98 miles of 12-in. gas pipe line to be laid by the Southern Carbon Co. from the Munroe, La., field to Alexandria, La. Some low prices are coming out against line pipe inquiries. Card discounts are given on page 685.

We quote steel bars rolled from billets at 1.30c. to 1.40c.; reinforcing bars, rolled from billets, 1.30c. to 1.40c. base; reinforcing bars, rolled from old rails, 1.25c. to 1.30c.; refined iron bars, 2c. to 2.10c. in carloads, f.o.b. mill, Pittsburgh.

Structural Material.—Steel for the new Mellon National Bank Building, Pittsburgh, which will be a three-story, instead of a four-story structure, and for which 1650 tons will be required, will be furnished by the American Bridge Co., which also has taken 1000 tons of eye-bars and buckle plates for the Fort Pitt Bridge Co., for the Sixteenth Street bridge, Pittsburgh; 350 tons of beams for reinforcing work in a building of the Armstrong Cork Co., Pittsburgh, and 800 tons for a new building for the Commercial Savings Bank & Trust Co., Toledo, Ohio. The Ritter-Conley Co. has taken a contract for 10 steel barges for the Island Creek Coal Co., Huntington, W. Va., requiring 1600 tons of steel, mostly plates. The P. H. Kelly Co., Philadelphia, has a contract for the erection of a junior high school, Monessen, Pa., for which about 100 tons of steel will be required. Inquiry still is brisk and

fabricating interests are looking forward to a good spring business. Few companies, however, have very full order books, and competition for work is so sharp that very low prices still prevail. Plain material demands are larger than they were earlier in the year, but there is still considerable room for improvement. The quotable market still is 1.35c. to 1.40c. Prices are given on page 685.

Plates.—Such business as has lately been done has been at about 1.35c., Pittsburgh. There was one sale of 2000 tons at that figure to a local tank and boiler company, which has the contract for a riveted pipe line for Bay City, Mich. About 2500 tons of plates will be required for 10 55,000-barrel tanks recently awarded the Riter-Conley Co. by the South Penn Oil Co. The advance to 1.50c. for plates by one company has not yet been followed by other makers, and on the basis of business done the market remains quotable at the recent range.

We quote sheared plates, $\frac{3}{4}$ in. and heavier, tank quality, at 1.35c. to 1.40c., f.o.b. Pittsburgh.

Sheets.—Last week was one of the best in the history of the American Sheet & Tin Plate Co. in the matter of orders and specifications and the experience of independent manufacturers has been only slightly less favorable. There is no marked tendency on the part of buyers to anticipate their requirements, the bulk of the orders being for early shipment, but consumers' stocks have been allowed to run so low that actual needs are becoming more pressing. Deviations from regular market quotations are few and unimportant. The leading interest has about 70 per cent of its sheet capacity in operation while independent schedules call for about 60 per cent operations. Prices are given on page 685.

Tin Plate.—Consumers still are specifying with considerable freedom against contracts, and these demands rather than new ones, are keeping mills here and in nearby districts running at a high rate. The Weirton Steel Co., the Trumbull Steel Co., the Jones & Laughlin Steel Co., the Standard Tin Plate Co., Washington Tin Plate Co. and the American Steel Co. all have all of their tin mills in full operation this week, while the Wheeling Steel Corporation now has five mills on at Yorkville, Ohio, where an effort is being made to operate on an open shop basis. The tin plate making subsidiary of the Steel Corporation is running about 60 per cent of capacity, but this is a natural result of the fact that many of its large customers anticipated their requirements and during that period the operation of this company ran well ahead of the independent mill activities. The "official" quotation on standard cokes remains at \$4.75 per base box, Pittsburgh, but the common basis on most mills to regular customers is \$4.60 and in some markets, notably in the East, even less than that price has been done. In a general way, however, there is fairly close observance of \$4.60 as a minimum.

We quote standard production coke tin plate, \$4.60 per base box f.o.b. Pittsburgh for carload lots.

Cold-Finished Steel Bars and Shafting. There is a better demand from the automotive industry, but other consuming industries are providing little or no business and the aggregate of orders still is unsatisfactory. Agricultural implement manufacturers are carrying rather big stocks of both bars and completed machines and are not expected to be buyers of bars until this year's crops have been garnered and farmers are buying more tools. Machine tool makers also are negligible factors because they have so many machines made up and which are moving out slowly. The general quotation is 1.90c. base, Pittsburgh, but this price is being shaded \$1 to \$2 a ton on attractive orders. Ground shafting holds at 2.25c. base, mill, for carloads.

Hoops and Bands.—The market shows little life and prices are irregular and unsettled. On hoops most makers are trying to hold the market at 1.90c. base, Pittsburgh, but on inquiries of sufficient size to cause competition, that price is being shaded \$1 to \$2 a ton. Bands range from 1.75c. to 1.90c., but only retail lots command the higher figure.

Hot-Rolled and Cold-Rolled Strips.—Business is looking up and most makers now have fair-sized order

books. Mill operations average about 50 per cent, this being the highest rate in several months. Enlarged automobile plant operations and schedules are one reason, but other consuming industries also are busier. Some second quarter specifications are coming out, but as a rule buying is for early delivery. Prices do not change much. Cold-rolled strips are fairly steady at 3.50c. base, Pittsburgh, and hot-rolled from 1.75c. to 1.85c. for large lots and 1.90c. to 2c. for small quantities.

Spikes and Track Bolts.—The approach of spring is bringing increase in inquiries from the railroads for track material, but they are buying cautiously and trying hard to get prices down. On very large lots of standard spikes, \$2 base per 100 lb. is possible, but on smaller lots such as are being bought the going price is \$2.10. Track bolts are rated at \$3 base per 100 lb. for carloads. An effort is being made to get 1c. per lb. more for less than carloads, but is not especially successful. Tie plate inquiries are numerous, but sales are moderate. The market is quotable from \$33 to \$38 per net ton, depending on specifications and tonnages involved. Prices are given on page 685.

Coke and Coal.—The coke market is considerably quieter than it was recently, and while it still is possible for producers to obtain recent maximum quotations of \$3.50 per net ton oven for furnace grade, and about \$1 per ton more for foundry coke, there is rather more resistance to these prices on the part of buyers than there was recently. Small tonnages have sold 25c. per ton below these figures and there is a possibility of \$3.25 becoming a common quotation on furnace coke soon, through the release of tonnages now moving on short term contracts. A Buffalo steel making interest making its own by-product plant on union coal is seeking 15,000 tons of beehive oven coke a month for second quarter delivery, rather than take the chance of not being able to get coal from its own properties in the event of a strike. Quotations of \$3.50 against this inquiry have been rejected as too high. Stocking of foundry coke still is going on and is the sustaining influence on prices. Steam coal still is available at \$1.50 to \$1.85 for mine run grade, by-product from \$1.75 to \$2 and non-union gas coal from \$2.15 to \$2.40.

Old Material.—Apparently some of those who recently took business from the steel makers here and in nearby districts sold short against a considerable portion of the tonnages and covering of these sales now is the sustaining influence on prices. Offerings at the moment are moderate because production is seasonably light and prices are not high enough to permit the shipment of material from dealers' yards. Offerings of steel scrap by the New York Central and Erie Railroads brought \$15.35 to \$15.40 Youngstown, and as high as \$15.75, Pittsburgh, was paid on the steel offered by the Pennsylvania Railroad, Central Region. The latter is being applied on contracts carrying a maximum price of \$15. The market is rather soft on cast iron scrap for foundry use, but steel makers want heavy breakable cast and are paying relatively high prices.

We quote for delivery to consumers' mills in the Pittsburgh and other districts taking the Pittsburgh freight rate, as follows:

Heavy melting steel, Steubenville, Follansbee, Brackenridge, Monessen, Midland and Pittsburgh.....	\$15.00 to \$15.50
No. 1 cast, cupola size.....	15.75 to 16.25
Re-rolling rails, Newark and Cambridge, Ohio; Cumberland, Md.; Huntington, W. Va., and Franklin, Pa.....	15.00 to 15.50
Compressed sheet steel.....	13.00 to 13.50
Bundled sheets, sides and ends.....	12.00 to 12.50
Railroad knuckles and couplers.....	15.50 to 16.00
Railroad coil and leaf springs.....	15.50 to 16.00
Low phosphorus standard bloom and billet ends.....	17.00 to 17.50
Low phosphorus plates and other grades.....	16.50 to 17.00
Railroad malleable.....	13.00 to 13.50
Iron car axles.....	23.00 to 24.00
Locomotive axles, steel.....	21.00 to 22.00
Steel car axles.....	15.50 to 16.00
Cast iron wheels.....	15.50 to 16.00
Hot-rolled steel wheels.....	15.50 to 16.00
Machine shop turnings.....	10.00 to 10.50
Sheet bar crop ends.....	15.00 to 16.00
Heavy steel axle turnings.....	12.00 to 12.50
Short shoveling turnings.....	11.50 to 12.00
Heavy breakable cast.....	14.75 to 15.25
Stove plate.....	12.50 to 13.00
Cast iron borings.....	11.50 to 12.00
No. 1 railroad wrought.....	12.50 to 13.00

Chicago

CHICAGO, March 7.

February records of local steel mills show marked gains over January in shipments, orders booked and production. For one important Chicago producer shipments increased 33 per cent, orders booked increased 32 per cent and ingot production 52 per cent. That this general betterment is continuing is indicated by current operating reports. The Illinois Steel Co. has blown in its thirteenth furnace, giving it seven active stacks at Gary, four at South Works and two at Joliet, and has increased its ingot production during the week from 55 per cent to 63½ per cent. Of the company's individual plants, the Gary works is leading, having reached an operating basis of 77 per cent last week. The Inland Steel Co. continues to run at 60 per cent with every prospect of bettering that record next week.

Undoubtedly the large tonnages bought by railroads and car builders account in considerable measure for the improvement in mill operations, but miscellaneous demand also continues to expand steadily, although consisting mainly of small individual orders. In fact, the mills are not encouraging forward buying, being unwilling to book plates, shapes and bars at current prices for delivery beyond March. The trend toward greater firmness in these three commodities is indicated by an announcement made by the Inland Steel Co. to-day that no further business will be taken at less than 1.60c., Indian Harbor.

The threatened coal strike has had little perceptible effect on either the steel or pig iron markets up to date. The only precautionary measures taken so far have had to do with fuel requirements, orders for foundry and furnace coke being more numerous. Connellsville foundry has advanced to a minimum of \$4.50 ovens, while local by-product foundry coke remains unchanged at \$10.75, delivered Chicago switching district.

Another labor controversy was reopened to-day in Chicago when the United States Railroad Labor Board started hearings on an application of the railroads for a general reduction in wages back to the basis existing before the advance of 1920.

Ferroalloys.—An inquiry for 200 tons of ferromanganese is before the trade and several carlot inquiries for spiegeleisen are pending. Prices on these alloys are firm and it is notable that available furnace stocks of spiegeleisen are very low.

We quote 78 to 82 per cent ferromanganese, \$70.90, delivered; 50 per cent ferrosilicon, \$56 to \$57.50, delivered; spiegeleisen 16 to 18 per cent, \$40.10, delivered.

Pig Iron.—Notwithstanding occasional signs of weakness such as were noted a week ago, the local iron market is growing firmer as the steel works which has been long a source of active competition becomes less of a factor in the market. This interest has all the merchant iron bookings it can handle for a considerable period ahead, and at the same time must use an increasingly large proportion of its blast furnace output as the operations of its mills expand. So far as Chicago and immediate surrounding territory are concerned, a minimum price of \$20 local furnace is well established. Concessions are being made only in competitive territory where the delivered prices of outside furnaces figure lower than that of Chicago producers. On the whole, the market is quieter than before the advance, and it is probable that melters are delaying action on large inquiries until they are thoroughly convinced that the present market will hold. New inquiries of any size are few. The National Sewing Machine Co., Belvidere, Ill., wants 200 tons of foundry for April shipment. The Chicago Hardware Foundry Co. is in the market for 500 tons of Southern foundry for delivery at North Chicago. Sales of Southern foundry in this territory are increasing, one broker reporting total bookings of 2000 tons within the past week. The Kewanee Boiler Co., Kewanee, Ill., has bought 500 tons of Southern foundry for delivery by the water and rail route. Iron moved north in this manner is quoted at \$20.77, delivered Chicago, while the lowest competing Southern price is \$15 base, Birmingham, or \$21.67, Chicago. Practically all charcoal iron producers are

now quoting \$22.50, base furnace. A local melter has bought 300 tons of copper bearing low phosphorus at approximately the market, which is \$2 below copper free material.

Quotations on Northern foundry, high phosphorus malleable and basic irons are f.o.b. local furnace and do not include a switching charge averaging 70c. per ton. Other prices are for iron delivered at consumers' yards, or when so indicated, f.o.b. furnace other than local.

Lake Superior charcoal, averaging sil. 1.50, delivered at Chicago.....	\$26.00
Northern coke, No. 1, sil. 2.25 to 2.75	20.50
Northern coke, foundry, No. 2, sil. 1.75 to 2.25.....	20.00
Northern high phos.....	20.00
Southern foundry, sil. 1.75 to 2.25....	\$20.77 to 21.67
Malleable, not over 2.25 sil.....	20.00
Basic.....	20.00
Low phos., Valley furnace, sil. 1 to 2 per cent copper free.....	30.00
Silvery, sil. 8 per cent.....	32.82

Railroad Equipment.—The Chicago & Northwestern has put out an inquiry for 2750 freight cars, including 1250 box, 500 stock, 250 gondola, 500 flat and 250 refrigerator cars. The Monon is inquiring for 20 locomotives.

Steel Castings.—Orders for the miscellaneous castings for the Burlington cars have been distributed under protections granted by the foundries 90 days ago. The Standard Steel Car Co. has let the castings for 2600 refrigerator cars for the Pacific Fruit Express to the Ohio Steel Foundry Co.

Bars.—Demand from jobbers and miscellaneous manufacturers is increasing in volume and there continues to be a fair amount of reinforcing business. Automobile manufacturers in the Detroit district are now operating at from 65 to 75 per cent of capacity and the implement makers are placing more orders to round out their stocks in preparation for a resumption of production. In the reinforcing field, bids were taken yesterday on 300 tons for the Children's Hospital and Nurses' Home, Milwaukee. An inquiry from the Great Northern for 800 tons for Lake Superior docks is pending. Prices on mild steel bars are unchanged. Bar iron mills continue to operate intermittently. As bar iron is selling at a higher figure than steel bars, the latter product is being substituted for purposes for which bar iron was customarily used.

Mill prices are: Mild steel bars, 1.50c. to 1.60c., Chicago; common bar iron, 1.55c. to 1.60c., Chicago; rail carbon, 1.50c., mill or Chicago.

Jobbers quote 2.53c. for steel bars out of warehouse. The warehouse quotation on cold-rolled steel bars and shafting is 3.40c. for rounds and 3.90c. for flats, squares and hexagons. Jobbers quote hard and medium deformed steel bars at 1.90c. base. Hoops and bands, 3.13c.

Sheets.—Jobbers and manufacturing consumers alike are taking an active interest in the market and prices are increasingly firm. Some mills are now selling Nos. 10 and 12 gage blue annealed on a straight sheet basis, whereas until recently they took some business on a plate basis to meet plate mill competition.

Mill quotations are 3c. for No. 28 black, 2.25c. for No. 10 blue annealed and 4c. for No. 28 galvanized, all being Pittsburgh prices, subject to a freight rate to Chicago of 38c. per 100 lb.

Jobbers quote: Chicago delivery out of stock, No. 10 blue annealed, 3.38c.; No. 28 black, 4.15c.; No. 28 galvanized, 5.15c.

Wire Products.—Demand shows some improvement and prices are on a firmer footing, but buying is not yet on the scale to be expected at this season of the year. With the improvement in the grain and live stock markets, however, jobbers serving the agricultural districts look forward to increased trade. For mill prices, see finished iron and steel, f.o.b. Pittsburgh, page 685.

We quote warehouse prices f.o.b. Chicago: No. 9 and heavier black annealed wire, \$2.85 per 100 lb.; No. 9 and heavier bright basic wire, \$3 per 100 lb.; common wire nails, \$3 per 100 lb.; cement coated nails, \$2.50 per keg.

Warehouse Prices.—Local jobbers have reduced wire and nails to the prices appended under the wire products paragraph.

Rails and Track Supplies.—The Missouri Pacific has placed 18,000 tons of rails, of which 12,000 went to the Colorado mill, 2000 to Tennessee, 3000 to Gary and 1000 to Inland. The Illinois Central has bought 2000

kegs of track spikes at less than 2.40c., delivered. There is still considerable business in track supplies pending and it is notable that rail specifications received at the Gary mill are increasingly liberal.

Standard Bessemer and open-hearth rails, \$40; light rails rolled from new steel, 1.50c. to 1.60c., f.o.b. makers' mills. Standard railroad spikes, 2.05c. to 2.10c., Pittsburgh; track bolts with square nuts, 3.05c. to 3.10c., Pittsburgh; tie plates, steel and iron, 1.65c. to 1.75c., f.o.b. mill; angle bars, 2.40c., f.o.b. mill.

Plates.—The steady expansion in demand from miscellaneous sources is regarded as of far greater significance than the business recently placed by carbuilders which, although involving large individual tonnages, is believed to be of a temporary character. It is the smaller orders, from jobbers, boiler plants, fabricators, and numerous small manufacturers upon which the mills must depend for anything approaching steady operations and the fact that this class of business is slowly increasing is considered an indication of general industrial revival. In this connection it is notable that jobbers are now laying in stocks not only of plates, but also structural shapes, bars and sheets. At the same time, mills are showing less inclination to accept orders at current prices for forward delivery beyond March. The Sinclair Oil Co. has let 10 oil tanks, involving 3000 tons of plates, to the Chicago Bridge & Iron Co. and still has 10 tanks to place. The tanks are to be erected in Kansas and Oklahoma.

The ruling mill quotations range from 1.50c. to 1.60c., Chicago. Jobbers quote 2.63c. for plates out of stock.

Bolts and Nuts.—Demand is slowly expanding with business coming in from jobbers, railroads, automobile makers and miscellaneous manufacturers. While the market is still weak, bolt and nut makers in this district are in many cases selling at the discounts published on page 685, f.o.b. their plants.

Jobbers quote structural rivets, 3.43c.; boiler rivets, 3.53c.; machine bolts up to $\frac{3}{8}$ x 4 in., 60, 10 and 10 per cent off; larger sizes, 60 to 10 off; carriage bolts up to $\frac{3}{8}$ x 6 in., 60 and 10 off; larger sizes, 55 and 5 off; hot pressed nuts, square and hexagon tapped, \$3.75 off; blank nuts, \$4 off; coach or lag screws, gimlet points, square heads, 65 and 5 per cent off. Quantity extras are unchanged.

Structural Material.—Fabricating shops in this district are not operating nearly so well as the mills, but they are looking forward to better business as the season progresses. The past week, however, has been rather disappointing both from the standpoint of lettings and new inquiries. Awards include:

Elks' Building, Bakersfield, Cal., 408 tons, to Golden Gate Iron Works.

Mt. Vernon Car Mfg. Co., truck shop, Mt. Vernon, Ill., 450 tons, to McClintic-Marshall Co.

Kansas City Cold Storage & Warehouse Co., plant, Kansas City, Mo., 218 tons, to Kansas City Structural Steel Co. Palmolive Co., plant, Milwaukee, 120 tons, to Milwaukee Structural Steel Co.

School, Whiting, Ind., 125 tons, to Duffin Iron Works.

Interstate toll bridge, Prescott, Wis., for Prescott Bridge Co., 360 tons, to Milwaukee Bridge Co.

Pending business includes:

Milwaukee Sewerage Commission, power and boiler house for Jones Island disposal plant, 530 tons, bids to be in March 10.

Indianapolis Athletic Club, 1425 tons.

Wild Bank Building, Indianapolis, 515 tons.

Masonic Temple, Aurora, Ill., 300 tons, W. Q. Bendus, Chicago, architect.

The mill quotation on plain material ranges from 1.50c. to 1.60c., Chicago. Jobbers quote 2.63c. for plain material out of warehouse.

Cast-Iron Pipe.—The Milwaukee Department of Public Works takes bids March 14 on 1430 tons of 6- to 16-in. water pipe and specials. The United States Cast Iron Pipe & Foundry Co. will furnish 1350 tons for Chicago, and the Lynchburg Foundry Co. has the contract for 110 tons for Muskegon, Mich. The market has a firmer tone with 6-in. and over at a minimum of \$33, Birmingham.

We quote per net ton, f.o.b. Chicago, as follows: Water pipe, 4-in., \$46.10 to \$47.10; 6-in. and above, \$42.10 to \$43.10; class A and gas pipe, \$3 extra.

Old Material.—The market shows greater strength and numerous grades have advanced 25c. to 50c. a ton, but it is notable that conservative buying is conservative with a tendency towards contraction as prices go

up. In fact, some buyers are of the opinion that the current rise in the market is due in large measure to trading between dealers as well as to speculative buying of railroad material. On the other hand, there are those who feel that a sustained swing upward has started which will accompany an increase in industrial activity which has already made itself apparent in more widely distributed sales of scrap. Railroad offerings include the Santa Fe, 2500 tons; the Union Pacific 2000 tons; and the Soo Line, and the Chicago and Eastern Illinois, 500 tons.

We quote delivery in consumers' yards, Chicago and vicinity, all freight and transfer charges paid, as follows:

Per Gross Ton	
Iron rails	\$16.00 to \$16.50
Relaying rails	20.00 to 25.00
Cast iron car wheels	15.50 to 16.00
Rolled or forged steel car wheels	13.50 to 14.00
Steel rails, rerolling	12.50 to 13.00
Steel rails, less than 3 ft.	13.25 to 13.75
Heavy melting steel	11.75 to 12.25
Forgs, switches and guards cut apart	11.75 to 12.25
Shoveling steel	11.25 to 12.75
Low phos., heavy melting steel	13.50 to 14.00
Drop forge flashings	7.75 to 8.25
Hydraulic compressed sheet	8.50 to 9.00
Axle turnings	8.50 to 9.00
Per Net Ton	
Iron angles and splice bars	14.25 to 14.75
Steel angle bars	11.50 to 12.00
Iron arch bars and transoms	16.00 to 16.50
Iron car axles	19.50 to 20.00
Steel car axles	13.00 to 13.50
No. 1 busheling	9.00 to 9.50
No. 2 busheling	6.00 to 6.50
Cut forge	10.25 to 10.75
Pipes and flues	7.25 to 7.75
No. 1 railroad wrought	11.25 to 11.75
No. 2 railroad wrought	10.75 to 11.25
Steel knuckles and couplers	12.00 to 12.50
Coil springs	12.75 to 13.25
No. 1 machinery cast	13.75 to 14.25
No. 1 railroad cast	13.25 to 13.75
Low phos. punchings	11.00 to 11.50
Locomotive tires, smooth	10.00 to 10.50
Machine shop turnings	5.50 to 6.00
Cast borings	7.00 to 7.50
Stove plate	12.50 to 13.00
Grate bars	10.50 to 11.00
Brake shoes	10.50 to 11.00
Railroad malleable	12.00 to 12.50
Agricultural malleable	12.00 to 12.50

Buffalo

BUFFALO, March 6.

Pig Iron.—Probably at no time in the history of the Buffalo market has such a peculiar condition existed; with improved demand for every grade of iron, prices are perhaps weaker than at any stage since the inception of the depression. Some sales of Buffalo iron at \$18 have been made at New England points and for delivery in Buffalo and the immediate territory \$18.25 and \$18.50 for silicon 1.75 to 2.25 is a common consideration. About 14,000 tons have been sold and inquiry is much brighter. More foundries are operating in a limited way. A furnace quoting \$19, and not particularly keen to take business at that figure, has sold nothing. A firmer market is expected if the coal strike becomes a certainty. Out of a total volume of sales by one furnace amounting to 8000 tons, one was for 1000 tons and several for 400 and 500 ton lots.

We quote f.o.b. per gross ton Buffalo as follows:

No. 1 foundry, 2.75 to 3.25 sil.	\$19.00 to \$19.50
No. 2X foundry, 2.25 to 2.75 sil.	18.50 to 19.00
No. 2 plain, 1.75 to 2.25 sil.	18.00 to 18.50
Basic	18.00 to 18.25
Malleable	18.50 to 19.00
Lake Superior charcoal	27.75

Finished Iron and Steel.—Very definite improvement has appeared and in some materials sales have exceeded the present rate of production. Bars have been in good demand and in cold finished and wire products orders have come in since the beginning of March at a brisker rate than in any like period in a year. Buyers are apparently confident they will not see a lower market this year with particular reference to sheets. The price of \$2.25 for No. 10 gage blue annealed and \$3 for black has not been disturbed in the face of keen competition. In Buffalo a number of sales of tonnages varying from 25 to 100 tons at the above prices f.o.b. Pittsburgh have created confidence in the strength of the sheet market. Immediate delivery is the first requirement of most of

this business from buyers who have been out of the market for some time.

We quote warehouse prices f.o.b. Buffalo as follows: Structural shapes, 2.65c.; plates, 2.65c.; plates, No. 8 gage, 3.35c.; soft steel bars and shapes, 2.55c.; hoops and bands, 3.15c.; blue annealed sheets, No. 10, 3.40c.; galvanized steel sheets, No. 28, 5.25c.; black sheets, No. 28, 4.25c.; cold-rolled strip steel, 5.90c.; cold-rolled round shafting, 3.40c.

Warehouse Business.—Plate demand has been especially good and signs of better business in structural shapes are appearing with the progress of the spring season. March business to date has been generally more satisfactory than in January or February. Repairs to equipment of plants at Niagara Falls have developed some satisfactory business and a general overhauling of machinery in the chemical industries of that city seems to be going on.

Coke.—Efforts to anticipate future needs by stocking up far ahead have brought about price advances and best grades are quoted at \$4.50 to \$5.50 ovens for foundry coke.

Old Material.—While trade in all lines of old material is lively and demand better than in months, prices remain the same. The one mill which has been in the market for heavy melting steel for some time is still able to buy at \$13.50. Outside Buffalo it is understood that steel is quoted higher, and in railroad lists which closed March 2 quotations of \$15.50 Youngstown ruled. Demand for borings and turnings continues to increase and in all materials the week was the best this year.

We quote dealers' asking prices per gross ton f.o.b. Buffalo as follows:

Heavy melting steel	\$13.00 to \$14.00
Low phos., 0.04 and under	17.00 to 18.00
No. 1 railroad wrought	15.00 to 16.00
Car wheels	16.50 to 17.50
Machine shop turnings	7.50 to 8.00
Cast iron borings	7.00 to 8.00
Heavy axle turnings	10.50 to 11.50
Grate bars	12.00 to 13.00
No. 1 bushing	10.00 to 11.00
Stove plate	15.00 to 16.00
Bundled sheet stampings	8.00 to 9.00
No. 1 machinery cast	17.00 to 18.00
Hydraulic compressed	10.50 to 11.50
Railroad malleable	13.00 to 14.00

Cleveland

CLEVELAND, March 7.

Iron Ore.—It is reported that the railroads in the central territory will make a 15 per cent reduction in carrying rates on ore from lower lake ports to interior furnaces about April 1. Ore shippers have been advised that the matter is under consideration and the report of a 15 per cent cut has reached them from sources that lead them to give it considerable credence. It has been reported that the railroads in the Eastern territory may make a 28 per cent reduction on ore rates April 1. Information received by local ore shippers indicates that the proposed Eastern reduction will apply to Southern and New York ore as well as to imported ore. The final hearing in the ore rate case before the Interstate Commerce Commission which was to have started in Chicago yesterday has been postponed until March 21 at the request of the railroads. The improvement in the iron and steel industry will be reflected somewhat in the ore mining industry. Because of the better outlook for iron and steel, Oglebey, Norton & Co. will resume operations in their Eureka mine in the Gogebic range within a few days. Ore shipments from dock continue very light. During February, dock shipments amounted to only 166,507 gross tons as compared with 211,533 tons in January and with 523,098 tons during February, 1921. The balance on Lake Erie docks March 1 was 8,057,958 tons as compared with 8,699,284 tons on the same day last year.

We quote delivered lower lake ports: Old range Bessemer, 55 per cent iron, \$6.45; Old range non-Bessemer, 51½ per cent iron, \$5.70; Mesabi Bessemer, 55 per cent iron, \$6.50; Mesabi non-Bessemer, 51½ per cent iron, \$5.55.

Pig Iron.—The market continued fairly active during the week with a large number of small-lot sales. Some producers report a further improvement in shipments. One lake furnace booked 7,000 tons during the week, this being made up of over 50 orders which with two or three exceptions, were for small lots. While

most orders are for delivery over a period of 60 days or less, some consumers are showing a disposition to contract for longer periods. The largest order reported was for 1,000 tons of malleable iron for delivery until July 1, this coming from a Michigan foundry that specializes in automobile castings. An Indianapolis melter purchased 300 tons of malleable iron. Recent price levels are being maintained. Lake furnace quotations on foundry iron range from \$19 to \$20, but the lower price generally prevails except for nearby shipment and one or two lake furnaces will still go to \$18.50 for foundry iron for shipment to some competitive points. For Cleveland delivery, local furnaces quote No. 2 foundry iron at \$19 to \$19.50 at furnace. One Cleveland pig iron interest which expects to put a furnace in blast shortly unless a coal strike interferes has withdrawn from the market as it has only sufficient stock to fill existing orders. We note the sale of 200 tons of Ohio silvery iron to an Indiana melter at the regular price.

Quotations below are f.o.b. local furnace for Northern foundry iron, not including a 56c. switching charge. Other quotations are delivered Cleveland, being based on a \$1.96 freight rate from Valley points, a \$3.36 rate from Jackson and a \$6.67 rate from Birmingham:

Basic	\$19.71
Northern No. 2 fdy., sil. 1.75 to 2.25	\$19.00 to 19.50
Southern fdy., sil. 1.75 to 2.25	22.17
Ohio silvery, sil. 8 per cent	30.86
Standard low phos., Valley furnace	32.00

Semi-Finished Steel.—The demand for sheet bars has improved, but mills are still buying in small lots, purchasing one week for the following week's requirements. Prices are apparently well established at \$29, Youngstown, for sheet bars and \$28 for slabs.

Finished Material.—The demand has further improved. While business is still mostly in car lots, larger orders have become more plentiful. These include 500 tons of bars placed by a spark plug manufacturer, 350 tons from a rivet manufacturer, and 500 tons of plates and structural material placed by a jobber. The most important development in the price situation was the announcement to-day of a price advance to 1.50c. on steel bars, plates and structural material by the Jones & Laughlin Steel Co. While it is too early to judge the effect of the price advance by the Pittsburgh company on other producers, it is believed that with the existing sentiment among sellers it will result in a little stiffening of prices all around. However, the market is still quotable at 1.40c. for steel bars, plates and structural material for desirable orders. A local mill continues to take a fair amount of business in plates in the lighter gages at 1.50c. to 1.60c. The Otis Steel Co. has its Lakeside plate mill in operation this week for the first time since December. Hard steel reinforcement bars are very irregular. Some rerolling mills are apparently using their location as basing points and are naming prices equivalent to below 1.35c., Pittsburgh. The contractor for the Baldwin Reservoir, Cleveland, is about to place 2000 tons of twisted square or deformed bars for that work. The strike in the building trades in Cleveland has put a stop to all the larger building work and little new inquiry for fabricating material has come out. The American Bridge Co. has taken the Commercial Trust and Savings Bank Building, Toledo, requiring 250 tons, and an inquiry is out for 200 tons for a school building at Painesville, Ohio. Fabricators are figuring on Northern Pacific bridge work requiring 6000 tons of steel.

Jobbers quote steel bars, 2.36c.; plates and structural shapes, 2.46c.; No. 9 galvanized wire, 3c.; No. 9, annealed wire, 2.50c.; No. 28 black sheets, 3.75c.; No. 28 galvanized sheets, 4.75c.; No. 10 blue annealed sheets, 3.10c.; hoops and bands, 2.96c.; cold-rolled rounds, 3.25c.; flats, squares and hexagons, 3.75c.

Sheets.—The demand for black, blue annealed and automobile body sheets continues to improve. A leading Detroit automobile manufacturer is in the market for 2000 tons of frame stock and is also expected to close next week for a round tonnage of full finished sheets. A Cleveland mill during the week took 500 tons of black sheets for Japan and has quotations out on several other Japanese inquiries. Regular prices are being firmly held.

Warehouse Business.—Warehouse sales show a slight gain from week to week. Prices are firm and unchanged.

Wire Products.—All the leading mills are holding firmly to 2.40c. for nails and 2.25c. for wire. A buyer attempted to break the market with a large inquiry during the week, but was unsuccessful and did not place the order.

Bolts, Nuts and Rivets.—The demand for bolts and nuts continues to show an improvement and makers are now operating their plants at 50 per cent or more of capacity. Prices are about as irregular as they have been, most of the weakness apparently being in the Chicago territory. The demand for rivets has improved slightly. The leading local maker is adhering to the regular prices of 2.10c. for structural rivets and 2.20c. for boiler rivets.

Coke.—Some producers have advanced the price on foundry coke 25c. a ton and others have withdrawn from the market until they get caught up with existing orders. We quote Standard Connellsville foundry coke at \$4.25 to \$4.75 per net ton at oven. The demand is not active.

Old Material.—The local scrap market is again rather quiet after the activity noted last week, and the upward movement of prices has apparently been checked, the only change in quotations being an advance of 25c. a ton on heavy melting steel. A Canton mill has purchased some heavy railroad scrap at around \$15.25. For Youngstown delivery heavy melting is quoted at \$15 and dealers are offering \$13 for this grade delivered to a Cleveland mill. A Cleveland consumer has purchased the March output of machine shop turnings of a Detroit automobile plant at a reported price of \$7 Detroit or \$10.36 delivered.

We quote per gross ton, f.o.b. Cleveland, as follows:

Heavy melting steel.....	\$12.25 to	\$12.75
Steel rails, under 3 ft.....	12.75 to	13.25
Steel rails, rerolling.....	14.50 to	15.00
Iron rails.....	12.00 to	12.50
Iron car axles.....	18.00 to	19.00
Low phosphorus melting.....	13.50 to	14.00
Cast borings.....	9.00 to	9.25
Machine shop turnings.....	8.75 to	9.00
Mixed borings and short turnings.....	8.75 to	9.00
Compressed steel.....	9.25 to	9.75
Railroad wrought.....	12.00 to	12.50
Railroad malleable.....	12.50 to	13.00
Light bundled sheet stampings.....	7.00 to	8.00
Steel axle turnings.....	9.50 to	10.00
No. 1 cast.....	15.00 to	16.00
No. 1 busheling.....	9.00 to	9.25
Drop forge flashings, over 10 in.....	9.00 to	9.25
Drop forge flashings, under 10 in.....	9.25 to	9.75
Railroad grate bars.....	12.75 to	13.00
Stove plate.....	13.00 to	13.25
Pipes and flues.....	8.50 to	9.00

Birmingham

BIRMINGHAM, ALA., March 6.

Very good bookings were made last week and the week before by Birmingham furnaces on a base of \$15.50 with few departures in either direction. The market gathered strength strategically, but prices showed no tendency to advance. One maker did the best business of many months the week ending Feb. 25, booking over 4,000 tons, including a lot of 2,000 tons, the remainder being smaller lots. A Southern stove foundry paid \$15.50 for 500 tons. Bookings of Sloss-Sheffield Steel & Iron Co. of its Sheffield iron going into middle and far west via Ohio river gateways through barge service on the Tennessee river are understood to have aggregated a very considerable volume with deliveries being promptly made. Birmingham district furnaces are also getting into St. Louis, Indiana, Ohio and Illinois markets with numerous lots for many kinds of consumers. The pronounced feature of the larger tonnage recently booked is that very little has come from the pipe interests, the bulk being from the general foundry trade with radiator works and stove plants large takers. One maker remains out of the market on account of sold-up condition. Another maker entered the month with 10,000 tons for March delivery on a one-furnace make. It is known that one or two makers feel so confident of the future that they are having extra furnaces kept in readiness for operations on a day's notice. Recent additional furnace capacity has been for steel mill purposes. One maker booked 1,200 tons in lots from car loads to 300 tons in a day. Consumers are clamoring for prompt delivery

and tracers are sent on slightest delay. There are six active merchant furnaces in Alabama now, seven on basic and two on charcoal. There have been several sales of charcoal iron.

We quote per gross ton f.o.b. Birmingham district furnaces as follows:

Foundry, silicon 1.75 to 2.25.....	\$15.50
Basic.....	14.50
Charcoal, warm blast.....	32.00

Finishing Mills.—The Tennessee company is continuing full turn at the Ensley ingot mill this week and, following the blowing in of Ensley No. 4, it has just blown in Alice furnace in Birmingham. This gives it six stacks producing basic iron. All finishing mills are going this week with the exception of the plate mill at Fairfield, but the plate mill at Bessemer is in operation. The rail mill is again on a schedule of 10,000 tons. Wire drawing mills of the American Steel & Wire Co. and Gulf States Steel Co. are at about the capacity of last November, which ranged around 60 per cent. New wire drawing business is coming in well with wire fencing again in demand. Structural steel has become active. The Ingalls Iron Works made unusually large bookings in January for Florida, Louisiana, Georgia and Alabama. Export structural steel is picking up and orders are being figured on.

Cast Iron Pipe.—High pressure pipe makers are receiving a steady inflow of new business with prices firm at \$33. The National Cast Iron Pipe Co. and American Cast Iron Pipe Co. booked additional orders for the West. Sanitary pipe makers report jobbers as still reluctant to place business, but expect an early change of front. Base remains at \$37 for standard.

Coal and Coke.—Coal production has risen from an average of 225,000 to 260,000 tons a week following furnace resumption and increased railroad traffic. Some consumers are laying in extra stocks as protection against labor troubles and advances in price for spot coal. Steam coal averages \$1.90 per ton, but as low as \$1.50 is heard of. Coke is in acute demand and operations are increasing. The price is held firmly at \$5.

Old Material.—Yards are about out of cast scrap owing to recent active demand. Three thousand tons of No. 1 steel are reported to have sold at as low as \$9.50, but usual yard man will not sell under quoted price. Scrap is making a turn for the better with cast strong.

We quote per gross ton f.o.b. Birmingham district yards as follows:

Steel rails.....	\$11.00 to	\$12.00
No. 1 steel.....	10.00 to	11.00
No. 1 cast.....	14.00 to	15.00
Car wheels.....	13.00 to	14.00
Tramcar wheels.....	12.00 to	13.00
No. 1 wrought.....	12.00 to	13.00
Stove plate.....	11.00 to	12.00
Cast iron borings.....	6.00 to	7.00
Machine shop turnings.....	6.00 to	7.00

Boston

BOSTON, March 7.

Pig Iron.—One Buffalo furnace took practically all of the business offered in this territory last week, including three round tonnage lots. The Portland Stove Co., Portland, Me., inquiry for 50 to 150 tons of No. 2X is the only one made general last week that remains uncovered. That company has enough iron on hand to last through the summer and is in no hurry to buy. The Draper Co., Hopedale, Mass., bought 1000 tons No. 1X and a small tonnage of charcoal iron; the General Fire Extinguisher Co., Providence, R. I., 600 tons No. 1X and 300 tons No. 2X; the Gurney Heater Co., Framingham, Mass., 1000 tons No. 2X; the Old Colony Foundry, Bridgewater, Mass., 200 tons No. 1X, and several other Massachusetts foundries smaller amounts. No. 2 plain Buffalo iron sold on a basis of \$18 furnace, No. 2X at \$18 and \$18.25 furnace, and No. 1X at \$18 and \$18.25. The same furnace expects to close on 500 tons of No. 2X to-day with a Massachusetts foundry. The cleaning up of available business last week has left the market in a firmer position. The Buffalo market is now generally established on a \$18.50 furnace basis. Eastern Pennsylvania furnace interests heretofore offering iron in competition with \$18 Buffalo have withdrawn competitive quotations, and with other furnaces

in its district are quoting on a basis of \$20, \$20.50 and \$21 furnace, respectively, for No. 2 plain, No. 2X and No. 1X. Other sales for the week include two one-car and one 100-ton lot of Low charcoal to Massachusetts foundries at \$22.50 furnace, and 45 tons of malleable at \$18 furnace to a Massachusetts melter. The only large prospective customer is the H. B. Smith Co., Westfield, Mass., heating appliances. That company possibly will not buy, however, until it has made a new wage scale with its molders.

We quote delivered at common New England points as follows, having added to furnace prices \$4.06 freight from eastern Pennsylvania, \$5.46 from Buffalo, \$6.58 from Virginia and \$10.66 from Alabama:

East Penn., sil. 2.25 to 2.75.....	\$24.56 to \$25.16
East Penn., sil. 1.75 to 2.25.....	24.06 to 24.56
Buffalo, sil. 2.25 to 2.75.....	23.90 to 24.40
Buffalo, sil. 1.75 to 2.25.....	23.90
Virginia, sil. 2.25 to 2.75.....	29.58
Virginia, sil. 1.75 to 2.25.....	29.08
Alabama, sil. 2.25 to 2.75.....	26.66
Alabama, sil. 1.75 to 2.25.....	26.16

Ferromanganese.—Numerous small lots of ferromanganese, manganese 76 to 80, were sold in this territory the past week on a basis of \$70 furnace, the market showing more life than it has before in months. A small yet unusual consignment was received in Boston this week. It consisted of 25 tons of British ferromanganese, delivered direct by steamer to local pig iron interests, which sold the material two months ago.

Old Material.—Although not very active, the old material market is more so than it has been before in some time. Sales of heavy melting steel were made this week to Johnstown, Pittsburgh and other Pennsylvania mill interests at \$14 to \$15 and in some cases \$15.50 a ton delivered, or \$8.50 to \$9 New England shipping point, which represents an advance of 50c. Sales of turnings were made to a West Virginia steel mill and to a Pennsylvania rolling mill on a basis of \$4.50 to \$5 New England shipping point, and a round tonnage of skeleton was sold to New York State interests at \$10 delivered. There also has been good buying of chemical borings, shippers in a few instances paying as high as \$10 shipping point. Most lots, however, sold at \$9 to \$9.50. New England foundries continue to show indifference toward the machinery cast market. One Taunton, Mass., stove maker this week bought 200 tons No. 1 textile cast, and still another 100 tons at about 75c. per 100 lb., or \$16.80 delivered, which is considerably below the heretofore recognized range of delivered quotations.

The following prices are for gross ton lots delivered consuming points:

No. 1 machinery.....	\$17.00 to \$17.50
No. 2 machinery.....	15.00 to 15.50
Stove plate.....	14.50 to 15.00
Railroad malleable.....	13.00 to 13.50

The following prices are offered per gross ton lots f.o.b. Boston rate shipping points:

No. 1 heavy melting steel.....	\$8.50 to \$9.00
No. 1 railroad wrought.....	10.50 to 11.00
No. 1 yard wrought.....	9.50 to 10.00
Wrought pipe (1 in. in diam., over 2 ft. long).....	7.00 to 7.25
Machine shop turnings.....	4.50 to 5.00
Cast iron borings, rolling mill.....	8.50 to 9.00
Cast iron borings, chemical.....	9.00 to 9.50
Blast furnace borings and turnings.....	4.50 to 4.75
Forged scrap and bundled skeleton.....	4.00 to 4.50
Street car axles.....	11.50 to 12.00
Shafting.....	12.00 to 13.00
Car wheels.....	11.00 to 11.50
Rerolling rails.....	8.50 to 9.00

A preliminary injunction in accordance with the restraining order issued recently was granted by Judge Cochran in the Federal Court at Maysville, Ky., against the strikers at the plant of the Andrews Steel Co. in Newport, Ky. The injunction prohibits any of the defendants from assembling or congregating in the proximity of the plant and until further orders of the court members of the union are enjoined from maintaining any pickets at or near the plant.

Realizing that most libraries do not index pamphlets, the Bureau of Standards has adopted the plan of constituting its technologic papers into volumes, with pages consecutively numbered. To cover the first 202, which have already been issued, 15 volumes have been allotted. Beginning with No. 203 the sixteenth volume will be started. This will prevent the utter loss of reference value which otherwise accompanies unindexed pamphlets in libraries.

New York

New York, March 7.

Pig Iron.—Buying of pig iron has continued in a very active way during the past week, and sales made by New York agencies amounted to about 20,000 tons of various grades, of which 15,000 tons was by one firm. One transaction of a considerable tonnage about which details are not available was involved, but most of the buying was of moderate tonnages. In the past two or three days, no large inquiries have developed. A number of buyers are in the market for from 100 to 1000 tons, including a fair tonnage of malleable. The usual quotation on No. 2 plain, eastern Pennsylvania, is \$20 and 50c. higher on No. 2 X and \$1 higher for No. 1, but these prices have been shaded as much as \$1, and at Buffalo \$18 can still be done. Strike has been declared in a number of foundries in Brooklyn and Long Island City on account of a reduction of wages of molders from \$6.50 for an 8-hr. day to \$6 and melt has been greatly reduced. Despite reports that the contracts have been awarded for the segments for the vehicular tunnel by the general contractors, Booth & Flinn, Inc., this action has not been taken. The situation is still complicated by New Jersey politicians and the effort of the legislature to legislate the New Jersey Tunnel Commission out of existence. There are also some complications in regard to the occupation of certain streets needed by the commission for entrances and exits.

We quote delivered in the New York district as follows, having added to furnace prices \$2.52 freight from eastern Pennsylvania, \$5.46 from Buffalo and \$6.16 from Virginia:

East. Pa. No. 1 fdy., sil. 2.75 to 3.25.....	\$22.52 to \$23.02
East. Pa. No. 2X fdy., sil. 2.25 to 2.75.....	22.02 to 22.52
East. Pa. No. 2 fdy., sil. 1.75 to 2.25.....	21.52 to 22.02
Buffalo, sil. 1.75 to 2.25.....	23.46 to 23.71
No. 2 Virginia, sil. 1.75 to 2.25.....	28.16

Coke.—Coke continues active, and marked scarcity has developed through the extraordinary demand attributed to the fear of the strike in the coal regions. Prompt furnace coke is now quoted at \$3.75, furnace, and foundry grades at \$4.50 to \$4.75. Deliveries are not as prompt as they were a short time ago. By-product coke is quoted at \$8.59 delivered to points on the Pennsylvania, Erie and Lackawanna railroads, and \$9.15 on the Central of New Jersey.

Ferroalloys.—The ferromanganese market is quiet with sales confined to carload lots. There is an inquiry for 1000 tons for delivery over the rest of the year and also one for 500 tons. There has been no change in prices, which continue firm. Spiegeleisen continues scarce and sales and inquiries are moderately active. In February more spiegeleisen was made than in any month since July, blast furnace returns on another page showing 4930 tons having been the output. Only 3610 tons of ferromanganese was made last month, one of the smallest outputs in several months. There is no interest in manganese ore and quotations are nominal. The 60 per cent ferrosilicon market is moderately active with prices unchanged. Quotations are as follows:

Ferroalloys

Ferromanganese, domestic, seaboard, per ton..	\$62.50
Ferromanganese, British, seaboard, per ton..	\$62.50
Spiegeleisen, 16 to 19 per cent, furnace, per ton..	\$30.00
Ferrosilicon, 50 per cent, delivered, per ton..	\$55.00 to \$60.00
Ferrotungsten, per lb. of contained metal..	40c. to 50c.
Ferrochromium, 6 to 8 per cent carbon, 60 to 70 per cent Cr., per lb. Cr., delivered..	12c. to 14c.
Ferrovandium, per lb. of contained vanadium..	\$4.00

Ores

Manganese ore, foreign, per unit, seaboard..	25c. to 26c.
Tungsten ore, per unit, in 60 per cent concentrates.....	\$2.00 up
Chrome ore, 40 to 45 per cent Cr ₂ O ₃ , crude, per net ton, Atlantic seaboard.....	\$20.00 to \$25.00
Chrome ore, 45 to 50 per cent Cr ₂ O ₃ , crude, per net ton, Atlantic seaboard.....	\$25.00 to \$27.00
Molybdenum ore, 85 per cent concentrates, per lb. of MoS ₂ , New York.....	50c. to 60c.

Finished Iron and Steel.—The leading Pittsburgh independent, which has conducted a country-wide drive for business in the past two or three weeks, has booked sufficient orders to operate its plants at about 60 per cent during March and April and has advanced its prices on heavy tonnage products to 150c., Pittsburgh.

The only exception will be on quotations on which protection had been given for a definite period, such as export tonnages, and the ordinary everyday wants of its regular trade. Steel companies which have met the 1.30c. prices obtaining in certain instances rather than lose the business of regular customers, welcome the firmer appearance of prices, but it is too early to determine whether the chaotic price situation will be immediately remedied. Whether it is still possible to buy plates, shapes and bars at the low prices which were in effect last week, about 1.25c. for export and 1.30c. for domestic trade, is not entirely clear. Another factor which may tend to stiffen prices is the expectation of a coal miners' strike on April 1. As no prospective settlement of the differences between the operators and the workmen has yet appeared, the steel trade grows more apprehensive that the strike may actually be called. The New York Central opened bids last week on 23,000 tons of fabricated steel for the proposed bridge across the Hudson River at Castleton, N. Y. The Bethlehem Steel Bridge Corporation was the low bidder, its price being \$68.60, fabricated and erected. Inquiry for structural steel continues to show some gain. Among the new projects are the following: Addition for National Bank of Commerce, Norfolk, Va., 500 tons; department store, Richmond, Va., 3000 tons; addition to car inspection sheds of Boston Elevated, Boston, 300 tons. Jobs awarded include the following: New York Cotton Exchange Building, 3200 tons, to American Bridge Co.; addition to Thalheimer department store, Richmond, Va., 300 tons, to Richmond Structural Steel Co.; work for American Sugar Refining Co., Baltimore, Md., 170 tons, to McClintic-Marshall Co. Business has improved slightly in the past week. This not only applies to domestic but also to export trade. Bar iron is now quoted at 1.35c., Pittsburgh, by some Eastern mills, a further concession of \$1 a ton. Sheets continue firm. Tin plate can still be bought at \$4.60, with occasional large lots going at \$4.50. Wire products are unchanged.

We quote for mill shipments, New York, as follows: Soft steel bars, 1.73c. to 1.78c.; plates, 1.73c. to 1.78c.; structural shapes, 1.73c. to 1.78c.; bar iron, 1.73c. to 1.88c. On export shipments the freight rate is 28.5c. per 100 lb. and the domestic rate 38c.

Warehouse Business.—Prices in the New York district are slightly weaker on most items, although official asking prices are unchanged. Undoubtedly warehouse prices here have been affected by the lower mill quotations now current and the recent weakness that prevailed for a brief period in the Philadelphia market. One Brooklyn warehouse, while maintaining current quotations, offers quantity reductions as follows: For 20,000 lb. or more, 13c. per 100 lb. off list price; 10,000 lb. or more, 10c. off list; and 5000 lb. or more, 5c. off list. On lots of 1000 to 2000 lb. an extra charge of 5c. per 100 lb. is made; on lots of 500 to 1000 lb., 10c. is made and on less than 500 lb. lots the charge per 100 lb. is 25c. Quotations on wrought iron and steel pipe are unchanged, but the market is weak and little new business is noted. Among brass and copper warehouses, business is generally active in materials involved in spring building operations, such as roofing, screening, etc. Recently there has been considerable business transacted with manufacturers of radio telephones. We quote prices on page 706.

High Speed Steel.—The market continues quiet and prices weak. A fair estimate of the present market is from 75c. to 85c. per lb. for 18 per cent tungsten high speed steel with prices on special brands of some companies ranging up to as high as \$1.05 per lb.

Cast Iron Pipe.—This market is extremely strong and increased operations are quite generally reported. There is noteworthy activity on the part of private purchases and the average number of municipal purchases. Bids will be opened March 9, by the Department of Water Supply, Gas and Electricity in New York, on 900 tons of 12-in. to 30-in. cast iron pipe. These bids are by contractors and call for the pipe installed. The 1200 tons of 12-in. to 24-in. cast-iron pipe for the Newburgh Water Department, Newburgh, N. Y., was awarded to the Warren Foundry & Machine Co. We quote per net ton, f.o.b. New York, carload lots, as fol-

lows: 6-in. and larger, \$47.30; 4-in. and 5-in., \$52.30; 3-in., \$62.30, with \$4 additional for Class A and gas pipe.

Old Material.—The general improvement in prices and feeling, manifest for the past fortnight or more, continues and is, if anything, stronger. Practically all steel mills show a greater interest in buying and are less inclined to hold to low prices in their offers. In many instances of late, sales prices have not kept pace with the increase in buying prices. It is reported that some sales have been consummated on delivered prices, which left no room for profit. No. 1 heavy melting steel shows another increase of about 50c. per ton, \$8.50 to \$9 now being a fair estimate of the market. The average buying price to-day is probably about \$8.85 per ton, with some dealers going as high as \$9. Iron and steel pipe, 1 in. in diameter, not under 2 ft. long, seems fairly stationary at \$8.30 per ton, but a fair average of current buying is \$8 to \$8.25 per ton. The Midvale Steel & Ordnance Co., which was in the market about 10 days ago for forge fire, specifying light drop forge trimmings and bundled cotton ties and offering up to \$10.50, is believed to have purchased a small tonnage, but at a lower price.

Buying prices per gross ton, New York, follow:		
Heavy melting steel, yard.....	\$8.50 to	\$9.00
Steel rails, short lengths, or equivalent.....	8.50 to	9.00
Re-rolling rails.....	9.25 to	9.75
Relaying rails, nominal.....	27.00 to	29.00
Steel car axles.....	10.00 to	10.50
Iron car axles.....	17.50 to	18.50
No. 1 railroad wrought.....	9.50 to	10.00
Wrought iron track.....	8.50 to	9.00
Forge fire.....	4.75 to	5.25
No. 1 yard wrought, long.....	9.00 to	9.50
Cast borings (clean).....	7.00 to	7.50
Machine-shop turnings.....	5.25 to	5.75
Mixed borings and turnings.....	5.00 to	5.50
Iron and steel pipe (1 in. diam., not under 2 ft. long).....	7.75 to	8.25
Stove plate.....	10.50 to	11.00
Locomotive grate bars.....	9.50 to	10.00
Malleable cast (railroad).....	8.00 to	8.50
Cast-iron car wheels.....	10.50 to	11.00
Prices which dealers in New York and Brooklyn are quoting to local foundries, per gross ton, follow:		
No. 1 machinery cast.....	\$16.50 to	\$17.00
No. 1 heavy cast (columns, building materials, etc.), cupola size.....	15.50 to	16.00
No. 1 heavy cast, not cupola size.....	15.00 to	15.50
No. 2 cast (radiators, cast boilers, etc.).....	10.00 to	10.50

Cincinnati

CINCINNATI, March 7.

Pig Iron.—Several fair-sized tonnages were sold during the week, the largest being for 4000 tons taken by a West Virginia melter on the basis of \$19, southern Ohio furnace. A southern Ohio melter bought a round tonnage of Southern iron on the basis of \$15, Birmingham. Two sales of Northern iron, of 500 tons each, were made to central Ohio melters at \$18.50, Iron-ton, and an Indiana melter bought 100 tons from a lake furnace at a similar figure. A southern Ohio stove manufacturer purchased 150 tons of southern Ohio iron at \$19, base, and a number of carload orders were also booked at the same figure. There is very little inquiry, the largest being from a Tennessee melter for 1000 tons. Another Tennessee melter is inquiring for 100 tons, and a Cincinnati foundry wants a similar amount. Several inquiries mentioned in last report are still outstanding. Prices are on an average 50c. lower than last week. Southern Ohio iron is now quoted at \$18.50 to \$19, Iron-ton, and Southern iron at \$15 to \$15.50. Birmingham. The higher price on Northern iron is quoted where the furnace has a freight advantage, but in competitive territory the lower price prevails. On Southern iron \$15 can be done on round tonnages, though several furnaces are holding to \$15.50. Sarah furnace in southern Ohio will blow out shortly, and it is expected that Belfont will be blown in towards the latter part of the month.

Based on freight rates of \$4.50 from Birmingham and \$2.52 from Iron-ton, we quote f.o.b. Cincinnati:

Southern coke, sil. 1.75 to 2.25 (base).....	\$19.50 to	\$20.00
Southern coke, sil. 2.25 to 2.75 (No. 2 soft).....	20.00 to	20.50
Ohio silvery, 8 per cent sil.....	30.02	
Southern Ohio coke, sil. 1.75 to 2.25 (No. 2).....	21.02 to	21.52
Basic, Northern.....	21.02	
Malleable.....	21.52 to	22.02

Finished Material.—A steady improvement is reported in the demand for finished materials, sheets probably being the leader. Practically all of the orders booked are for immediate shipment and while some mills have opened their books for second quarter, very few orders are being placed for that delivery. Prices show very little change, 1.40c. being the ruling price on bars, shapes and plates, although it is said that an attractive tonnage could be placed at 1.35c. There appears to be a stiffening of prices in the wire market and while some weeks ago wire nails were available at less than \$2.40, Pittsburgh, this price now appears to be the minimum. A nearby jobber has an inquiry out for 3000 kegs of wire nails, and it is said that he was unable to develop a lower price than \$2.40 Pittsburgh. Barbed wire and woven wire fencing are in fair demand and some few carload orders were booked during the week. Reinforcing bars are also fairly active, as some building projects involving small tonnages are up for bids. In the structural field the only award of consequence was 100 tons for the Federal Reserve Bank building at Nashville, Tenn., the contract going to the Nashville Bridge Co. The Willing Co., Bellevue, Ohio, has been awarded the contract for the construction of a high school at Middletown, Ohio, involving about 200 tons of structural steel and 400 tons of bars. The only new inquiry of consequence is for a highway bridge in Mississippi, taking 400 tons. Bids closed March 1 for the Business Men's Club, Cincinnati, the Wilde Bank building at Indianapolis, and the Indianapolis Athletic Club building, but no information has been given out as to the result of the bidding. The Big Four on Feb. 27 closed bids for 81,200 tie plates, but, so far as reported, no award has yet been made. On this inquiry the Lundie Engineering Co. quoted \$37 per ton f.o.b. Indiana Harbor for open-hearth tie plates and \$40 per ton for 25 per cent copper. The Wheeling Steel Products Co. quoted \$35.40 per ton, f.o.b. Cincinnati, with \$3 additional for copper. The Illinois Steel Co. quoted \$35.10, f.o.b. Kankakee; the Cambria Steel Co., \$35.20, f.o.b. Cleveland; the Inland Steel Co., \$35, f.o.b. Blue Island; the Railroad Supply Co., \$34, f.o.b. Chicago; the Dilworth-Porter Co., \$37.80, f.o.b. Cleveland; the Inter-State Iron & Steel Co., \$38, f.o.b. East Chicago. Several fairly large inquiries for tin plate are now being figured on and it is expected that these will be closed within the next week or so.

Plant Operations.—Plant operations will show a slight gain during the week. The American Rolling Mill Co. is operating both plants at Middletown at capacity. The Newport Rolling Mill Co. will put on three additional mills, making a total of seven. The Andrews Steel Co. is preparing to resume operations and it is likely it will be running approximately 50 per cent of capacity within the next two weeks. Three open hearths and 10 sheet mills are in operation at the Whitaker-Glessner plant at Portsmouth, Ohio, and the Ashland division of the American Rolling Mill Co. will have two open hearths and its blooming mill in operation.

Old Material.—Scrap dealers report an increased inquiry from foundries, many of which have not bought for a year. More inquiry for steel scrap is also reported from Valley points, but the local market continues quiet. Prices are stronger, and dealers have advanced bundled sheets, heavy melting steel, steel rails for melting, railroad wrought, borings and turnings, machinery cast and iron axles fifty cents a ton.

We quote dealers' buying prices, f.o.b. cars:

Per Gross Ton	
Bundled sheets	\$4.00 to \$4.50
Iron rails	11.50 to 12.00
Relaying rails, 50 lb. and up	24.50 to 25.00
Re-rolling steel rails	10.00 to 10.50
Heavy melting steel	9.00 to 9.50
Steel rails for melting	9.00 to 9.50
Car wheels	11.50 to 12.50

Per Net Ton	
No. 1 railroad wrought	8.50 to 9.00
Cast borings	3.50 to 4.00
Steel turnings	2.30 to 3.00
Railroad cast	11.50 to 12.00
No. 1 machinery	13.50 to 14.00
Burnt scrap	7.00 to 7.50
Iron axles	15.50 to 16.00
Locomotive tires (smooth inside)	9.00 to 9.50
Pipes and flues	3.50 to 4.00

Warehouse Business.—Local jobbers report a very

fair week both as to the number of orders and the tonnage. Reinforcing bars continue as a leader, although there is also a fair demand for shapes and wire products. Cold-rolled steel is unusually quiet. No price changes have been made and jobbers continue to quote:

Iron and steel bars, 2.75c. base; hoops and bands, 3.35c. base; shapes and plates, 2.85c. base; reinforcing bars, 2.82½c. base; cold rolled rounds, 1½ in. and larger, 3.50c. base; under 1½ in. and flats, squares and hexagons, 4c.; No. 10 blue annealed sheets, 3.60c.; No. 28 black sheets, 4.25c.; No. 28 galvanized sheets, 5.25c.; wire nails, \$2.75 per keg base; No. 9 annealed wire, \$2.60 per 100 lb.

Coke.—The coke market is not so active though prices are inclined to stiffen. Connellsville furnace coke is now quoted at \$3.50, ovens, and foundry at \$4.25 to \$4.75. Wise County coke is also up 25c. a ton, furnace, being quoted at \$4.25 to \$4.50 and foundry at \$5.25 to \$5.50. New River is firm at \$7.50.

St. Louis

ST. LOUIS, March 7.

Pig Iron.—The pig iron market has shown more activity the last week than at any time this year. There has been more buying and inquiries have been more plentiful. Carloads and up to 100 tons have formed the bulk of the business, but some good sized orders have been placed and are pending. The market for Northern iron is firm at \$20, Chicago, that price being well established. Southern iron is being sold at \$15 to \$16 Birmingham, the latter price being made by a producer who has been selling on a basis of \$16 Sheffield, which has a freight rate of 80c. a ton less than Birmingham. This concern has thus virtually withdrawn its water and rail quotation temporarily. A few more sales were made the last week on the basis of \$19.44 St. Louis for water and rail shipment from Sheffield, and while it produced about all the business to be had here, that all was rather disappointing to the Sheffield interests that made the combination rate, being about 2000 tons. In Northern iron local interests bought 500 tons of basic and 1000 tons of foundry. Another sale of 150 tons of malleable was made locally, and several western Missouri and eastern Kansas melters bought carloads up to 150 tons of foundry iron. A Pacific Coast melter bought 100 tons here. There is an inquiry pending for 1000 to 2000 tons of malleable for a Mississippi River melter. A Pacific Coast melter wants 1000 tons and a Missouri interest is in the market for 2000 tons of foundry iron. A central Illinois melter is in the market for 500 tons, a Kansas melter wants 400 tons and a local melter wants 300 tons, and there are two inquiries for 500 to 1000 tons each from two Indiana foundries. An Atchison, Kan., melter is in the market for 500 tons of foundry iron. Two cars of 80 per cent ferromanganese were sold this week on the basis of \$62.50 New Orleans, and the Commonwealth Steel Co. wants a car of 12 to 13 per cent ferrosilicon.

We quote delivered consumers' yards, St. Louis, as follows, having added to furnace prices \$2.80 freight from Chicago and \$5.74 from Birmingham:

Northern foundry, sil. 1.75 to 2.25..	\$22.80
Northern malleable, sil. 1.75 to 2.25..	22.80
Basic	22.80
Southern foundry, all rail, sil. 1.75 to 2.25	20.74 to 21.74

Finished Iron and Steel.—The demand for finished iron and steel products is improving, one concern reporting the best week for many months. Several carloads of reinforcing bars were sold to jobbers, and local fabricators bought some structural steel on the basis of \$1.40 Pittsburgh. There still is very little being done locally in the structural field because of the failure of labor and the master builders to get together on a wage adjustment. Interest is being shown here in the Indianapolis Athletic Club, involving 1500 to 1600 tons of structural steel, of which Roberts, Frost & Daggett of that city are the architects. Bids will be opened April 15 for the Fort Madison, Iowa, school to cost \$265,000. The railroads are entering the market again. The Missouri Pacific Railroad, which last week bought 20,000 tons of rails, made a purchase this week of 1250 kegs of track bolts and 2200 kegs of track spikes. Owing to an error of the telegraph operator, the rail tonnage was reported as 200,000 in THE IRON AGE of March 2. The Wabash Railroad is

in the market for 160,000 tie plates for 70, 80 and 90 lb. rails, and the Missouri, Kansas & Texas Railroad wants 350,000 tie plates for from 56 to 80-lb. rails.

For stock out of warehouse we quote: Soft steel bars, 2.62½c. per lb.; iron bars, 2.62½c.; structural shapes, 2.72½c.; tank plates, 2.72½c.; No. 10 blue annealed sheets, 3.47½c.; No. 28 black sheets, cold rolled, one pass, 4.15c.; cold drawn rounds, shafting and screw stock, 3.65c.; structural rivets, \$3.52½ per 100 lb.; boiler rivets, \$3.62½; tank rivets, 7/16-in. and smaller, 65 and 5 per cent off list; machine bolts, large, 60-10 per cent; small, 60, 10 and 10 per cent; carriage bolts, large, 55-5 per cent; small, 60 and 10 per cent; lag screws, 65-15 per cent; hot pressed nuts, square or hexagon blank, \$4; and tapped, \$3.75 off list.

Coke.—The market for coke is showing more activity, although most of the buying is for from a carload up to 125 tons. The most favorable feature is the increase in shipping specifications against contracts, especially among manufacturers of water gas. Foundries, too, are buying more freely, although the fear of a coal strike has not produced any very heavy buying.

Old Material.—The market for old material looks brighter, and there is a somewhat more bullish feeling among the dealers, a condition due to one of the large consumers having sent a representative on a tour of inspection to all the yards in the district looking for special grades of heavy melting steel; consequently the dealers are absorbing all railroad offerings at advancing prices. While the consensus of opinion is that better prices are just ahead, still, due to lack of actual buying by consumers, most of the grades remain at present quotations, the only exceptions being a few special items. The only railroad offering before the market is a list issued by the Pennsylvania—Southwestern region—calling for about 4000 tons.

We quote dealers' prices f.o.b. consumers' works, St. Louis industrial district and dealers' yards, as follows:

Per Gross Ton

Old iron rails.....	\$14.00 to \$14.50
Steel rails, rerolling.....	11.00 to 11.50
Steel rails, less than 3 ft.....	12.50 to 13.00
Relaying rails, standard section.....	23.00 to 28.00
Cast iron car wheels.....	13.50 to 14.00
No. 1 heavy railroad melting steel.....	10.00 to 10.50
No. 1 heavy shoveling steel.....	9.75 to 10.00
Ordinary shoveling steel.....	9.50 to 10.00
Frogs, switches and guards, cut apart.....	10.00 to 10.50
Ordinary bundle sheet.....	4.00 to 4.50
Cast steel bolsters.....	10.50 to 11.00

Per Net Ton

Heavy axles and tire turnings.....	6.00 to 6.50
Iron angle bars.....	13.00 to 13.50
Steel angle bars.....	9.00 to 9.50
Iron car axles.....	18.00 to 18.50
Steel car axles.....	12.50 to 13.00
Wrought iron arch bars and transoms.....	15.00 to 15.50
No. 1 railroad wrought.....	9.50 to 10.00
No. 2 railroad wrought.....	8.50 to 9.00
Railroad springs.....	11.00 to 11.50
Steel couplers and knuckles.....	11.00 to 11.50
Locomotive tires, 42 in. and over, smooth inside.....	8.00 to 8.50
No. 1 dealers' forge.....	8.00 to 8.50
Cast iron borings.....	3.50 to 6.00
No. 1 busheling.....	8.50 to 9.00
No. 1 boilers cut in sheets and rings.....	6.00 to 6.50
No. 1 railroad cast.....	13.50 to 14.00
Stove plate and light cast.....	11.50 to 12.00
Railroad malleable.....	9.50 to 10.00
Agricultural malleable.....	9.50 to 10.00
Pipes and flues.....	7.50 to 8.00
Heavy railroad sheet and tank.....	5.50 to 6.00
Light railroad sheet.....	3.50 to 4.00
Railroad grate bars.....	10.00 to 10.50
Machine shop turnings.....	3.00 to 3.50
Country mixed iron.....	6.00 to 6.50
Uncut railroad mixed.....	7.00 to 7.50
Horseshoes.....	9.50 to 10.00
Railroad brake shoes.....	9.50 to 10.00

The "Boost Bridgeport" committee of the Chamber of Commerce of Bridgeport, Conn., is contemplating the erection of a large loft building in the very near future for use of the small manufacturing industries which do not need, or cannot afford, buildings and plants of their own.

United States Civil Service examinations are to be held for information assistants under the Federal Board for Vocational Education. Salaries offered range from \$2,400 to \$3,600. Applications must be filed with the Commission at Washington on or before March 28.

Philadelphia

PHILADELPHIA, March 7.

The Jones & Laughlin Steel Co. to-day notified its customers in this district of an advance in prices on plates, shapes and bars to 1.50c., Pittsburgh, effective immediately. This action comes as an aftermath to two or three weeks of extremely low prices, during which time orders were taken at 1.30c., Pittsburgh, and in one or two instances at even lower figures. It is understood that all low quotations have been withdrawn except where protection was given for a specified period. The Jones & Laughlin Steel Co. is reported to have booked sufficient tonnage for two months' operation at 60 per cent of capacity and fear of a coal strike on April 1 brought about a cessation of its aggressive selling policy of the past few weeks. The local sales office of the Carnegie Steel Co. has also notified some of its customers of a prospective advance to 1.50c., Pittsburgh, on plates, shapes and bars, but it is not understood that this announcement has yet been officially made at the Pittsburgh headquarters of the company.

As a result of these advances, other steel companies are adopting a little firmer attitude on prices and before the week ends steel prices generally, it is predicted, may stiffen considerably. To-day, however, it appeared that orders for plates, shapes and bars could still be placed with some makers at 1.35c., Pittsburgh, though indications were that buyers would not find it easy to do 1.30c. even on very attractive business.

Pig iron prices have also stiffened. Three Eastern furnace interests which made a drive for business week before last at \$19 for No. 2 plain and \$19.50 for No. 2X, furnace, have advanced quotations to \$20 and \$20.50, but it is still possible to buy No. 2 plain at \$19.50, furnace, and No. 2X at \$20.

Steel plant operations show a slight increase. The Cambria works of the Midvale Steel & Ordnance Co. will put on two blast furnaces within 10 days, making five out of 11 in operation. The Bessemer steel works will also be started at the same time.

There has been a general advance in prices on old material, due mostly to higher prices and more active buying at Pittsburgh.

Pig Iron.—Three eastern Pennsylvania blast furnace interests, which lowered their prices \$1 a ton on foundry grades week before last in a drive for business which netted a total of 50,000 to 60,000 tons, have advanced their quotations \$1 and are now quoting \$20, furnace, for No. 2 plain and \$20.50 for No. 2X. It is still possible, however, to buy No. 2 plain at \$19.50 and No. 2X at \$20, furnace. Considerable business was closed during the past week at the low prices, principally in the New York district, but to-day the three leading sellers were firmly quoting the higher prices. Most all of the available business seems to have been closed and current inquiries are mostly for small lots for immediate shipment. The tonnage which has been put on furnace books within the past two weeks was not all for early shipment, some of it running throughout second quarter. However, the furnaces are fairly well off for this month and their attitude at present is to await developments in the threatened coal strike set for April 1. A small tonnage of malleable iron has been sold by an eastern Pennsylvania furnace at \$22, furnace. Low phosphorus iron is inactive and prices are unchanged. There is no demand for basic.

The following quotations are, with the exception of those on low phosphorus iron, for delivery at Philadelphia, and include freight rates varying from 84 cents to \$1.54 per gross ton.

East. Pa. No. 2 plain, 1.75 to 2.25 sil.....	\$20.76 to \$21.26
East. Pa. No. 2X, 2.25 to 2.75 sil.....	21.26 to 21.76
Virginia No. 2 plain, 1.75 to 2.25 sil.....	20.24 to 20.74
Virginia No. 2X, 2.25 to 2.75 sil.....	21.24 to 21.74
Basic delivery eastern Pa.....	19.84
Gray forge.....	20.50 to 21.00
Malleable.....	22.50 to 24.00
Standard low phos. (f.o.b. furnace)...	30.00
Copper bearing low phos. (f.o.b. furnace).....	28.00

Ferroalloys.—Very little ferromanganese has been sold in the past week. There is practically no business in the British alloy, as sales are subject to increase in the duty. Prices remain at \$62.50, seaboard, for both

domestic and imported. Spiegeleisen is nominally held at \$30, furnace, for the 16 to 19 per cent.

Semi-Finished Steel.—Only occasional sales of billets are being made, prevailing prices being \$28, Pittsburgh, for rerolling and \$32 for forging quality, with \$1 a ton higher for small lots. Sheet bars are quoted at \$29, Pittsburgh, but \$28 could undoubtedly be done on an attractive tonnage.

Plates.—The price situation on plates to-day appeared somewhat firmer due to the advance to 1.50c., Pittsburgh, by the Jones & Laughlin Steel Co. and the indication that the Carnegie Steel Co. would also announce the same quotation. While it appeared more difficult to place plate orders at 1.30c., Pittsburgh, at which business has been done in the past two or three weeks, it was possible to-day to obtain quotations of 1.35c. Just to what extent other mills will follow the advance to 1.50c. remains to be seen, but it is predicted that quotations below 1.35c. and possibly below 1.40c., Pittsburgh, may entirely disappear before the end of the week. All sellers are not sanguine, however, that a marked improvement in the price situation will immediately result. Eastern plate mills are operating at a slightly better rate. The Standard Oil Co. is reported to have placed 1000 tons for its Bayway, N. J., plant. The Norfolk & Western Railroad has issued an inquiry for 2000 to 4000 70-ton steel freight cars. The Delaware, Lackawanna & Western Railroad has divided 985 cars for repair between the American Car & Foundry Co. and the Magor Car Corporation. The Baltimore & Ohio has withdrawn its inquiry for 50 passenger, mail and baggage coaches because of inability to obtain deliveries in time for the summer excursion traffic. We quote sheared and universal plates at 1.35c. to 1.40c., Pittsburgh.

Structural Material.—Steel for the new Philadelphia public library, amounting to 4300 tons, is reported to have been placed with the American Bridge Co. Considerable new work is being talked of, but most of it is still in the estimating stage. Structural shapes are possibly a trifle firmer in price, but the market can still be quoted at not over 1.35c. to 1.40c., Pittsburgh.

Bars.—Orders for steel bars continue in fair volume, with most of the business being taken at not more than 1.35c., Pittsburgh. Bar iron is now available at the same figure, but business is extremely limited.

Old Material.—Although scrap business in the East has not materially increased, greater activity and higher prices in the Pittsburgh district have given this market a much firmer tone. Such sales as have been made in eastern Pennsylvania are at advancing prices and the market this week is about 50c. a ton higher on nearly all grades. The Bethlehem Steel Co. has paid \$13.50, delivered Steelton, Pa., but at steel plants nearer to Philadelphia steel scrap has been offered as low as \$12, delivered. The steel scrap on the recent list of the Pennsylvania Railroad is reported to have been sold at \$14.60, delivered at western Pennsylvania steel plants. We quote for delivery at consumers' works in this district as follows:

No. 1 heavy melting steel.....	\$12.00 to \$13.00
Scrap rail.....	12.00 to 13.00
Steel rails, rerolling.....	15.00 to 15.50 *
No. 1 low phos., heavy 0.04 and under.....	18.00 to 19.00
Cast iron car wheels.....	16.00 to 16.50
No. 1 railroad wrought.....	15.00 to 15.50
No. 1 yard wrought.....	12.50 to 13.00
No. 1 forge fire.....	10.00 to 10.50
Bundled sheets (for steel works).....	10.00 to 10.50
No. 1 bushelling.....	11.50 to 12.50
No. 2 bushelling.....	9.00 to 10.00
Turnings (short shoveling grade for blast furnace use).....	10.00 to 10.50
Mixed borings and turnings (for blast furnace use).....	10.00 to 10.50
Machine-shop turnings (for rolling mill and steel works use).....	10.50 to 11.00
Heavy axle turnings (or equivalent).....	11.00 to 11.50
Cast borings (for steel works and rolling mills).....	12.00 to 12.50
Cast borings (for chemical plants).....	14.50 to 15.00
No. 1 cast.....	17.00 to 17.50
Railroad grate bars.....	14.00 to 14.50
Stove plate (for steel plant use).....	14.00 to 14.50
Railroad malleable.....	13.00 to 13.50
Wrought iron and soft steel pipes and tubes (new specifications).....	13.00 to 13.25
Iron car axles.....	No market
Steel car axles.....	17.00 to 18.50

Track Supplies.—The Pennsylvania Railroad will probably place orders this week for 100,000 to 200,000

tie plates (1000 to 2000 tons), 500,000 lb. of railroad spikes and 100,000 heat-treated track bolts.

Warehouse Business.—Local jobbers have reduced prices on steel bars and small shapes, round edge iron and steel, tank steel plates, deformed steel bars, hoops and bands. We now quote for local delivery as follows:

Soft steel bars and small shapes, 2.40c.; iron bars (except bands), 2.50c.; round edge iron, 2.60c.; round edge steel, iron finish, $1\frac{1}{2}$ x $\frac{1}{2}$ in., 2.60c.; round edge steel planished, 3.35c.; tank steel plates, $\frac{1}{4}$ -in. and heavier, 2.40c.; tank steel plates, $\frac{3}{16}$ -in., 2.55c.; blue annealed steel sheets, No. 10 gage, 3.50c.; light black sheets, No. 28 gage, 4c.; galvanized sheets, No. 28 gage, 5c.; square twisted and deformed steel bars, 2.40c.; structural shapes, 2.50c.; diamond pattern plates, $\frac{1}{4}$ -in., 4.60c.; $\frac{3}{16}$ -in., 4.785c.; $\frac{1}{2}$ -in., 4.90c.; spring steel, 4.10c.; round cold-rolled steel, 3.25c.; squares and hexagons, cold-rolled steel, 3.75c.; steel hoops, No. 13 gage and lighter, 3.15c.; steel bands, No. 12 gage to $\frac{3}{16}$ -in., inclusive, 3c.; iron bands, 3.90c.; rails, 2.75c.; tool steel, 8c.; Norway iron, 5c.; toe steel, 4.50c.

Sheets.—Prices are firm, 2.25c. for blue annealed, 3c. for black and 4c. for galvanized, Pittsburgh, being quoted by all makers. Tin plate is usually quoted at \$4.60, Pittsburgh, but on large lots \$4.50 can be done.

LOWER EXTRAS ON WIDE PLATES

Lukens Steel Co., Makes Reductions Up to \$40 a Ton on Its Product

The Lukens Steel Co., Coatesville, Pa., which has the only mill in the country rolling extra wide plates, has issued a new card of extras on wide plates, putting into effect reductions which amount to as much as \$40 a ton on plates 190 to 195 in. wide. Cutting extras are entirely eliminated in the new card. The extra on widths over 190 in. to 195 in. is reduced from 4c. to 2c. per lb.; on widths from 170 to 185 in., the former extras ranged from 3c. to 3.75c. per lb., while the new extra on these widths is 1.50c. per lb.; from 155 to 170 in., the former extra ranged from 2.25c. to 2.75c., while the new extra for all of these widths is 1.25c. per lb.; widths from 140 to 155 in., which formerly took extra of from 1.50c. to 2c. per lb., now take an extra of 1c. per lb.; on 130 to 135 in., the former extra was 1c. and on 135 to 140 in., 1.25c., while the new card gives 0.75c. as the extra on widths from 130 to 140 in.

Alabama Pig Iron Stocks Decline

BIRMINGHAM, ALA., March 7.—Alabama iron yard stocks show a decrease of 23,000 tons. Stocks on yards Feb. 1 and March 1 were as follows: Feb. 1, 82,000 and 73,000 tons; basic 27,000 and 21,000; warrants, 800 and 700; machine cast, 46,000 and 38,000; total stocks, 157,000 and 134,000.

The Stanley Iron Works, Bridgewater, Mass., signifies its intention of resuming operations this week. The plant has been closed a week or so. A reduction in wages of molders, amounting to 20 per cent, was followed by a strike.

The number of employees at the General Electric Co., Pittsfield, Mass., has been increased 12 per cent during the past three months and the plant is running 46 per cent of normal. While domestic business continues to increase, foreign orders have been the salvation of the company.

Within the next few months, the New London Ship & Engine Co., New London, Conn., will install new engines and shafts in six submarines and later will do similar work on 12 others.

The wage scale of some 650 employees of the Hendee Mfg. Co., Springfield, Mass., motorcycles, has been reduced 15 per cent.

Several departments of the Stevens-Duryea Co., Chicopee, Mass., automobiles, have been placed on a half-time basis.

The Royal Typewriter Co., Hartford, Conn., has increased its operating schedule 15 per cent. Many of its employees are now on full time.

British Iron and Steel Market

Labor Deadlock Hampering Home Trade—Shipments to Continent Expanding—Beams and Ship Plates Higher

(By Cable)

LONDON, ENGLAND, March 7.

DUE to the deadlock in the engineering and ship-building trades, because of the dispute with regard to overtime payments and the withdrawal of the war bonus, a decrease has resulted in the home business in pig iron. The export demand is improving and there have been further sales to Continental destinations. Makers are well booked over March and prices are firm.

Hematite sales have decreased. Buyers are disinclined to pay the increased prices. Makers' order books are well filled. East Coast mixed numbers have been sold at £4 19½s. (\$21.89). Sellers are now asking £5 (\$22).

Best Bilbao Rubio ore is now held at 26½s. (\$5.83) ex-ship Tees, nominal. Coke is easier.

Finished steel trades are threatened by an industrial upheaval. The works are badly in want of orders, but prices are still held, owing to the uncertainty of future costs. Home and export demand is still slow.

Belgian merchant bars are being sold at £8 to £8 10s. (1.57 to 1.67c. per lb.) f.o.b., May and June delivery. French merchant bars are held at the same quotation. Luxembourg merchant bars are quoted at £8 2½s. to £8 7½s. (1.60 to 1.65c. per lb.) f.o.b., April and May shipment.

Belgian angles are held at £7 10s. to £7 12½s. (1.47 to 1.50c. per lb.) f.o.b. Luxembourg steel beams are quoted at £7 10s. to £7 15s. (1.47 to 1.52c. per lb.) f.o.b., for June delivery. Belgian 3/16-in. plates are held at £9 (1.77c. per lb.) c.i.f. India. Belgian sheet bars may be had at £6 10s. to £6 12½s. (\$28.60 to \$29.15) f.o.b., for March shipment. Luxembourg billets are obtainable at £7 (\$30.80) f.o.b., March and April.

Tin plates are steady, but there is little business passing. Welsh manufacturers are not yet disturbed over the acid workers' strike. Cheap offerings of Continental tin plate bars have been made, but buyers are chary of placing orders.

We quote per gross ton, except where otherwise stated, f.o.b. maker's works, with American equivalent figured at \$4.40 per £1 as follows:

Durham coke, delivered	£1 9s	\$6.38
Cleveland No. 1 foundry	4 15	20.90
Cleveland No. 3 foundry	4 10	19.80
Cleveland No. 4 foundry	4 7½	18.25
Cleveland No. 4 forge	4 10	19.80
Cleveland basic	4 10	19.80
Hematite	7 0*	30.80*
East Coast mixed	5 0 to 5 2½	22.00 to \$22.55
Ferromanganese	15 0 to 14 10*	66.00 & 63.80*
Rolls, 60 lb. and up	8 0 to 9 10	35.20 to 41.80
Billets	7 0 to 7 10	30.80 to 33.00
Sheet and tin plate bars		
Welsh	7 0 to 7 7½	30.80 to 32.55
Tin plates, base box	0 18½ to 0 19	4.07 to 4.18
		C. per Lb.
Ship plates	9 5 to 10 10	1.82 to 2.06
Boiler plates	12 10 to 14 0	2.46 to 2.75
Tees	9 10 to 11 0	1.87 to 2.15
Channels	8 15 to 10 5	1.72 to 2.01
Beams	8 10 to 10 0	1.67 to 1.96
Round bars, ¾ to 3 in.	10 10	2.06
Galvanized sheets, 24 g.	15 15 to 16 0	3.09 to 3.14
Black sheets	12 10 to 13 0	2.46 to 2.55
Steel hoops	12 0 to 12 5*	2.36 & 2.41*
Cold rolled steel strip, 20 g.	23 10	4.62

*Export price.

Revival Slow — Pig Iron Demand Light — Further High-Speed Steel Stocks

LONDON, ENGLAND, Feb. 8.—The long-looked for revival has not yet made its appearance, to the disappointment of all concerned. It cannot be said with

any confidence that the corner has been turned. Certainly, there has been considerable improvement in pig iron during the past week or so, but this is only a minute proportion of the normal trade. The whole trouble, of course, is high prices, which consumers all over the world are not disposed to pay, and though the process of deflation has continued steadily for many months, prices have not yet got down to an economic level. Various wage reductions have been made recently which, of course, help to cheapen production, but there is still the question of fuel and railroad transport, and consumers of steel in this country assert that it is not so much the high price they have to pay which is a hindrance to substantial business as it is the cost involved in the handling of material afterward and in working it up for their own purposes. A certain amount of export business is, of course, moving, and in one or two instances low prices have been taken, but the works involved now appear to have sufficient orders to cope with their present limited output and are consequently slightly stiffer. On the other hand, continental quotations are advancing, and deliveries becoming more and more in arrears, so that buyers hesitate from committing themselves into such contracts.

Home consumers of pig iron are simply purchasing from hand to mouth, while export sales are small but include a few lots to Germany. No alterations have been made in Cleveland quotations, No. 3 G. M. B. being obtainable at 90s. for either home or export, but buyers are confident that before long they will be able to obtain all they want for less money, and are therefore holding off as long as possible.

Hematite continues in fair demand, South Wales and Sheffield being the prominent purchasers for the home trade, although by no means in any substantial degree, while for export Germany has bought a little. Prices, however, are weak, as makers want the orders and East Coast Mixed Nos. can be obtained for about 90s. There are in the Cleveland district 27 furnaces now working, and of these seven are on foundry and 12 on hematite pig iron, and the remainder on basic and special.

In finished iron and steel, North Eastern and Scotch makers have decided no longer to compete against each other for ship plates and shapes, and have re-established the fixing of minimum quotations for the home trade. Ship plates are accordingly offered at £10 10s., delivered, and shapes at £10, delivered. Apart from this, the market generally is dull and uninteresting.

On top of the recent throwing on the market of a large quantity of high-speed tool steel by the government, comes a discovery of further quantities at Constantinople, thus causing additional uneasiness to Sheffield producers. The quantity involved is in the neighborhood of 100 tons and consists in the main of 18 and 14 per cent tungsten material, which was shipped for munition making in Russia and is offered exactly as it left the works here several years ago.

Youngstown View of Advance

YOUNGSTOWN, March 7.—Independents believe the advance on bars, shapes and plates to 1.50c. by the Jones & Laughlin Steel Co., Pittsburgh, will help stabilize the market. The new minimum will be recognized by Valley interests, which have heretofore been accepting bar and plate tonnage at 1.40c. The general effect will be to strengthen prices, producers believe.

Receivers for the Pittsburgh Railways Co., have asked authority in the Federal Court to spend \$400,000 for 40 new all steel cars, money for which is available or will be available before the completion of the order, which is expected to go to the Pressed Steel Car Co. Motors are to be furnished by the Westinghouse Electric & Mfg. Co.

The Timken Roller Bearing Co., Canton, Ohio, has added 200 men to its force and is now operating its plant at from 60 to 70 per cent capacity.

FAR EAST INQUIRIES FOR BARS

Pipe for China—Quotations Asked on 10,000 Tons of Second Hand Plates

NEW YORK, March 7.—The Chinese market is beginning to show considerable improvement, evidently in sympathy with the increased activity of Japanese buying. Purchases by merchants in Japan continue on an upward trend and Chinese merchants also are beginning to inquire, with the evident intention of buying. Among recent Chinese purchases in the United States has been 2000 kegs of checker-head, counter sunk wire nails, which were reported to have gone at 3.65c. per keg, c.i.f. Chinese port. Some business has also been transacted in wire, black and galvanized sheets and bars. An inquiry is current from Chinese interests for about 10,000 tons of Matheson joint, 16-in. steel pipe and another inquiry, being handled by A. G. De Sherbinin & Co., 60 Broadway, New York, calls for 10,000 tons of second-hand steel plates, for April, May and June delivery. The offering price of the exporter is reported to be \$25 per ton.

Inquiry for bars by both Chinese and Japanese merchants continues to increase. Orders up to 500 tons are reported to have been placed and several inquiries are current. Sizes are generally confined to $\frac{1}{2}$ in. and smaller. German competition in Far Eastern markets on bars and structural material is reported to be confined to only the smallest sizes, the larger bars being quoted lower by American mills.

An inquiry for fabricated pipe for Calcutta, India, received by way of London, asks for quotations on 5/16 and 7/16-in. steel plates for 33-in. and 60-in. pipe, totaling about 4000 tons for a 6-mile line. It is understood that the fabrication is to be done in England, and as American mill prices are still rather high to compete

in England, it is doubted that the order could be closed here.

The recent activity in wire rod exports to Japan has evidently come to a temporary end with the slight stiffening of the American market, and the decline of that market in Japan. Recent sales of wire rods were made at \$47 per ton, c.i.f. (about \$38 mill) Japan, but at present sales are being consummated there at less than the American market price. Steel bar orders by Japanese merchants are reported by numerous exporters. One exporter is stated to have booked 1000 tons, another 500 tons and quotations were recently made by certain exporters on 3400 tons and on 2500 tons. Practically all were for small sizes. Although it has been reported that the Imperial Japanese Railways inquiry for 4730 tons of 20-lb. rails, with which was included 191 tons of 20-lb. rail splice bars and 6 tons of 16-lb. rail splice bars, was placed with the Asano Bussan Co., 165 Broadway, New York, no confirmation has as yet been received. The reported quotation on this order, c.i.f. Japanese port, was \$42.75 per ton.

The heavy black sheet buying of Japan, during the latter part of last year, evidently led to some speculation in the United States. Lower mill prices here and the recent light buying by Japan has brought a number of lots of both black and galvanized sheets upon the market. It is also reported that shipyards in Pennsylvania have been offering resale lots of black sheets in good condition at \$15 to \$16 per ton. Some mills are reported to be shading prices considerably on their standard brands of sheets, when quoting for export.

The leading independent steel export company reports a considerable gain for February, though tonnage figures are still very far from what may be considered a normal volume. Japan is buying consistently and South American countries have also come into the market to a greater extent.

Blast Furnace Investigations of Bureau of Mines

The blast furnace research section of the Bureau of Mines, located at Minneapolis, has carried out plant investigations for six years; these are being continued. The conviction has been forced on it, however, that little progress toward the solution of the many important problems involved in furnace operation will, or can, be solved by any method of study of commercial operations on account of the large amount of materials to be handled and the numerous causes of irregularities. The need of a furnace capable of operating on a small scale and under controllable conditions has been obvious for years. In the last year an experimental stack has been erected and twelve combinations of furnace lines and operating conditions tried out. This work is being continued.

One investigation covers the effect of furnace lines on blast furnace operations. The blast furnace works on the countercurrent principle; the ascending gas stream encountering the descending raw materials, with a regenerative transfer of heat. Maximum contact between gas stream and raw materials produces most rapid heat transfer and reduction of the ore. The degree of contact between gas stream and solid charge depends to a very large extent upon the size and shape of the furnace. About 200 furnaces are relined each year, most of the new lines being copies of previous unsatisfactory ones. The furnace designer, lacking practical rules governing the best shape of furnace, prefers to stick to known troubles rather than accept the risk of a new design. An investigation in the laboratory and in the experimental furnace is being carried on by the bureau with the hope to discover some fundamental principles which may be of use to the furnace designer.

Another investigation being conducted relates to the effect of physical characteristics of the charge on blast furnace operation. Probably the greatest cause of the fundamental inefficiency of the blast furnace, considered thermally as a furnace, is due to the enormous

disparity between the sizes of the particles of the solids charged. The average lump of coke has a volume of 400 to 800 c.c. and a surface exposed to the gas stream of 0.5 to 1 sq. cm. per gm. The average ore particle, on the contrary, has a volume approximately 0.000005 and would expose a surface of about 300 sq. cm. per gm. to the gas stream if its surface were exposed to the gas stream. A study is being made of the effect on furnace operation of a mixture of solid particles one-third of which is one hundred million times the size of the other two thirds. In a number of cases furnace operators have improved furnace efficiency by sizing the coke charge. There are prospects of being able to continue such work on the sizing, not only of the coke but of the ore.

The bureau is also conducting performance tests on various cokes in the blast furnace. Opportunities for obtaining rather complete data on coking conditions and coordinate information concerning the performance of this coke in the blast furnace are particularly good at this plant. Variations in the quality of the coke in commercial practice are sufficiently great to promise valuable data without instituting special coking conditions. Furnace irregularities from other causes probably will be difficult to eliminate. Chances of a successful study of data at this plant are better than at the majority of plants due to the simple and direct means there employed for the transfer of coke from the ovens to the furnace. In most plants the identity of individual coke heats is lost in transfer and storage of the coke.

The Worcester, Mass., Chamber of Commerce estimates the unemployed in that city as 8000, or 2000 less than was the case six months ago. At the peak of the business depression, more than 15,000 were out of employment in that city. The unemployment in the metal working and machine tool industries has grown considerably less during the past six months, largely because of the activity of steel company subsidiaries and of textile machinery accessories makers.

Prices Finished Iron and Steel, f.o.b. Pittsburgh

Freight Rates

Freight rates from Pittsburgh on finished iron and steel products, in carload lots, to points named, per 100 lb., are as follows:

Philadelphia, domestic...	\$0.36	Kansas City	\$0.815
Philadelphia, export...	0.265	Kansas City (pipe)...	0.77
Baltimore, domestic...	0.35	St. Paul	0.665
Baltimore, export...	0.255	Omaha	0.815
New York, domestic...	0.38	Omaha (pipe)	0.77
New York, export...	0.285	Denver	1.35
Boston, domestic...	0.405	Denver (wire products)...	1.415
Boston, export	0.285	Pacific Coast	1.665
Buffalo	0.295	Pacific Coast, ship plates...	1.335
Cleveland	0.24	Birmingham	0.765
Detroit	0.325	Jacksonville, all rail...	0.555
Cincinnati	0.325	Jacksonville, rail and water	0.46
Indianapolis	0.345	New Orleans	0.515
Chicago	0.38		
St. Louis	0.475		

The minimum carload to most of the foregoing points is 36,000 lb. To Denver the minimum loading is 40,000 lb., while to the Pacific Coast on all iron and steel products, except structural material, the minimum is 80,000 lb. On the latter item the rate applies to a minimum of 50,000 lb., and there is an extra charge of 9c per 100 lb. on carloads of a minimum of 40,000 lb. On shipments of wrought iron and steel pipe to Kansas City, St. Paul, Omaha and Denver the minimum carload is 46,000 lb. On iron and steel items not noted above the rates vary somewhat and are given in detail in the regular railroad tariffs.

Rates from Atlantic Coast ports (i.e. New York, Philadelphia and Baltimore) to Pacific Coast ports of call on most steamship lines, via the Panama Canal, are as follows: Pig iron, 55c.; ship plates, 75c.; ingot and muck bars, structural steel, common wire products, including cut or wire nails, spikes and wire hoops, 75c.; sheets and tin plates, 60c. to 75c.; rods, wire rope, cable and strands, \$1; wire fencing, netting and stretcher, 75c.; pipe, not over 8 in. in diameter, 75c.; over 8 in. in diameter, 2 1/2c. per in. or fraction thereof additional. All prices per 100 lb. in carload lots, minimum 40,000 lb.

Structural Material

I-beams, 3 to 15 in.; channels, 3 to 15 in.; angles, 3 to 6 in., on one or both legs, 1/4 in. thick and over, and zeels, structural sizes, 1.35c. to 1.40c.

Sheared plates, 1/4 in. and heavier, tank quality, 1.35c. to 1.40c.

Wire Products

Wire nails, \$2.40 base per keg; galvanized, 1 in. and longer, including large-head barbed roofing nails, taking an advance over this price of \$1.25 and shorter than 1 in., \$1.75; bright Bessemer and basic wire, \$2.25 per 100 lb.; annealed fence wire, Nos. 6 to 9, \$2.25; galvanized wire, \$2.75; galvanized barbed wire, \$3.05; galvanized fence staples, \$3.05; painted barbed wire, \$2.55; polished fence staples, \$2.55; cement-coated nails, per count keg, \$1.90; these prices being subject to the usual advances for the smaller trade, all f.o.b. Pittsburgh, freight added to point of delivery, terms 60 days, net, less 2 per cent off for cash in 10 days. Discounts on woven-wire fencing are 70 1/2 per cent off list for carload lots; 69 1/2 per cent for 1000-rod lots, and 68 1/2 per cent for small lots, f.o.b. Pittsburgh.

Bolts and Nuts

Machine bolts, small, rolled threads, 70, 10 and 10 per cent off list
Machine bolts, small, cut threads, 70 and 10 per cent off list
Machine bolts, larger and longer, 70 and 10 per cent off list
Carriage bolts, 1/2 in. x 6 in.:
Smaller and shorter rolled threads, 70 and 10 per cent off list
Cut threads 70 per cent off list || Longer and larger sizes | 70 per cent off list |
Lag bolts	70, 10 and 5 per cent off list
Flow bolts, Nos. 1, 2 and 3 heads	60 and 10 per cent off list
Other style heads	20 per cent extra
Machine bolts, c.p.c. and t. nuts, 1/2 in. x 4 in.: Smaller and shorter	65, 10 and 5 per cent off list
Larger and longer sizes	65 and 10 per cent off list
Hot pressed sq. or hex. blank nuts	\$5.00 off list
Hot pressed nuts, tapped	\$5.25 off list
C.p.c. and t. sq. or hex. blank nuts	\$5.25 off list
C.p.c. and t. sq. or hex. blank nuts, tapped	\$5.00 off list
Semi-finished hex. nuts:	
1/4 in. to 9/16 in. inclusive, 80, 10, 10 and 10 per cent off list	
Small sizes S. A. E.	80 and 10 per cent off list
1/2 in. to 1 in. inclusive, U. S. S. and S. A. E.	70, 10, 10 and 10 per cent off list
Stove bolts in packages	80 and 3 tens and 5 per cent off list
Stove bolts in bulk	80, 3 tens and 2 1/2 per cent off list
Tire bolts	70, 10 and 5 per cent off list
Track bolts, carloads	3c. base
Track bolts, less than carloads	4c.

Upset and Hex. Head Cap Screws

1/2 in. and under, 80 and 10 to 80, 10 and 10 per cent off list
3/16 in. to 1/2 in., 80 and 10 to 80, 10 and 10 per cent off list

Upset Set Screws

1/2 in. and under, 80, 10 and 5 to 85 per cent off list
3/16 in. to 1/2 in., 80, 10 and 5 to 85 per cent off list

Milled Square and Hex. Cap Screws

All sizes 75 and 10 to 80 per cent off list |

Milled Set Screws

All sizes 70, 10 and 10 per cent off list |

Rivets

Large structural and ship rivets, \$2.00 to \$2.10
Large boiler rivets, 2.10 to 2.20
Small rivets, 75 and 10 off list

Wire Rods

No 5 common basic or Bessemer rods to domestic consumers, \$36; chain rods, \$36; screw stock rods, \$41; rivet and bolt rods and other rods of that character, \$36; high carbon rods, \$43 to \$46, depending on carbons.

Railroad Spikes and Track Bolts

Railroad spikes, 9/16-in. and larger, \$2 to \$2.10 base per 100 lb. in lots of 200 kegs of 200 lb. each or more; spikes, 1/2-in., 3/8-in. and 7/16-in., \$2.15 to \$2.25 base; 5/16-in., \$2.15 to \$2.25 base. Boat and barge spikes, \$2.15 to \$2.25 base per 100 lb. in carload lots of 200 kegs or more, f.o.b. Pittsburgh. Track bolts, 3c. base per 100 lb. Tie plates, \$1.75 per 100 lb. Angle bars, \$2.40 per 100 lb.

Terne Plates

Prices of terne plates are as follows: 8-lb. coating, 200 lb., \$9.30 per package, 8-lb. coating, 1 C., \$9.60; 15-lb. coating, 1 C., \$11.80; 20-lb. coating, 1 C., \$13; 25-lb. coating, 1 C., \$14.25; 30-lb. coating, 1 C., \$15.25; 35-lb. coating, 1 C., \$16.25; 40-lb. coating, 1 C., \$17.25 per package, all f.o.b. Pittsburgh, freight added to point of delivery.

Iron and Steel Bars

Steel bars, 1.35c. to 1.40c. from mill. Refined bar iron, 2c. to 2.10c.

Welded Pipe

The following discounts are to jobbers for carload lots on the Pittsburgh basing card:

Butt Weld			Iron		
Inches	Steel	Black Galv.	Inches	Black Galv.	
1/4	54 1/2	28	1 1/2 to 3	38 1/2	22 1/2
3/8 to 1/2	60	33 1/2	3 1/2	38 1/2	18 1/2
5/8	65	50 1/2	3 1/2	42 1/2	27 1/2
3/4	69	56 1/2	1 to 1 1/2	44 1/2	29 1/2
1 to 3	71	58 1/2			

Lap Weld			Lap Weld		
Inches	Steel	Black Galv.	Inches	Black Galv.	
2	64	51 1/2	2	39 1/2	25 1/2
2 1/2 to 6	68	55 1/2	2 1/2 to 6	42 1/2	29 1/2
7 to 8	65	51 1/2	7 to 12	40 1/2	27 1/2
9 to 12	64	50 1/2			

Butt Weld, extra strong, plain ends			Lap Weld, extra strong, plain ends		
Inches	Steel	Black Galv.	Inches	Black Galv.	
1/4	50 1/2	33	1 1/2 to 3	44 1/2	37 1/2
3/8 to 1/2	56	38 1/2	3 1/2	35 1/2	23 1/2
5/8	62	50 1/2	3 1/2	42 1/2	28 1/2
3/4	67	55 1/2	1 to 1 1/2	44 1/2	30 1/2
1 to 1 1/2	69	57 1/2			
2 to 3	70	58 1/2			

Lap Weld, extra strong, plain ends			Lap Weld, extra strong, plain ends		
Inches	Steel	Black Galv.	Inches	Black Galv.	
2	62	50 1/2	2	40 1/2	27 1/2
2 1/2 to 4	66	54 1/2	2 1/2 to 4	43 1/2	31 1/2
4 1/2 to 6	65	53 1/2	4 1/2 to 6	42 1/2	30 1/2
7 to 8	61	47 1/2	7 to 8	35 1/2	23 1/2
9 to 12	55	41 1/2	9 to 12	30 1/2	18 1/2

To the large jobbing trade the above discounts are increased by one point, with supplementary discounts of 5 and 2 1/2 per cent.

Boiler Tubes

The following are the discounts for carload lots f.o.b. Pittsburgh.

Lap Welded Steel		Charcoal Iron	
Inches	Discount	Inches	Discount
1 1/2 in.	26 1/2	1 1/2 in.	5
2 to 2 1/2 in.	41	1 3/4 to 1 7/8 in.	15
2 1/2 to 3 in.	52	2 to 2 1/4 in.	25
3 1/4 to 13 in.	57	2 1/4 to 3 in.	30
		3 1/4 to 4 1/2 in.	32

To large buyers of steel tubes, a supplementary discount of 5 per cent is allowed.

Standard Commercial Seamless Boiler Tubes

New discounts have been adopted on standard commercial seamless boiler tubes, but manufacturers are not yet ready to announce them for publication, and for that reason we publish no discounts this week.

Sheets

Prices for mill shipments on sheets of standard gage in carloads, f.o.b. Pittsburgh, follow:

Blue Annealed		Box Annealed, One Pass Cold Rolled	
No.	Cents per Lb.	No.	Cents per Lb.
Nos. 8 and heavier	2.20	Nos. 11 and 12	2.30
Nos. 9 and 10 (base)	2.25	Nos. 13 and 14	2.35
		Nos. 15 and 16	2.45
Galvanized		Tin-Mill Black Plate	
No.	Cents per Lb.	No.	Cents per Lb.
Nos. 10 and 11	3.00	Nos. 25 and 26	3.70
Nos. 12 to 14	3.10	No. 27	3.85
Nos. 15 and 16	3.25	No. 28 (base)	4.00
Nos. 17 to 21	3.40	No. 29	4.25
Nos. 22 to 24	3.55	No. 30	4.50
No. 27	2.95		
Tin-Mill Black Plate		Galvanized	
No.	Cents per Lb.	No.	Cents per Lb.
Nos. 15 and 16	2.80	Nos. 25 and 26	3.70
Nos. 17 to 21	2.85	No. 27	3.85
Nos. 22 to 24	2.90	No. 28 (base)	4.00
Nos. 25 to 27	2.95	No. 29	4.25
		No. 30	4.50

LABOR COMMENDED

Message to Employees of United Engineering & Foundry Co.—Conditions Reviewed

"Labor, generally speaking, is deserving of a large amount of credit for the commendable spirit manifested in accepting ungrudgingly the unavoidable wage reductions and for the better co-operation and higher standard of efficiency which, in the majority of cases, is clearly noticeable in the amount and quality of work turned out." This statement is contained in a message to employees at its various plants by the United Engineering & Foundry Co., Pittsburgh.

"Labor is coming to realize that the only way to relieve the unemployment situation is to put forth its best efforts toward elimination of waste, and toward increased efficiency, in order that the employer, by reason of the resultant lower production costs, may secure his share of business, which in turn means more employment. It is regrettable that all labor cannot see the vital need of co-operation between employer and employee.

"We cannot expect any considerable improvement in industry until fuel, as well as transportation, is cheaper. Many railroads are now farming out repair work which should and would be done by railroad labor, if their rates were not so far above those outside of the railroad service."

"There has been a slight upturn in general business," continues the statement, "and from present indications the improvement will continue slowly. A rapid recovery of business might result from unnatural or artificial means, but this would be dangerous and might

eventually lead to another crash similar to that experienced in 1920.

"Considering the fact that the noticeable, but slight, industrial improvement since the middle of last year represents, to a large extent, purchases for replacement or repair of worn-out equipment and buildings rather than new construction, we may safely look for a much larger volume of business this year, for the reason that in addition to a greater volume of purchases for replacement there will be a large demand for needed construction which has been pending for several years.

"Announcement has already been made that contemplated construction projects of a public utility nature as well as extensive improvements by large steel corporations and other businesses are to be prosecuted or started in the near future.

"Liquidation has progressed rapidly as is indicated by the large number of commercial failures in 1921. It is well to remember that too few failures during a business depression is a bad sign. Considering the fact that so many ill-conceived and inefficiently managed concerns entered the field of business during the period of the war, when the unlimited demand and crying need everywhere for materials made it possible for almost anyone to produce and market goods at a profit, the period of depression so far has been characterized by too low a percentage of failures to make for a healthy condition.

"There still exists a great deal of uncertainty as to whether the bottom has been reached in all lines of business. It is gratifying to note, however, that several indications now point to a slow but steady and substantial business improvement during the ensuing year and many business men are showing keen foresight by making preparations accordingly."

rates which became effective as the result of the general 40 per cent advance.

Iron Ore Rate Controversy Resumed

WASHINGTON, March 7.—Tariffs filed with the Interstate Commerce Commission on March 1 proposing a reduction of 28 per cent as of April 1 on iron ore from Eastern mines are to be followed at once, according to reports, by an effort to obtain a reduction of 14 per cent on April 1 on ex-lake rates. Provided the latter went into effect on the date mentioned, it would have to be through special permission of the commission. The 28 per cent reduction proposed on rates from Eastern mines, including those in Pennsylvania, New York and New Jersey, would mean the elimination of the 40 per cent increase effective on Aug. 26, 1920, while the proposed 14 per cent cut in rates from lower lake docks on Lake Superior ore would amount to the cutting off of one-half of the general 40 per cent advance.

These moves by the carriers again brings to the fore the contest between the lake front and interior iron and steel interests. Buffalo iron and steel producers have consistently opposed a reduction in rates on iron ore from lower lake ports to interior furnaces in the absence of reductions in rates on coal to the Buffalo district and in a complaint now before the commission have asked it to establish a minimum on rates on iron from lower lake ports and, going further, argue that present rates on such shipments are too low when compared with coal rates to Buffalo from Pennsylvania mines. It is therefore expected that the Buffalo producers will contest the proposed 28 per cent cut in ore rates from Eastern mines on the ground that it is an entering wedge to a move toward a cut in rates on ore from lower lake ports.

Conferences have been held during the past week between the railroads interested and the commission regarding the proposed 28 per cent reduction and it remains to be seen whether the commission will permit the lower rates to go into operation on April 1 or will suspend them. It also is expected that if the 14 per cent rate on ex-lake ore rates is proposed, as it is said will be done, conferences will be held with the commission, requiring action on this matter also. As is known, the temporary reduction of 28 per cent on ore rates from lower lake ports was eliminated on Jan. 1 of the present year and the lower rates, which applied last fall, suspended until April 1 and succeeded by the old

Cincinnati Section, National Metal Trades Association

The annual meeting of the Cincinnati section of the National Metal Trades Association was held at the Business Men's Club in that city on March 2. The principal speakers were W. W. Coleman of Milwaukee, George W. Cartwright, Philadelphia, and the Rev. John B. Ascham of Cincinnati. President J. B. Doan presided, and in his annual address stated that this country needed an organized force to successfully resist the oppression of misguided labor and the spirit of communism and that the National Association and all of its constituent organizations must not dilute their militant forces in the fight for the open shop. Mr. Coleman's remarks dealt with the labor situation in England, and he declared that organized labor in that country had brought it to the verge of industrial ruin. One of the most serious mistakes the United States could make would be to enact an unemployment insurance law. He declared that American industries of their own volition had accomplished far more for American labor than the British unions had accomplished for English labor.

Mr. Cartwright in his address advocated an educational reform to give the workman the proper perspective toward his work. He said there should be less of boards and co-operative legislation and that we in this country must avoid the troubles brought about through the gospels preached by the English unions. In Mr. Cartwright's opinion the present industrial depression was scheduled to arrive in 1914, but the war postponed it. Those who were first to retrench by stopping speculative credit extensions and curtailed production will be the first to recover without suffering too severe losses. The speaker asserted that it was the Federal Reserve Act more than any other thing that saved the United States from an unprecedented financial panic. The election of officers resulted as follows: President, J. Wallace Carrel; vice-president, E. A. Muller; secretary, N. C. Lamont; the executive committee will be comprised of the officers and P. O. Geier, A. B. Breeze and J. B. Doan.

Non-Ferrous Metals

The Week's Prices

March	Cents Per Pound for Early Delivery							
	Copper, New York Straits		Lead		Zinc			
	Lake	Electro-lytic*	Tin New York	New York	St. Louis	New York	St. Louis	
1.....	12.75	12.50	29.50	4.70	4.40	4.90	4.55	
2.....	12.75	12.50	29.37½	4.70	4.40	4.90	4.55	
3.....	12.87½	12.62½	29.50	4.70	4.40	4.95	4.60	
4.....	12.87½	12.62½		4.70	4.40	4.95	4.60	
5.....	12.87½	12.62½	29.75	4.70	4.40	4.97½	4.62½	
6.....	12.87½	12.62½		4.70	4.40	4.97½	4.62½	
7.....	13.00	12.75	29.00	4.70	4.40	4.97½	4.62½	

*Refinery quotation.

New York

NEW YORK, March 7.

An optimistic tone pervades all the markets and prices are advancing. The tin market has been quiet and prices are steady. Conditions in the lead market are unchanged. Sentiment and prices in the zinc market have improved.

Copper.—Not only have practically all of the cheaper offerings of copper been eliminated or withdrawn, but consumers are gradually becoming convinced that the bottom of the market on this movement has been reached. As a result buying in the last week or two has improved decidedly and the lower levels have disappeared. Electrolytic copper for early or 30-day delivery is quoted to-day at a minimum of 13c., delivered, or 12.75c., refinery, and it is doubtful if this could be shaded. Some sellers, however, will quote on this basis through May, while others confine themselves to more conservative limits as to delivery. Sales in February are estimated to have been about 100,000,000 lb., as contrasted with a little over one-half of this in January. The buying late in February and so far this month has been fairly heavy, both for domestic and foreign account, the latter being much better than a few weeks ago.

Tin.—The past week has been one of the quietest in some time. Only enough business in Straits tin has been done to establish a market and it is safe to say that the week's turnover has ranged from 500 to 600 tons and that on no one day was more than 150 tons dealt in. The chief cause of the inactivity has been an uncertainty on the part of buyers and sellers as to the meaning of the fluctuations in the London market and this has resulted in extreme caution on their part. Spot Straits tin was quoted to-day at 29c., New York, and in London spot standard was quoted at £142, future standard at £144 and spot Straits at £144 10s., all about £3 per ton less than a week ago, with the market reported weak. Deliveries of tin into consumption in February are reported to have been 3215 tons, with 506 tons in stock and 900 tons landing on Feb. 28. Imports for the first two months of this year have been 7200 tons, against 3830 tons for the same two months in 1921. Arrivals thus far this month have been 1205 tons, with 7935 tons reported afloat.

Lead.—The healthy conditions in this market continue, with demand maintained at the steady rate which has characterized it for so many weeks. The only change in price is that at St. Louis of the leading interest which now stands at 4.50c., instead of 4.70c., the New York quotation being unchanged at 4.70c. In the outside market the quotation of the independents is 4.70c., St. Louis, or 4.70c. to 4.75c., New York and Eastern points.

Zinc.—Prices of prime Western have advanced from 4.55c., St. Louis, a week ago, to 4.62½c. to-day for early or 30-day delivery, and the market is regarded as firm. This is due not so much to a large increase in demand as to the fact that producers have taken advantage of the slight increase in consumption to maintain a firm attitude as to offerings which they are willing to make. Quotations for future delivery are not freely obtained except at considerable increase.

Antimony.—Due to pressure to sell a few lots, the

market is lower, at 4.20c., New York, duty paid, for wholesale lots for early delivery.

Aluminum.—The leading interest continues to quote wholesale lots of virgin metal 98 to 99 per cent pure, for early delivery at 19c. to 19.10c., f.o.b. plant, depending on the quantity, and the same grade is offered by importers at 17c. to 18c., New York, duty paid.

Old Metals.—Prices are generally unchanged with business dull, though holders seem to be less inclined to sacrifice as has been the case during the past few weeks. Dealers selling prices are as follows:

	Cents Per Lb.
Copper, heavy and crucible.....	12.25
Copper, heavy and wire.....	11.50
Copper, light and bottoms.....	9.00
Heavy machine composition.....	9.50
Brass, heavy.....	7.25
Brass, light.....	5.75
No. 1 red brass or composition turnings.....	8.00
No. 1 yellow rod brass turnings.....	6.00
Lead, heavy.....	4.25
Lead, test.....	3.25
Zinc.....	3.00

Chicago

MARCH 7.—Demand is light and prices show little change. A slight advance in tin reflects greater strength in the London market. It is to be noted that the London market last week was the lowest in 18 years. In this country lower than current prices were quoted last summer. But this was due to the exchange situation. Zinc has advanced principally because producers are holding back their metal in an effort to stiffen the market. Copper alone has shown evidences of real activity, buying in this market having been the best for several weeks. Old metal prices remain unchanged. We quote in carload lots: Lake copper, 13.25c.; tin, 32c.; lead, 4.50c.; spelter, 4.70c.; antimony, 6.50c., in less than carload lots. On old metals we quote: Copper wire, crucible shapes and copper clips, 9.50c.; copper bottoms, 7.50c.; red brass, 7.50c.; yellow brass, 6c.; lead pipe, 3.25c.; zinc, 2c.; pewter, No. 1, 22c. tin foil, 23c.; block tin, 25c.; all buying prices for less than carload lots.

St. Louis

MARCH 7.—Both lead and zinc are dull. We quote lead at 4.37½c., car lots, and slab zinc at 4.50c. On old material we quote: light brass, 3.50c.; heavy red brass, 7c.; light copper, 7c.; heavy yellow brass, 4c.; heavy copper and copper wire, 7.50c.; pewter, 15c.; tinfoil, 16c.; tea lead, 2c.; aluminum, 9c.

Investigation of the Alabama Iron Ore District

At the Southern Experiment Station of the Bureau of Mines, Birmingham-Tuscaloosa, Ala., the problem of the treatment of the iron ores of the Birmingham district has been divided into three parts as follows: (a) A detailed economic study will be made of the whole iron and steel industry in the Birmingham district, from the ore in the ground to the finished product. (b) What proportion of the gangue material associated with the iron ore of the district should be removed in ore dressing plants. (c) What proportion of the gangue of the iron ore of the district should be removed in the blast furnace for the most efficient practice.

A detailed study will be made of the methods of mining, handling and concentration of the ores, which will in turn be correlated with the studies on furnace practice and the use of coke best adapted to the treatment of the ores. The intention is to prepare a report covering the economic features of the iron ore industry of the Birmingham district, particularly with respect to the utilization of the siliceous ores that are not extensively used at the present time; also to ascertain whether it may not be possible to apply the information obtained as a result of this investigation to the mining, beneficiation and utilization of siliceous ores in other states, for example, in Tennessee and Missouri.

PERSONAL

Thomas C. Ham, who has been looking after the export business in the New York office of the Jones & Laughlin Steel Co., effective March 1, was made



THOMAS C. HAM

assistant manager of exports under A. H. Holliday, manager of exports. Mr. Ham will remain in the New York office. Mr. Ham was born in New Hampshire and is a graduate of Dartmouth College. He has been with the company since 1910, serving as assistant manager of sales in the wire department until 1919, when he was transferred to the New York office. Previously he was affiliated with the American Steel & Wire Co., first as manager of the Oklahoma City office of the company, and later as assistant manager, merchant trade

department, in the Chicago office.

Henry J. Kranz, who for the last 15 years has represented Carnegie Steel Co., Illinois Steel Co., and Tennessee Coal, Iron & Railroad Co. in Kansas and Oklahoma, has become associated with the Laclede Steel Co., St. Louis.

J. V. Emmons, Cleveland Twist Drill Co., gave an illustrated talk on the effect of structure upon the machining of tool steel, before the Boston Chapter American Society for Steel Treating, at the City Club, Boston, Wednesday, March 1.

Edward L. Pond, president Andrew Terry Co., Terryville, Conn., foundry, on March 4 observed the fiftieth anniversary of his connection with that company.

Frank S. Bradley, formerly secretary and general manager of the West Haven Mfg. Co., since its inception in 1896, has accepted the management of The Roberts Mfg. Co., New Haven, Conn., as its president.

The Pittsburgh Steel Co. announces the appointment of John F. Hazen as assistant general manager of sales. Mr. Hazen has been for several years connected with the sales end of the Pittsburgh Steel Co. in various capacities.

F. W. Pennock has resigned as vice-president and general manager of Cleaton Co. (of Canada), Ltd., and will hereafter be solely connected with Gelinas & Pennock, registered engineers, 207 St. James Street, Montreal.

Several changes in personnel were announced recently by the Westinghouse Electric & Mfg. Co. R. L. Rathbone, who has been manager of the Cleveland office, will take up special duties in connection with merchandising matters, with headquarters in Cleveland, and is succeeded by J. Andrews, Jr., who has been manager, industrial division, Pittsburgh office. C. D. Taylor succeeds Mr. Andrews in the Pittsburgh office. R. Seybold has been appointed manager of price statistics and will act as secretary of the domestic sales committee. W. R. Keagy has been appointed manager of the Cincinnati office and J. R. Deering manager of the Los Angeles office. H. S. Walker succeeds H. E. Lanning as promotion man in the Denver office and I. G. Cline takes the promotion work vacated by R. A. O'Reilly in the Chicago office. K. L. Graham succeeds to the post vacated by H. C. Hopkins as promotion man in the San Francisco office.

J. C. Miller, formerly manager, Columbus division, of the American Rolling Mill Co., has been transferred to Ashland, Ky., as manager of the Ashland division of the company, which property at present is comprised of

two blast furnaces, six 100-ton open-hearth furnaces and blooming mill, bar mill, and six sheet mills, and 22,000 acres of Kentucky coal property. He will also have the direction of the company's West Virginia coal properties, consisting of about 12,500 acres of gas coal in Fayette and Boone counties. In a recent reorganization of the Asland Coal & Iron Railway Co., also owned by the company, Mr. Miller was elected first vice-president and general manager, and also president of The Tygart Limestone Co. The company contemplates constructing additional finishing capacity during the present year.

Arthur Whitcraft, M.E., has assumed charge of the manganese steel sales department of The Hadfield-Penfield Steel Co. with headquarters at Bucyrus, Ohio. Mr. Whitcraft was for a number of years successively with the Marion Steam Shovel Co., American Locomotive Co., and New York Central Railroad, and he was for 12 years with the American Manganese Steel Co. as a sales engineer engaged in the design, application and sale of manganese steel castings.

L. J. Buck has severed his connection with the National Carbon Co., a subsidiary of the Union Carbide & Carbon Corporation, and has become United States sales representative of the British America Nickel Corporation, Ltd., Ottawa, Canada, with offices at the Canadian Pacific Building, 342 Madison Ave., New York. The British America Nickel Corporation is a Canadian organization with Sir Robert Borden as chairman of its board of directors and Hon. Edgar N. Rhodes president. It operates in the Sudbury district of mines with large quantities of proven ores of excellent quality and a modern smelter. Its refinery is located at Deschenes, near Ottawa.

D. K. Bullens, president D. K. Bullens Co., consulting metallurgist, Philadelphia, on March 7 addressed a joint meeting of the Pittsburgh sections of the American Steel Treating Society and American Institute of Mining and Metallurgical Engineers.

W. K. Singleton, formerly sales manager Carnahan Sheet & Tin Plate Co., now the Falcon Tin Plate & Sheet Co., has joined the sales force of the American Steel Co., Pittsburgh.

A. A. Potts has been elected secretary and treasurer and a director of the Pioneer Coal & Coke Co., Pittsburgh, and its subsidiary companies.

F. E. Fitzgerald, manager of sales Pioneer Coal & Coke Co., Pittsburgh, and affiliated companies, has been elected a director of the company and of the Tidewater Coal Co. and the National Transportations Co., subsidiaries.

President James A. Campbell of the Youngstown Sheet & Tube Co., Youngstown, Ohio, left Tuesday evening for a month's stay at Hot Springs, Ark.

William Bassett, as of March 1, retired from the Standard Supply & Equipment Co., Pittsburgh.

Samuel R. Robinson has resigned as foundry superintendent for the Sandusky Foundry & Machine Co., Sandusky, Ohio, to accept the position as metallurgist with the Lorain Steel Foundry Co., Lorain, Ohio. Mr. Robinson was metallurgist for the Philadelphia Roll & Machine Co., Philadelphia, from 1918 to 1921. Previous to that time he was metallurgist for 11 years for the Duquesne Steel Foundry Co., Corapolis, Pa.

It has been estimated that there were, July 1 last, 12,588,949 motor vehicles in the world, of which 10,505,660 were in the United States. No other country reaches 500,000, Great Britain being second with 497,582, Canada third with 463,448, France fourth with 236,146 and Germany fifth with 91,384. All of Europe is credited with 1,110,990, or rather less than New York and Pennsylvania combined.

It has been definitely shown by the Bureau of Standards that very accurate control of the temperature of molten metal is necessary in the determination of gases evolved in vacuo. The higher the metal is heated above its melting point the greater the quantity of gas evolved in a given time.

OBITUARY

LEWIS T. MILLER died at Pottsville, Pa., Feb. 26. He was born in Rochester, N. Y., Aug. 1, 1892, and lived the early part of his life around Rochester and Pittsburgh. After attending the University of Pittsburgh, he went to the Colonial Steel Co. at Colona, Pa., where he served in turn as inspector and assistant paymaster for four years. He was later with the Witherow Steel Co. as paymaster. He enlisted as a mechanic in the aviation section in September, 1917, was in service 22 months until July, 1919, when he was commissioned pilot in the Reserve Corps. After returning from service he again went with the Witherow Steel Co. as assistant district manager of its New York office and was later made district manager. He also served with the Hess Steel Corporation for a short time and with the International High-Speed Steel Co. as general superintendent of its Rockaway, N. J., plant. Since July, 1921, he had been connected with the National Steel Rolling Co., at Schuylkill Haven, Pa., as general superintendent, as well as being interested in work for Hartmann, Duncan & Rogow, Inc.

COL. JOHN LAMBERT, of Joliet, Ill., formerly president of the American Steel & Wire Co., died at his winter home, Pasadena, Cal., March 6, from complications following an attack of pneumonia. Col. Lambert's death ended an active business career, marked by a genius for organization in the field of iron and steel manufacture and distribution. He was born in Lambertville, N. J., Jan. 12, 1847, obtained a common school education and joined the Union forces in the Civil War in 1864. In 1879 at Joliet, Ill., the wire manufacturing firm of Lambert & Bishop was organized, one of the first producers of steel wire fencing in the country. With John W. Gates and Elbert H. Gary, Colonel Lambert was, years ago, one of the national figures in the organization of the steel industry, having been associated with them in the formation of the United States Steel Corporation. He leaves his widow and one daughter.

CAPT. HORACE G. H. TARR, widely known as an engineer of achievement, died unexpectedly March 2 at his home in Philadelphia. Captain Tarr was born in Chillicothe, Mo., in 1844, was educated at Andover Academy, enlisted in the Union Army when 16 years of age, and was soon promoted to captain. He made an admirable record. After the war he was engaged on a number of engineering projects and became associated with the Otis Elevator Co. He afterward became manager of the H. R. Worthington Pump Works, holding that position 17 years and resigning in 1901. At his death he was with the R. D. Wood Co., Philadelphia. He was a member of a number of engineering associations.

SOLOMON SHAW, for 52 years an expert in the iron and steel foundry business in Milwaukee, died Feb. 28 aged 73 years. He was born in Dudley, England, Oct. 1, 1848, and came to the United States in 1868. Mr. Shaw developed many new ideas in molding practice.

JOSEPH HEWES SHEPHERD, mechanical engineer, Blanchard Machine Co., Cambridge, Mass., died March 2 at his home in Needham Highlands. Mr. Shepherd was born in Arlington, Mass. His first business association was with the Baldwin Locomotive Works.

HENRY W. BULLARD, treasurer Poughkeepsie Foundry & Machine Co., Poughkeepsie, N. Y., died Saturday, Feb. 4.

JOHN SARGEANT of Domhoff & Joyce, pig iron brokers, Cincinnati, died last Saturday, March 4, at Buffalo, where he had been receiving treatment for several months.

OTIS H. CUTLER, chairman American Brake Shoe & Foundry Co., died at Miami, Fla., March 4. He was born May 15, 1866, and for a number of years was connected with the Baldwin Locomotive Works.

FRANK E. CARLE, Porter-Cable Machine Co., Syracuse, N. Y., died March 7 at Newton Center, Mass., following an illness of ten days of heart trouble. He was 66 years old.

STEEL MAKING COSTS IMMUNE

Federal Trade Commission Cannot Force Producers to Report Costs

WASHINGTON, March 7.—Holding that manufacturing is not commerce and that the Federal Trade Commission was trying to interfere with commerce, Judge Bailey, in the Supreme Court of the District of Columbia, last Saturday signed an order and final decree making permanent the temporary injunction restraining the commission from compelling independent iron, steel and coke producers to make monthly reports to the commission of their costs of production and other intimate details of their business.

This victory in what is known as the Claire Furnace Co. case, involving 22 producers, is of great importance, and the ultimate outcome is being watched with deep interest by business organizations. The principle embraced in the proceeding is of far-reaching character to all manufacturing enterprises of the country, and the case is clearly a test as to whether the commission has the authority to force producers to make reports to it as to facts which are considered by them to be of a purely private nature. That both the steel producers and the commission consider the proceedings to be of vast importance is evident from the fact that it will be contested through the Supreme Court of the United States.

The decision of Judge Bailey was in accordance with his previously expressed opinion that he would strike out the entire amended answer of the Federal Trade Commission as not stating a sufficient defense and in the nature of a demurrer. Because of this he made the injunction permanent, pursuing a policy similar to that he established in the Maynard Coal Co. case. In open court counsel for the commission noted an appeal which was allowed, and the case now is before the Court of Appeals of the United States in Washington.

The case as it now stands on appeal makes a square issue between the bill of complaint and the amended answer of the commission. The date for argument before the Court of Appeals has not been set. The argument will be made on the case as stated by the pleadings.

The case originated in December, 1919, when the commission called upon the iron, steel and coke makers to produce the data required. Claim was made by them that the commission has no jurisdiction and that its attempt to compel the production of the facts wanted is unconstitutional. Judge Bailey first issued a temporary restraining order against the commission. Various arguments subsequently were made before him, with the result that the permanent injunction and decree were issued.

The producers included in the case are the Claire Furnace Co., Ella Furnace Co., Edgewater Steel Co., Bethlehem Steel Co., Midvale Steel & Ordnance Co., Reliance Coal & Coke Co., Westmoreland-Connellsville Coal & Coke Co., Wierton Steel Co., LaBelle Iron Works, Donner Steel Co., Steel & Tube Co. of America, Cambria Steel Co., Republic Iron & Steel Co., McKeesport Tin Plate Co., N. & G. Taylor Co., Inland Steel Co., Trumbull Steel Co., Youngstown Sheet & Tube Co., Brier Hill Steel Co., West Penn Bridge Co., Wheeling Steel & Iron Co., and Sharon Steel Hoop Co.

James J. Davis, Secretary of Labor, in an address at Lima, Ohio, on Feb. 22, advocated the removal of more than 2,000,000 children from industry, as a means of relieving the unemployment situation. Mr. Davis also advocated not only a living wage, but a saving wage for workers. Further restriction of immigration was also declared to be necessary.

BROADER BUYING

Improvement in Demand for Steel Products in the Mahoning Valley

YOUNGSTOWN, March 7.—In a broader way than at any time in many months, business is coming to independent steel mills in the Mahoning Valley, accelerating schedules. Unless something unforeseen should happen, March gross tonnage placed in this territory should register an appreciable advance over the volume of February sales.

The Republic Iron & Steel Co. has definitely decided to blow in an additional blast furnace, after an idleness of many months, increasing the number of its active stacks to two.

Incoming sheet business shows a broader range, and orders for 400 and 500 tons are coming through with considerably more frequency, whereas a month ago business was largely confined to 25 and 50-ton lots. With exception of sheet makers catering particularly to the automobile trade, delivery is possible within a couple of weeks.

Rather than continue to meet prices on plates which it characterizes as "ruinously low," the Brier Hill Steel Co. has marked up its quotation on this product to 1.65c. per lb. This compares with an actual price at which plate tonnage has moved in competitive districts of 1.35c. The Brier Hill company maintains it cannot accept plate business at a price below the slab market. A small volume of plate tonnage is being placed. The company announces suspension of its 132-in. mill is preferable to its continued operation at a loss.

Another Valley independent is quoting 1.40c. on

plates, with operations on merchant material intermittent.

Open-hearth furnace operations have been materially enlarged within the past two weeks due to the sustained demand for semi-finished material from non-integrated sheet and tin plate interests, and to the broader requirements of finishing units of self-contained interests.

At the beginning of the week, 38 of 51 independent open-hearths were scheduled for production in the Mahoning Valley. Buying of billets and wire rods, in addition to sheet bars, by non-integrated interests, has caused steel making to expand at a more rapid rate than rolling mill production. Finishing mill schedules are stronger all along the line, excepting plate units. Sheet mill capacity is engaged to the extent of about 52 per cent.

Open-hearth sheet bar prices continue firm at \$29 to \$30. With scrap quotations advancing, a Valley independent anticipates an increase in sheet bar quotations of from \$1 to \$2, if buying activity is maintained. An advance in sheet bars, it is pointed out, would likely affect the sheet market. Prices of sheets entered the year firm at 3c. and 4c. for black and galvanized respectively, base gages, and these prices have held since. Blue annealed continues to be quoted at 2.25c., but an advance to 2.40c. in its quotations is "being considered by a Valley interest."

It is generally held that the time is not yet at hand to warrant higher quotations in sheets. The market, however, is likely to be responsive to broader requirements, as makers are unsatisfied with existing prices. One interest which is operating eight sheet mills states that current business is sufficient to enlarge production, which is held down for the time being by lack of steel.

Volunteer Committee to Relieve Unemployment of Engineers

Volunteer committees of engineers to aid in meeting the unemployment situation are being formed in the principal industrial centers of the country. These committees will co-operate with the Employment Service of the American Engineering Council of the Federated American Engineering Societies, whose headquarters are in the Engineering Societies Building, 29 West Thirty-ninth Street, New York. Unemployment has been so widely prevalent among engineers that a big volunteer committee was formed in New York to aid the overtaxed employment service, which for months has had more than 3000 applications for jobs on file, according to the manager, Walter V. Brown.

Frank A. Casey, Billerica, Mass., is in charge of the volunteer work in Boston. In Cleveland the Cleveland Engineering Society has appointed a special committee on employment with C. R. Sabin as chairman. In Bridgeport, Conn., William E. Hogan is heading the movement, while the work in Fairfield County, Conn., is being directed by Paul D. Wright, 309 Edgewood Avenue, New Haven, Conn., and H. R. Audit, New Haven. In New Jersey the committees are being headed by S. B. Austin, Boonton, N. J., and A. F. Johnson, 868 Kenegan Avenue, West Hoboken, N. J., George Beavers is directing the volunteer work in Milwaukee and C. C. Coonan of the Rochester Engineering Society is in charge in Rochester, N. Y.

More Employment in Cleveland

CLEVELAND, March 6.—Industrial employment in Cleveland showed a fair gain during February and more men are now at work in this city than at any time since last May, according to the monthly survey of the Cleveland Chamber of Commerce Committee on labor relations. The figures are based on reports from 100 plants normally employing 500 or more persons. These reported 73,158 employees on their payrolls Feb. 28, as compared with 69,352 on Jan. 31, an increase of 5.5 per cent. The greatest gain was in the automotive field. Eighteen companies making motor cars and accessories on Feb. 28 were employing 8728

persons, as compared with 7440 on Jan. 31, a gain of 17 per cent. The increase in employment in the metal trades, which includes iron and steel plants, was 9 per cent. There was a 10.8 per cent increase in the employment in plants making metals and metal products other than iron and steel. The low point was reached in July last.

Judge Gary on Business Conditions

Judge E. H. Gary, chairman of the United States Steel Corporation, in an interview with a representative of the New York News Bureau, Tuesday afternoon, said:

"Although there has been a gradual, if limited, improvement in business conditions during the last few months, I have seen no substantial evidence of general rapid recovery to normalcy, so called. Probably it is better so. The natural laws applying to business are grinding slowly but surely, and will compel sooner or later stability, progress and prosperity.

"If the laws of the country shall be sufficiently enforced to permit every individual to utilize his talent and energy without forcible interruption, we shall soon see the prosperous conditions for which we have been anxiously and expectantly looking for many months.

"The sun of prosperity is still shining, though it has been unnecessarily obscured."

Announcements were made this week from the general offices of the Locomobile Co. of America, Bridgeport, Conn., automobile and truck manufacturer, that over 200 additional workmen were added to the payroll on Monday, Feb. 27. Col. Elmer H. Havens, president and receiver of the company, states that a greater demand for the company's product is the main cause, and also states that business is "picking up" nicely.

The plan of the Ohio Industrial Commission to establish medical depots in various districts of the State for the benefit of injured workmen is meeting with strong protest, according to the committee on workmen's compensation of the Cincinnati Chamber of Commerce.

RAILROADS UNYIELDING

Testimony Opposes Reduction of Rates in Iron and Steel Products

WASHINGTON, March 7.—The rebuttal testimony of railroad witnesses in the general rate investigation case before the Interstate Commerce Commission clearly shows that the railroad executives have not yielded in the slightest in their opposition to rate reductions. They are still seeking certain "adjustments" independent of any formal proceedings. One of these relates to proposed cuts in rates on iron ore. Apparently the railroad executives feel that by attempting to controvert the testimony given by witnesses who vigorously urged general rate cuts in the basic lines, such as iron and steel and coal and coke, they would make their most effective point toward forestalling sweeping cuts. The rebuttal ended last Saturday.

Arguments will start to-morrow and the case will come to a final close on Saturday of the present week. It is believed that the commission will hand down an early decision. This has been urged by both shippers and carriers and the great volume of testimony that has been taken since the case was begun on Jan. 17, has been analyzed as it proceeded by a large corps of experts of the commission.

While railroad representatives have conceded that rates eventually will come down, they have at all times strongly opposed any general reductions. They have taken the position that the rate structure must be gradually straightened out by adjustments and they have laid considerable stress upon those which have already been made. It is evident that they are fearful of a broad sweep of cuts involving a heavy volume of traffic. In the course of the rebuttal, they have maintained that any reduction being made at the present time would not stimulate traffic. A contrary view has been taken by shippers. With this as their basic idea, the railroad witnesses in their rebuttal testimony devoted a large portion of their attack against reductions in coal, coke, and iron and steel rates.

Mr. Cochran's Statement

In this connection, an elaborate statement was made by H. H. Crocker, assistant coal traffic manager of the Baltimore & Ohio, sharply attacking the testimony of shippers asking for rate cuts in coal and coke, and iron and steel. His testimony was taken to be particularly significant in view of the prevailing opinion that while a general rate reduction is not probable, cuts in rates on coal and other raw products at least are likely to be ordered. Manifestly, however, this opinion can be nothing but a surmise.

Shippers contend that the railroads, realizing the prevalence of this opinion, are attempting to prevent such action, thinking that to do so would also make cuts in rates on iron and steel and other lines improbable. The railroad people contend that their financial condition does not warrant cuts in rates on coal or any other commodity involving a great volume of traffic. The shippers plainly recognize the interdependence of the railroads and industries, but representatives of the carriers argue that reduced rates would not increase traffic and would only further deplete their revenues. The shippers, on the other hand, have argued that reduced rates would increase the volume of traffic to such an extent that there would be a greater net return to the carriers.

Opposed to Reductions

The testimony of Mr. Cochran was in opposition to reductions in rates on coal and coke and iron and steel products. Concerning coal, he strongly denied the testimony given by J. D. A. Morrow, vice-president of the National Coal Association, that reduced coal rates would result in decreased operating costs for railroads, or increased traffic. He also denied testimony of witnesses of steel interests that a reduction in coal rates would be followed by any increase in outbound shipments of steel products, but would only tend to reduce the cost of producing iron and steel. He took the situation of the iron and steel producers as typical of the

situation of other producers throughout the United States, using coal for manufacturing purposes and, as he said, the railroad people "carefully digested the testimony of the representatives of the iron and steel interests for the particular purpose of determining whether a reduction in coal rates would stimulate the movement of traffic or merely operate to reduce the cost of manufacturing iron and steel articles. The testimony is convincing that in any event in the absence of a concomitant reduction in the rates on outbound iron and steel products, a reduction in the coal rates would not be followed by any increase in the outbound tonnage, but would merely operate to reduce the cost of production."

Comment by Shippers

Steel shippers have commented on the testimony of Mr. Cochran as lacking in comprehension of economic facts. In this connection, they pointed to one of his general contentions that even if railroad rates on steel products were reduced, the benefit would be passed along to the consumer. At the outset, steel shippers say, the basic idea of rate making relates to the reasonableness or unreasonableness of the rates and other matters, such as benefits of the ultimate consumer, are extraneous. Moreover, Mr. Cochran, while saying that the ultimate consumer would not be given the advantage of cut rates in steel products, indicated his agreement with steel makers that the prices of their products in many cases are below cost. By reason of this fact, steel interests have pointed out that they can hardly be expected to "pass along the benefits" of rate reductions while losing money. In any event, it is pointed out, prices for finished steel now are lower than at any time since December, 1915, and those for pig iron lower than at any time since September, 1916, despite the much higher costs due to excessive railroad rates.

The trend of prices as a result of rate reductions, manufacturers have stated, would depend upon market conditions but they have stated positively that the steel industry cannot permanently produce at a loss, and unless it does get into heavier production the effect on transportation as a result of reduced volume of traffic will injure the railroad along with the steel industry itself.

Fewer Metal Workers and Lower Wages

Iron and steel plants, according to figures of the Bureau of Labor Statistics, show for January a loss of 7623 employees in 105 establishments. This loss of 6.9 per cent was accompanied by a loss of 16.9 per cent in the half-month payroll, with a corresponding reduction in the average pay envelope from \$44.09 to \$39.35, or 10.7 per cent.

Similar decreases, both in number of employees and in half-month payroll, together with sharp drops in average pay envelopes, were recorded by both the automobile and the car building and repairing industries. Present wages in the automobile industry, on this showing, are slightly below those in the iron and steel mills. Wages in car building and repairing, however, are considerably higher than in either of the other two groups, being \$51.76 in January, which is 31½ per cent above the average pay envelope in the iron and steel industry. This reflects in large measure the continuance of wartime wages in the railroad car shops, against which the railroad managements are now moving.

Period	Number of Establishments	Number of Men	Half-Month Payroll	Average Pay Envelope
<i>Iron and Steel</i>				
January, 1921 ..	106	131,358	\$9,042,235	\$68.84
January, 1922 ..	105	102,918	4,049,534	39.35
December, 1921 ..	105	110,541	4,873,934	44.09
<i>Automobiles*</i>				
January, 1921 ..	47	36,588	2,257,979	61.72
January, 1922 ..	47	36,282	3,289,717	38.13
December, 1921 ..	47	91,682	5,120,876	55.85
<i>Car Building and Repairing</i>				
January, 1921 ..	58	62,559	4,419,424	69.54
January, 1922 ..	58	53,114	2,749,069	51.76
December, 1921 ..	58	58,103	3,354,876	59.79

*Payroll figures are reported as "weekly"; they have been made "semi-monthly" by multiplying by 2 1/6.

Further Gains in Iron and Steel Exports

January Shows Advance Over December—Best Month Since April—Gains in Wire, Wire Rods, Galvanized Sheets, Tin Plate and Rails

WASHINGTON, March 7.—Increases were made in iron and steel and machinery exports, and iron and steel imports, during January, as compared with those of December. Whatever this greater movement of commerce in these basic products may mean in the way of a gradual and permanent improvement in conditions of world economics, they have at least afforded encouragement to students of industrial conditions.

The new classification of iron and steel and machinery exports of the Bureau of Foreign and Domestic Commerce, effective in January, caused a revision of our export table.* The outstanding difference between the new and old classifications is that the present one subdivides products and, with some exceptions, is more specific. The effect on the tonnage, however, is relatively unimportant, because only in a few instances are new items included. Some of these, such as castings and forgings, have been reported previ-

ously by value, but now appear according to both value and tonnage. In view of the fact that these have not been reported by tonnage previous to January, no figures are recorded for the seven-month period, but are included for the single month.

The machinery group has been considerably amplified and subdivided and this group now takes in agri-

Exports, January, 1920, to January, 1922, Inclusive

	Gross Tons		
	All Iron and Steel	Pig Iron	Semi-finished Material
Calendar year 1919..	4,239,837	309,682	258,907
January, 1920	333,601	18,468	19,937
February	308,185	15,739	22,693
March	417,216	22,740	30,444
April	395,120	14,608	19,032
May	420,359	13,032	16,370
June	402,707	17,075	29,811
Fiscal year 1920.....	4,212,732	248,126	288,766
July	458,866	29,647	17,243
August	431,484	22,645	20,920
September	409,200	22,724	18,113
October	452,015	17,296	11,853
November	434,297	13,929	7,042
December	498,765	10,055	3,415
Calendar year 1920..	4,961,851	217,958	216,873
January, 1921	547,394	3,710	315
February	393,328	1,807	92
March	230,635	2,320	1,023
April	162,592	1,234	678
May	142,551	2,541	749
June	119,081	1,689	1,106
Fiscal year 1921.....	4,168,619	129,641	82,549
July	86,523	2,744	363
August	75,827	2,424	2,447
September	95,169	3,078	1,318
October	106,582	2,830	153
November	122,290	1,299	1,869
December	134,415	2,550	250
Calendar year 1921...	2,213,012	28,305	10,863
January, 1922	160,920	1,043	4,683
Seven months	773,706	15,543	10,891

*Editor's Note: Most of the items in the new classification are identical, or practically so, with corresponding items in the old, permitting direct comparison. Important divergences follow: Sheet bars and skelp have been added to the old group of ingots, billets and blooms. Iron and steel bars are now grouped, where previously they were reported separately; alloy steel bars are now separately reported. Iron plates have been added to the old item of steel plates. Black iron sheets are reported separately, having previously been included under "all other sheets and plates." Strip steel has been added to the old item of hoops and bands. Structural steel, now segregated between plain and fabricated material, includes two old items—"structural steel" and "ship plates, punched and shaped"; the latter is included under fabricated material. Rail fastenings, switches, frogs, etc., take the place of railroad spikes, and cover a much larger group of materials. The heading of the new item "boiler tubes, welded pipes and fittings" is more inclusive than the old "welded pipe and fittings." The wire products, except for wire nails, have been entirely recast. Cut nails are now reported under the general head of "nails, other than wire, including tacks." Radiators and cast house boilers are no longer reported separately. Several new items appear, as shown in the table.

Imports of Iron and Steel—Gross Tons

	January		Seven Months Ending January	
	1921	1922	1921	1922
Ferromanganese	1,107	1,300	39,098	5,171
Ferroasilicon	213	1,593	5,951	7,835
Pig iron	2,435	8,346	47,584	20,419
Scrap	12,156	2,413	75,082	24,150
Bar iron	113	232	3,196	1,463
Steel bars*	338	268	3,618	2,399
Structural steel	25	174	1,060	593
Billets, without alloys .....	...	137	746	5,565
All other billets	440	118	2,608	430
Steel rails	147	365	23,429	13,112
Sheets and plates	52	62	1,021	235
Tin andterne plates	65	171	259	296
Wire rods	69	178	4,252	665
Total	17,159	13,406	222,904	82,216
Manganese ore and oxide ..	49,699	9,500	440,094	118,479

*Not previously recorded separately.

cultural implements, electrical machinery and vehicles.

While the recovery in iron and steel exports has been comparatively small, it has been continuous since last September. The January movement was the largest since April of last year, when exports totaled 162,592 tons.

Exports in January of this year totaled 160,920 gross tons, valued at \$15,149,174, as against 134,415 tons, valued at \$29,502,448, for December. For the seven-month period ending with January, 1922, the total was 775,706 tons, valued at \$97,898,465. This compares with 3,199,343 tons, valued at \$738,112,894, for the corresponding period one year ago. Exports

Exports by Countries for January, and for the Seven-Month Period Ending January, 1922, of Leading Steel Products

	January, 1922	Per Cent of Total	Seven Months Ending January, 1922
Galvanized Sheets: Gross Tons			
Japan	7,923	49.3	8,927
Philippine Islands	1,399	8.7	3,074
British India	1,301	8.1	2,161
Black Sheets:			
Japan	22,530	39.5	138,896
Canada	1,461	5.8	18,692
Tin Plate:			
Japan	6,189	51.3	21,726
Canada	1,862	15.4	13,271
Hongkong	1,512	12.5	2,961
Rails:			
Japan	21,140	71.3	42,302
Canada	2,453	8.3	19,591
Chile	1,533	5.3	2,861
Honduras	1,499	5.1	7,730
Galvanized Wire:			
Japan	5,477	...	10,378
Canada	793	...	5,615
Wire Nails:			
Japan	3,663	55.7	8,138
China	1,089	16.6	1,716
Sum of Six Items Above:			
Japan	66,922	67.3	220,262

reported for January of last year totaled 547,894 tons, valued at \$137,803,395. These figures vividly reflect the sharp slump in both value and volume of exports during January, and the seven-month period ending with January, 1922, when compared with the same periods of one year ago.

Imports in January of the present year totaled 18,406 tons, valued at \$2,164,062, and for the seven-

month period amounted to 82,216 tons, valued at \$14,839,898. These figures include steel bars, not previously separately reported in our tables. December imports were only 9309 tons, valued at \$1,964,159. For January, 1921, imports totaled 16,822 tons, valued at \$2,549,811, and for the seven months ending with January of last year the imports aggregated 219,286 tons, valued at \$30,787,360.

Imports of manganese ore in January of the present year totaled 9500 tons, valued at \$47,614, and for the seven-month period ending with January, 1922, they amounted to 118,479 tons, valued at \$672,018. Manganese ore imports in December totaled 14,900 tons, valued at \$75,770. For January of last year they totaled 49,699 tons, valued at \$1,036,096, and for the seven-month period ending with that month, they totaled 440,094 tons, valued at \$8,494,380.

Exclusive of agricultural implements and vehicles, machinery exports for January, 1922, aggregated \$17,243,154, and for the seven-month period ending with that month their total value was \$136,497,306. Similar exports in December were valued at \$15,068,-

seven-month period that country took 42,302 tons of rails out of the aggregate exports of 114,628 tons.

Rails constituted the largest single item of export in January. Of the total exported, 26,306 tons were rails weighing 50 lb. and over per yard, while 3364 tons were light rails weighing under 50 lb. per yard.

Of the 25,170 tons of black steel sheets exported in January, Japan took 22,530 tons, or 89.5 per cent, and for the seven-month period that country took 128,896 tons out of the total exports of 154,960 tons, or 83.2 per cent. This movement to Japan indicates that American manufacturers have built up a substantial market there, but also is attributed partly to the fact that the Japanese industry is greatly depressed, owing to its inability to produce as economically as industries of the United States and other countries where operations have long been organized on an efficient basis.

The largest single item of imports was pig iron, the inbound movement of this blast furnace product being 6346 tons, while scrap ranked second, with 2412 tons; and ferrosilicon third, with 1593 tons. Imports of rolled steel were light.

The New Patent Law

President Harding has presented to Edwin J. Prindle, chairman of the Patent Committees of the Mechanical Engineers, the pen with which the Patent Office relief bill was signed. Mr. Prindle, a New York lawyer and engineer, led the fight for the engineers in their nation-wide campaign to wipe out archaic conditions in the Patent Office.

Manufacturers, inventors, scientists, lawyers and other classes joined in the movement, the success of which was described in an engineering announcement as a "great stimulus to the production of American inventions, which is the chief object of our patent system."

The pen was forwarded to Mr. Prindle by George B. Christian, Jr., secretary to the President, and at the same time came a letter from Thomas E. Robertson, Commissioner of Patents, in which he pointed out that the Patent Office victory, won after four years of effort, signalized an outstanding achievement in the public interest. Engineers said that the passage of the patent measure relieved a situation which menaced American industry and invention.

Mr. Prindle explained that the new law added \$451,000 to the payroll of the Patent Office, increasing the salaries of the examiners approximately 45 per cent and the number of examiners 10 per cent. "The bill," he added, "also contains an amendment to the patent law which will make a money recovery possible in all patent infringement cases where the patent has been held to be valid and there has been any substantial use of the invention. Heretofore the rules governing accountings in patent infringement suits have been so technical and illiberal that a money recovery has been impossible in most cases.

"Recently a few decisions have been rendered in which a more equitable principle has been applied to a limited class of infringement cases. The amendment makes the said principle statutory and extends its application to all classes of infringement cases."

Officers of the steel works section, Engineers Society of Western Pennsylvania, elected at the annual meeting at the William Penn Hotel, Pittsburgh, Feb. 28, are: Strickland Kneass, Jr., Youngstown Sheet & Tube Co., chairman; G. M. Goodspeed, National Tube Co., McKeesport, Pa., vice-chairman; T. J. McLaughlin, Carnegie Steel Co., Duquesne, Pa., Barton R. Shover, consulting engineer, Pittsburgh, Charles McKnight, Jr., Carbon Steel Co., Pittsburgh, G. D. Bradshaw, Andrews-Bradshaw Co., Pittsburgh, and A. F. Backlin, American Steel & Wire Co., Pittsburgh, directors.

C. M. Johnson, director research department and chief chemist, Park Works, Crucible Steel Co. of America, was the speaker at the annual meeting of the Steel Works section, Engineers' Society of Western Pennsylvania, at the William Penn Hotel, Pittsburgh, Tuesday evening, Feb. 28.

Exports of Iron and Steel—Gross Tons

	January		Seven Months Ending January	
	1921	1922	1921	1922
Pig iron	3,710	1,043	116,590	15,543
Ferromanganese	118	121	3,055	413
Ferrosilicon	98	53	521	287
Scrap	5,849	4,585	165,653	19,503
Ingot, blooms, billets, sheet bars and skelp	315	4,633	78,901	10,891
Iron and steel bars	67,579	6,375	389,981	7,206
Alloy steel bars		684		
Wire rods	5,556	6,438	54,892	56,428
Plate, iron and steel	110,485	2,801	595,300	83,845
Galvanized sheets	11,408	16,058	67,110	84,165
Black steel sheets	18,294	25,170	110,495	154,960
Black iron sheets	2,592	1,985	21,035	
Hoops, bands and strip steel	3,365	2,468	29,712	10,612
Tin plate,terne plate, etc.	34,545	12,061	138,476	45,396
Structural shapes, plain material	74,787	4,196	367,451	67,728
Structural materials, fabricated	4,167	3,859	27,149	5,809
Steel rails	59,739	29,670	372,433	114,628
Rail fastenings, switches, frogs, etc.	2,067	2,577	10,143	5,048
Boiler tubes, welded pipe and fittings	72,999	12,393	238,570	81,012
Cast iron pipe and fittings	10,100	1,235	51,472	14,579
Plain wire	25,980	8,237	139,948	23,744
Barbed wire and woven wire fencing	9,756	2,348	77,754	(b) 13,269
Wire cloth and screening		98		
Wire rope and cable		533		
Wire nails	8,532	6,575	67,733	18,883
Nails, other than wire, including tacks	1,588	600	11,331	3,042
Horseshoes	83	62	1,237	325
Bolts, nuts, rivets and washers, except track	6,599	1,015	25,889	6,925
Car wheels and axles		2,050		
Iron castings		449		
Steel castings		363		
Forgings		120		
Machine screws		15		
Total	547,394	160,920	3,199,343	775,706

*Not reported separately prior to January, 1922.

†Previously reported by value only.

(b) Includes barbed wire only.

096. For January, 1921, their value was \$56,705,507, and for the seven-month period of one year ago the total was \$300,277,127.

Exports of lathes in January were valued at \$64,351, and for the seven months, \$707,036; sharpening and grinding machines at \$43,296 and \$490,508, respectively, and all other metal working machinery at \$445,555, and \$4,774,476, respectively.

It is interesting to observe that Japan was the greatest single source of export of American iron and steel products in January. While this Oriental country has long been a big purchaser of products in this country, Canada is, of course, the greatest permanent consumer outside the domestic market itself, but was second to Japan in January. Japan led in the purchase of such products as steel rails, black and galvanized sheets, tin plate, galvanized wire, and wire nails. Of the 29,670 tons of steel rails exported in January, 21,140 tons went to Japan, and for the

Shipping Iron and Steel Products by River

A. B. Shephard Tells of the Experiences of One Company—Good Time Made, but Handling Charges Were Excessive

WASHINGTON, March 7.—Pointing out that ever since the cessation of the war, the railroad transportation situation has been in such condition, particularly with the high rates prevailing, as to seriously restrict the markets of the iron and steel industries in the Pittsburgh district, A. B. Shephard, of the Jones & Laughlin Steel Co., Pittsburgh, addressed the National Rivers and Harbors Congress at its convention here last Wednesday, and told of the relief that has been sought by turning to transportation on the Ohio and Mississippi rivers. Mr. Shephard explained the work which the company undertook during the past summer for the delivery of its finished products by river transportation to consumers in the South, the West, and Southwest. He said that no attempt had been made to set up a so-called barge line, the company using the barge equipment owned by its subsidiary, the Vesta Coal Co., which carried the products while power for towing was arranged with local steamboat owners. Mr. Shephard said that on Oct. 27, 1921, the first tow departed from Pittsburgh and consisted of half dozen steel coal barges temporarily converted into merchandise carriers. He said that trans-shipping and delivery at various points down the rivers into customers' warehouses were provided. The total shipment delivered on the first tow was about 4000 tons of various products, mostly structural shapes, steel pipe, wire nails and fence material. A second tow was immediately arranged for, Mr. Shephard said, and departed a few weeks later for Louisville, Ky., Evansville, Ind., St. Louis, and Memphis, Tenn., carrying approximately 8000 tons of steel products.

Attracted Much Attention

"The departure, movement and arrival at destination of these two tows," Mr. Shephard said, "attracted widespread attention, not only in the Ohio and Mississippi Valleys, but throughout the country, being hailed, as indeed it was in degree, as marking the return of activities on our inland waterways. Several of the other large steel companies in the Pittsburgh district followed closely each step in the progress of this undertaking, and have since themselves sent considerable quantities of their products to downriver points in the same manner."

Mr. Shephard pointed out that the system operates to give the Jones & Laughlin Steel Co. a wider market for its products than is obtainable under the present high schedule of freight rates and operates similarly for their customers who have received products in this manner.

"It might be stated," continued Mr. Shephard, "that the average saving to the customer who has purchased Jones & Laughlin Steel Co. products delivered by barge has been between \$2 and \$2.50 per ton. As these products were sold in considerable quantities only, it will be noted that the saving on a 1000-ton barge-load, for example, amounts to \$2,000 to \$2,500, which is highly appreciated in these times of close competition and strict economies.

On a Permanent Basis

"It is the intention of the company to establish this service on an efficient and permanent basis, and to continue it as a factor in the general service offered to its customers. Efforts will be made to arrange for delivery of products to points at still greater distances from Pittsburgh, and also for export through New Orleans. It is believed that this business will amount to probably 50,000 tons or more during the present year, and within a short time, if the proper facilities are provided, it will be moving at the rate of 100,000 tons or more per year, and it is not unreasonable to expect that the last

named amount will, in time, more nearly represent a monthly shipment instead of a yearly shipment.

"In preparation for the development of this business, careful survey of the whole situation is being made, together with studies of the most adaptable equipment and the most economical loading and unloading devices.

"Difficulties were encountered in these first shipments both in the movement on the rivers and at the unloading points. Delays were experienced by lack of sufficient water in the river on several occasions. Notwithstanding these delays, and others occasioned by fog and being compelled to tie up occasionally, good time was made. The tow which left the Ohio River (Aliquippa) Works on Oct. 27 docked at St. Louis Nov. 9, practically 14 days for the movement as against 10 days rail delivery.

Can Shorten Time

"With the river improvement completed, this time can be much shortened, possibly to equal the present rail time.

"The terminal facilities for unloading at the delivery points were in general unsatisfactory, and the cost of handling the materials excessive. In some cases the terminal cost exceeded the total transportation cost. This is a condition which will have to be remedied, as it is certain that the future of the river transportation depends largely upon the cheapness and facility with which materials may be loaded and unloaded, and trans-shipped to destination. This fact will have to be fully recognized by the communities on the rivers which now have, along their entire river frontage, no means for unloading barges except possibly the costly and exasperatingly slow old wharf boat methods, and by others which have provided very modern terminals, but with facilities only for handling package goods, having made no provision for handling the weights and lengths encountered in the shipping of steel products.

Two Things Necessary

"It seems obvious, therefore, that before this river transport service can be permanently established it must be recognized by those interested that two things must be done: One is that a reliable stage of water must be made available by the completion of the river improvements, and the other is that provision must be made at the various delivery points for prompt and economical unloading and trans-shipment.

"With these facilities provided, I feel safe in predicting that the traffic on the Ohio and Mississippi rivers will be revived and developed and continue to expand in volume until even the dream of the most enthusiastic advocate of water transportation will be realized, and that, at the same time, the railroad systems reaching the same territories will have all the traffic that they can carry, a condition which when brought about will be an everlasting benefit to the communities located in these valleys and to the country."

Demand of the Congress

At its closing session on Thursday, the National Rivers and Harbors Congress adopted a resolution "demanding" that Congress approve at this session not less than the amount of money recommended by the Chief of Army Engineers as necessary for improving the national rivers and harbors.

Dr. Julius Klein, in an address at the banquet of the congress, said that "the natural advantages enjoyed by our overseas competitors because of their location close to the sea are difficult enough to overcome, but when this handicap is supplemented by staggering transportation charges covering long hauls to water

fronts, the unwilling exporter is up against it." He said that the seriousness of the situation from the export standpoint "will perhaps be realized if we bear in mind the fact that 40 per cent of the manufactured articles exported from this country originated west of

Pittsburgh, east of the Rockies, and north of the Arkansas-Tennessee line."

Vice-President Coolidge said that the "country looks for its present and future development to the use of its waterways, the natural avenues to trade."

President's Plan for American Merchant Marine

He Is Intensely in Earnest and His Ideas Are Finding
Much Support and Some Opposition

WASHINGTON, March 7.—The upbuilding of an adequate, privately owned American merchant marine is now being attempted by the Harding Administration. Easily one of the most fascinating and vital objects of legislation that ever comes before Congress, the course of the program laid out by the President for a merchant marine in his address before Congress last Tuesday is being watched with intense interest. The customarily divergent views on the subject exist to-day as hitherto. The fight ahead plainly is going to be a hard one and meanwhile its outcome is in doubt. The President in his clear and definite message mapped out a program that many, Republicans and Democrats alike, say not only is constructive but one that must be adopted if the long-hoped-for merchant marine is to be created so as to serve the industrial, agricultural and other interests of the country. A bill to this end has been introduced and efforts are being made to pass it at the present session of Congress. But there can be no denying the fact that it faces strong opposition. Aside from the foreign influences, which it is freely charged always attempt to obstruct legislation looking to the upbuilding of an American merchant marine, the Harding program is being opposed by the powerful agricultural bloc in Congress. This has been recognized with considerable discouragement and is held to be particularly unfortunate, inasmuch as it is evident that an American merchant marine would be of as great benefit to the agricultural interests of the United States as it would be to the industrial and other interests. It is firmly contended that unless there is an adequate American merchant marine, talk of building up a great export trade for any of these interests is entirely futile. And it is further argued that unless a privately owned fleet is created now, attempts to do it in the future will be well nigh hopeless.

Much of the opposition is based on the idea of a subsidy, though some of it is believed to be merely using this plea as an evasion. The President never appeared to better advantage than he did in connection with presenting his merchant marine program, and he had no hesitancy whatever in advocating the subsidy plan and to say so in the most direct terms. His doing so has elicited much admiration and the intensity he showed in urging the legislation was the object of much favorable comment. Always manifesting a particular interest in the matter of building up an American merchant marine, the President showed that he had given it careful thought and that he was aware of the influences at work against a merchant marine and the obstacles that must be faced. His program omitted some recommendations which many think ought to have been included, among them repeal of the LaFollette seaman's act, but at the same time, it is broad and comprehensive and carries plans which he feels would accomplish the purpose desired. There is evident also a broader view throughout the country as to merchant marine legislation, and this takes into account the necessity of creating a merchant marine by any method that is practical rather than the insistence upon particular methods. The President, in fact, challenged those opposing his program to offer a satisfactory alternative to the subsidy plan, which, it is estimated, would cost about \$32,000,000 annually, but would mean a vastly greater amount in savings to American shippers. The program really includes both a direct subsidy and indirect aid, and the incen-

tives it holds out may be seen in the following proposals it includes:

Creation of a merchant marine fund by diverting 10 per cent of all customs receipts, netting about \$302,000,000 a year and avoiding alleged complications with regard to treaties if discriminating duties were adopted; all tonnage taxes collected on both foreign and American ships to be added to the merchant marine fund; doubling tonnage taxes, to yield approximately \$4,000,000 annually; one-half of all profits to private owners in excess of 10 per cent to be added to merchant marine fund; establishing of a construction loan fund of \$125,000,000, drawing 2 per cent, and to be used for shipbuilding; deductions from income taxes of shippers equal to 5 per cent of freight paid on goods imported in American bottoms; greater depreciation allowances in income tax returns on ships; waiving of all income taxes when their amount is applied to half the cost of new ship construction; 50 per cent of all immigrants to be carried in American ships; building up of merchant marine reserve to the maximum of 5000 officers and 30,000 men employed on merchantmen, receiving a maximum of \$3,000,000 in pay each year from the Navy; all Government freight and passenger traffic to be carried on American ships whenever possible; army transport service to be turned over to Shipping Board; coastwise shipping laws to be extended to the Philippine Islands so as to confine all trade between the islands and the United States to American ships; preferential rail rates on through shipments on American vessels and co-ordination of rail and water transportation and development of railroad-owned vessels.

The program was indorsed by the National Merchant Marine Association at its convention here last week. It was also the object of some attacks at the convention, but they were few and relatively unimportant. The convention showed itself to be strongly desirous of going on record in favor of the immediate building up of a privately owned American merchant marine, and several speakers made vigorous attacks on foreign influences which are seeking to prevent its being established. Among them were Chairman Lasker and Commissioners Chamberlain and Benson of the Shipping Board, who urged a merchant marine both as a commercial necessity and a naval auxiliary.

* Sixty students in the department of mechanical engineering, University of Wisconsin, Madison, have enrolled in a new course in metallography, or the study of alloys and alloy steels, which is being conducted during the second semester under the direction of Prof. E. D. Fahlberg, of the chemical engineering department. It is stated that the course has been instituted in response to an ever-increasing demand from factories and shops for men who know the heat-treating of metals and alloys and understand the properties of alloys.

To meet the demand for a sliding frame saw suitable for somewhat lighter work than its No. 75 is designed for, the United Engineering & Foundry Co., Pittsburgh, has developed a new size, designated as No. 40, weighing about two-thirds as much as the No. 75. The first saw of the smaller size was built for the International Nickel Co. and equipped with a 36-in. diameter blade, though a 42-in. blade may also be used. It may be assembled with the blade on either the right or left side.

IRON AND INDUSTRIAL STOCKS

Ruling Prices the Past Week Reflected Conflicting Trade Conditions

Ruling prices on iron and industrial shares the past week reflected conflicting trade conditions. For instance, steel stocks held well because of greater plant activity. On the other hand, the passing of the Sloss-Sheffield preferred dividend has its influence on pig iron producers' preferred share valuations notwithstanding greater buying of iron by melters. High prices for raw cotton and grains have been supplemented by lower, thereby lessening the purchasing power of farmers. Farm and textile machinery makers are less secure if quotations on manufacturers' securities can be taken as an index. Retail trade is slowing up, making for conservatism among banking houses, and firmer money rates than accumulations in savings banks warrant.

The range of prices on active iron and industrial stocks from Monday of last week to Monday of this week was as follows:

Allis-Chal., com.. 45 - 47	Lackawanna St.. 44 - 47
Allis-Chal., pf... 91 1/2 - 92 1/2	Midvale Steel... 29 1/2 - 30 1/2
Am. Can., com... 39 1/2 - 42 1/2	Nat.-Acme... 10 1/2 - 12 1/2
Am. Can., pf... 101 - 102	Nat. E. & S., com. 32 1/2 - 34 1/2
Am. C. & F., com. 149 - 151	N. Y. Air Brake. 59 1/2 - 67 1/2
Am. C. & F., pf... - 119 1/2	Nova Scotia St.. 20 1/2 - 24
Am. Loco., com.. 107 - 111 1/2	Pressed Steel... 65 1/2 - 66
Am. Loco., pf... - 115 1/2	Ry. St. Sp., com. 95 1/2 - 97 1/2
Am. Rad., com.. 86 1/2 - 89	Ry. St. Sp., pf... 112 1/2 - 115
Am. St. Fd., com. 31 - 34	Replogle Steel... 29 1/2 - 31 1/2
Am. St. Fd., pf... 93 1/2 - 96	Republic, com... 46 1/2 - 49 1/2
Bald. Loco., com. 104 1/2 - 109 1/2	Republic, pf... 76 1/2 - 78 1/2
Bald. Loco., pf... - 108	Sloss, com... 35 1/2 - 39 1/2
Beth. Steel, com. 57 1/2 - 58 1/2	Sloss, pf... 65 - 71 1/2
Beth. St., Cl. B.. 61 1/2 - 64 1/2	Superior Steel... 29 1/2 - 29 1/2
Beth. St., 8% pf. 106 1/2 - 108	Un. Alloy Steel.. 27 - 28 1/2
Chic. Pneu. Tool. 63 - 67 1/2	U. S. Pipe, com.. 25 1/2 - 29 1/2
Crucible St., com. 52 1/2 - 58 1/2	U. S. Pipe, pf... 61 - 63 1/2
Crucible St., pf... 81 1/2 - 82 1/2	U. S. Steel, com. 92 1/2 - 95 1/2
Gen. Electric... 151 1/2 - 154	U. S. Steel, pf... 115 1/2 - 116 1/2
Gt. No. Ore cert. 34 1/2 - 35 1/2	Vanadium Steel.. 35 1/2 - 37 1/2
Gulf States Steel 66 1/2 - 76 1/2	Va. I. C. & Coke... 48
Int. Har., com... 90 - 91 1/2	Westinghouse El. 55 - 55 1/2
Int. Har., pf... 106 1/2 - 107 1/2	

American Locomotive Co. Report

The American Locomotive Corp., New York, reports that its gross earnings in 1921 were \$35,711,507.47, and after deducting from this \$30,192,721.90 for the cost of manufacturing, maintenance, administrative expenses, interest on bonds of constituent companies and an allowance for depreciation of \$1,409,838.32 on plant property, there remained a gross profit for the year of \$5,518,785.57, from which there has been deducted an allowance of \$435,000 for estimated United States and Canadian income taxes, the remaining balance of \$5,083,785.57 being the net profit available for dividends, which is equal to \$13.34 per share on the common stock after providing for the regular \$7 dividend on the preferred shares. As 7 per cent had been paid on the preferred stock and 6 per cent on the common stock, a total of \$3,250,000, there remained of the net profits \$1,833,785.57, from which \$1,000,000 was reserved for additions and betterments to plants and \$833,785.57 was credited to surplus. The gross earnings for the year in comparison with those of 1920 show a reduction of about 46 per cent.

It is stated in the report that the volume of domestic business was very materially reduced in 1921 owing to the severe state of business depression. A large volume of foreign business could have been obtained. It is stated, if the company had been willing to accept long-term credit risks.

No construction work was done during the year on the company's proposed new plant in the St. Louis district, and it is the present intention of the company to withhold active development of that property until the general business requirements of the company warrant going ahead.

J. G. Brill Co. in Canada

The annual report of the J. G. Brill Co., which has just been issued to stockholders, indicates that this company has now become well entrenched in its Canadian position. It was only last September that the company took over the Preston Car Works, Preston, Ont., and H. D. Scully, general manager of the Canadian Brill Co., says that, in the intervening five months, the parent company has expended \$500,000 in extending and improving the plant at Preston. Where between 50 and 60 hands were employed last summer the company is now employing 250, with a payroll amounting to \$5,000 per week. The company which is producing one car per day has recently delivered cars to Toronto, Ont., Winnipeg, Man., Victoria, B. C., Sault Ste. Marie, Ont., and to the Hydro-Electric Commission for Windsor and Guelph, Ont. Conductors' cabooses have also been delivered to the Temiskaming & Northern Ontario Railway Commis-

sion. In an interview, Samuel M. Curwan, president of the J. G. Brill Co., of Philadelphia, also president of the Canadian subsidiary, expressed himself as highly pleased with their venture in Canada.

A suit has been filed in the Common Pleas Court of Cincinnati by the Cosmopolitan Bank & Trust Co. seeking to foreclose a mortgage for \$40,000 on the plant of the Bickett Machine & Mfg. Co. The bank seeks a judgment for the entire amount with interest at 8 per cent since June 21, 1915, and also seeks an order for the sale of the property to meet the claim.

Pittsburgh Rolls Corporation Report

The Pittsburgh Rolls Corporation reports for 1921 net profits of \$62,726, equivalent, after preferred dividends, to \$2.45 a share earned on the common stock, compared with net profits of \$108,573 or \$5.37 a share on the common after preferred dividends in the previous year. The income account compares as follows:

	1921	1920
Gross profit from operations.....	\$250,119	\$436,052
Reserve for depreciation.....	91,602	97,468
Interest on funded debt.....	32,486	35,285
Loss on bonds sold and store.....		16,760
Federal tax.....	14,997	58,654
Interest, cash discounts and other income	20,027	
Net profit for year.....	140,061	227,886
Sinking fund provision.....	77,336	119,313
Balance for dividends.....	62,726	108,573
Dividends on preferred.....	28,000	28,000
Balance for common stock.....	34,726	80,573

Earnings of the company were especially poor during the last six months of the year, according to D. L. Hynon, president of the company. From present indications, earnings will continue to be small during the early months of 1922, he said. Last year, \$112,000 of first mortgage bonds were retired without impairing liquid assets.

Canadian Foundries & Forgings

At the annual meeting of the shareholders of the Canada Foundries & Forgings, held in Brockville, Ont., the report presented from the auditors showed an operating loss of \$3,704, after providing for depreciation. The total loss for the year was \$58,211, which takes in interest on bonds, bank interest on loan administration expenses and allows \$12,000 as interest for dividends on investments. This compares with net profits in 1920 of \$29,979 plus \$77,496 in the form of income from investments. Liabilities have been reduced by half a million dollars and reserve of \$200,000 was taken from the surplus to provide against inventory shrinkage, leaving the balance carried forward to profit and loss of some \$930,000, compared with \$1,204,273 a year ago. At the meeting Hon. W. J. Shaughnessy of Montreal retired as a director, and was replaced by Harry B. Housser of Toronto. The officers elected were as follows: President, W. W. Weir of Montreal; vice-president, Hon. George P. Graham; secretary-treasurer, J. H. A. Briggs; general manager, James Arnold; directors, J. H. A. Briggs, C. N. Monsarrat, C. W. Maclean, W. D. Robb, W. W. Weir, James Arnold, E. F. Conway, Hon. George P. Graham, W. T. Sampson, H. B. Housser.

Sloss-Sheffield Dividend Deferred

The Sloss-Sheffield Steel & Iron Co. directors at their meeting last week decided to defer action on the regular quarterly dividend of 1 1/2 per cent on the preferred stock. After the meeting the following statement was issued: "The board of directors, in view of the existing situation in the pig iron market, decided it was in the interest of the company to conserve its cash resources, and accordingly decided not to take action on the preferred dividend at this time."

Report of Interstate Company

The annual report of the Interstate Iron & Steel Co., Chicago, for the year ended Dec. 31, 1921, shows the effects of the period of business depression through which the industry has been passing. Net earnings were \$475,137, as compared with \$1,515,914 for 1920. After deductions for depreciation, reserve for taxes, interest, inventory adjustment and loss on Liberty bonds sold, the net loss for 1921 was \$344,723, as compared with net profits of \$342,953 for the previous year. A payment of \$144,214 in preferred dividends resulted in a total reduction in surplus of \$488,937.

In his annual statement to stockholders E. J. Llewellyn, president, said in part: "The last year has probably been the most critical and difficult year that the iron and steel industry has ever experienced. Deduction of values began in January and ended only with December. The results show that our tonnage for 1921 was about 45 per cent of that for 1920 and the money value in goods shipped to customers about one-third of that shipped in 1920. We reduced inven-

tory values from the beginning to the end of the year about \$284,000. We believe that our inventory values, which are priced at cost or market, whichever is lower at Jan. 1, 1922, will be a good basis from which to operate during the coming year."

Empire Steel & Iron Co. Loss

The Empire Steel & Iron Co. report a net loss for 1921, after charges and federal taxes, depreciation, depletion and inventory losses of \$966,071, contrasted with a net profit of \$446,061 for the previous year. Operating profit in 1921 amounted to \$91,489, total income to \$146,469, interest, expenses and cost of inactive plants to \$450,192, deficit to \$302,653, inventory adjustment to \$280,075, total deficit to \$582,728, depreciation and depletion to \$412,343, making the final deficit \$995,071.

The balance sheet as of Dec. 31 last shows surplus of \$1,802,104, against \$2,804,033 in 1920.

Electric Alloy Steel Co. Report

The Electric Alloy Steel Co., Youngstown, Ohio, booked as much business the first two months of this year as it did all of last year, President Louis J. Campbell informed stockholders March 2 at the yearly meeting.

In 1921 the company sustained an operating loss of \$156,000, and its total deficit, after all charges, including a liberal write-off for depreciation, was \$268,000. It operates a plant at Charleroi, Pa., producing commercial alloy steel bars of crucible and electric furnace qualities, special analysis carbon and high speed tool steels.

The company is constantly establishing new trade connections and has won business recently in sharp competition with other interests. The officers were re-elected.

Industrial Finance

At the recent annual meeting of the Winchester Repeating Arms Co., New Haven, Conn., sales for the past year were given as \$18,248,000, against \$18,042,000 for the year 1920. Losses for the year amounted to over \$1,000,000.

The annual report of the Sullivan Machinery Co., Chicago, for the year ended December 31, 1921, showed net earnings before dividends amounting to \$512,488. The payment of dividends amounting to \$549,497, however, including a dividend paid on Jan. 1, 1922, reduced the total surplus \$37,009. Current liabilities were reduced from \$2,210,271 to \$410,083.

A single bid was entered on the property of the defunct John Obenberger Forge Co., Milwaukee, at the public sale of the assets conducted March 1 by J. F. Gerdie, trustee. The bid was in the sum of \$233,000 and was entered by Adolph H. Weldner, attorney, on behalf of secured creditors. The appraised value of the property is \$955,242. The referee in bankruptcy has declined to accept the bid and instructed the trustee to call for new bids until March 20.

The Motor Wheel Corporation, Lansing, Mich., manufacturer of motor vehicle wheels, metal stampings and other steel products, reports a net profit of \$301,340.89 in 1921, after deductions for Federal taxes. The balance sheets show the company to be in excellent condition, with liquid assets of \$1,812,598.64 and current assets of materials, \$1,939,506.82, a total of \$3,752,105.26. Current liabilities amount only to \$278,691.48. H. F. Harper is president and general manager of the corporation.

The Lima Locomotive Works, Inc., Lima, Ohio, for the year 1921 shows a net income after charges and Federal taxes of \$1,136,591, equivalent after preferred dividends are paid to \$21.51 a share on the \$4,350,000 of common stock. This compares with a net income of \$1,078,780, or \$20.18 a share in the previous year.

The Wheeling Steel Corporation has declared the quarterly dividends of 1 per cent on the preferred A stock and 1½ per cent on the preferred B stock, payable March 18.

Westinghouse Electric & Mfg. Co. has declared the regular quarterly dividends of 2 per cent on its preferred and common stock. The preferred dividend is payable April 15 and the common dividend April 29, both to stockholders of record March 31.

After taking an inventory shrinkage of \$299,114, the Atlas Tack Corporation, Boston, showed a net loss in 1921 of \$463,313, as against a net profit in 1920 of \$130,853 or \$1.37 a share on the \$5,000 outstanding shares. Sales last year were \$1,809,121, contrasted with \$3,044,265 for 1920. The assets and liabilities at the close of 1921 were \$3,082,672, whereas at the close of the previous year they were \$3,437,789.

A meeting of the stockholders of the Standard Steel Car Co. has been called for May 2, at Pittsburgh, to vote on an increase in the capitalization from \$5,000,000 to \$50,000,000.

The annual report of the American Hardware Corpora-

tion, New Britain, Conn., shows net profits after adjustments and depreciation of \$882,545, and a surplus, after \$793,600 paid out in dividends, of \$58,945. In 1920 the net profits were \$1,456,857, dividends \$1,190,400, and the surplus \$266,957.

Employees of the Stanley Works, New Britain, Conn., hardware, are given an opportunity to purchase on easy payments common stock at \$44 a share. Last year about 700 employees bought \$187,200 of common stock.

The Toronto Laundry Machinery Co., Ltd., 1947 Dundas Street West, Toronto, Ont., manufacturers of laundry machinery and ice-making machinery, has assigned to G. T. Clarkson. The company was incorporated in 1903, with \$40,000 capital stock and the late John O'Neill was president and chief stockholder, and J. C. O'Brien was managing director.

Stockholders of Harbison-Walker Refractories Co. will meet May 15, to vote upon a proposition that the capital stock be decreased from \$36,600,000 to \$30,000,000, the decrease to be made by the retirement and cancellation of \$6,600,000 of preferred stock now in the treasury of the company.

Plans of New Companies

George F. Merrell, Inc., is manufacturing its Wash-All washing machine by contract and will probably continue to do so for some time.

The Fire-Grate-Radiator Heating Corporation, 302 West Clinch Avenue, Knoxville, Tenn., will do its own manufacturing and will be in the market at an early date for general equipment for foundry and machine shop.

P. W. P. Mfg. Co., 64 William Street, Newark, N. J., expects to build wireless apparatus.

F. W. Reisman and L. E. Turk, formerly traveling sales manager and treasurer respectively, of Quigley Furnace Specialties Co., have with others organized and incorporated the Keystone Refractories Co. and will manufacture high temperature cements and granular refractories. Offices will be located at 120-122 Liberty St., N. Y. and factory in Jersey City. Mr. Reisman is president and general manager and Mr. Turk secretary and treasurer of the new company.

The Marlin Wire Wheel Corporation, 386 Madison Ave., New York, is the incorporation of the wire wheel business formerly conducted by Marlin-Rockwell Corporation at Philadelphia, under the Rudge-Whitworth patents. The conduct of the business will be the same as formerly, under the name of The Marlin Wire Wheel Corporation.

The Craine-Schrage Steel Co., 6189 Greenwood Ave., Detroit, Mich., has been organized by W. C. Schrage, secretary and treasurer, who was long identified with the Pittsburgh Shafting Co., of Detroit, a subsidiary of the Columbia Steel & Shafting Co. of Pittsburgh, and C. P. Craine, who also was associated with that company for a period of years and later took over the account of the Wyckoff Drawn Steel Co., Pittsburgh, and the Columbia Steel Co., Elyria, Ohio, as district manager of sales. These two men have joined forces with a view of facilitating the two mill representations and carrying an extensive warehouse stock of cold-drawn steel and cold-rolled strip steel.

The Twin Steam Trap Corporation, 1019 Dime Bank Bldg., Detroit, will be in the market for manufacturing equipment within 30 to 60 days.

A. W. Lau, formerly of the Lau Iron Works, has organized the Steel City Iron Co., capitalized at \$100,000, at Youngstown, Ohio, to manufacture ornamental iron and structural steel. The company plans to erect a factory and warehouse in the Spring. It will carry a general stock in warehouses to enable industries and contractors to obtain its products without delay. Among the products it will handle are metal doors, metal window casings, concrete bars and fireproofing materials. Temporary offices have been established at 311 Federal building, Youngstown.

Henry J. Reeve and James E. Fritts have incorporated the Reeve-Fritts Co., 37 South Desplaines Street, Chicago, and will handle all types of metal-working machines. Mr. Reeve was one of the organizers of H. A. Stocker Machinery Co. in 1905 and continued with that company until its consolidation with the Rumely-Wachs Co. in 1917. From that date until about a year ago Mr. Reeve was treasurer of the Stocker-Rumely-Wachs Co., following which he was associated with the Dale Machinery Co. Mr. Fritts also was formerly with the Stocker-Rumely-Wachs Co.

The Loyd Wireless Telephone Corporation, Sixth Avenue at Forty-first Street, New York, has several factories of its own making wireless apparatus, but at the present time it is greatly delayed in making deliveries and expects shortly to place over \$2,000,000 worth of contracts with outside concerns.

Machinery Markets and News of the Works

BUYERS ARE SLOW TO CLOSE

Orders in Small Volume Compared to Inquiries Recently Quoted On

General Business Improvement, However, Brings a More Cheerful Sentiment

Though two months of the new year have passed, very little of the expected improvement in machine-tool business has materialized. The volume of inquiry has been larger than at any time last year, but orders are only slightly more numerous. The trade is hopeful, however, that the larger number of inquiries is a promising sign of better business to come as soon as greater confidence has been established.

A good demand for machine tools from manufacturers of wireless telephone equipment is predicted.

New York

NEW YORK, March 7.

The outstanding fact in the machine-tool trade is that the number of orders which have been placed since the first of the year is in very small ratio to the number of machines for which inquiries have been received. The inquiries may, and perhaps do, indicate the interest of tool users in new equipment, but the dearth of orders also indicates that business recovery has not yet proceeded far enough to permit many of them to make the purchases they consider desirable.

No definite trend toward improvement in business in this market was discernible in the past week. The general observation of sellers is that business continues "extremely dull."

The Delaware & Hudson Railroad at Albany, N. Y., has placed an order for a boring mill and will probably place other orders this week, its requirements including a wheel press and a driving-box borer. The Sewell Valley Railroad has bought a 20-ton Niles crane and a 36-in. planer.

Present activity in the crane market is about on a par with previous weeks. One or two new inquiries are reported current and some orders have been placed. Among orders pending, which will probably be placed within the next few days, is the inquiry of the Public Service Production Co., Newark, N. J., for a 25-ton, 50-ft. boom locomotive crane for Burlington, N. J. Among hand power crane builders, but little activity is noted except in parts for replacement.

Among recent sales are: Cleveland Crane & Engineering Co., 60-ton, 24-ft. span, 1-motor, power house crane to the Phoenix Utilities Co., New York, for a power house in Wilkes-Barre, Pa.; Industrial Works, a 20-ton, 50-ft. boom locomotive crane to the Southern Pacific Co., 165 Broadway, New York, for West Oakland, Cal., a No. 3 pile-driver to the Canadian Pacific Railroad, Montreal; and a 10-ton crawl tread locomotive crane to Stone & Webster for use at Philadelphia; Philip T. King, 30 Church Street, New York, a 20-ton, 60-ft. boom used Ohio locomotive crane to the Industrial Service Co., Lincoln, N. J.; Niles-Bement-Pond Co., a 20-ton overhead traveling crane to the Sewell Valley Railroad Co., Rainelle, West Va.; Dravo-Doyle Co., a Dravo-Doyle Whirley to the Hainesport Mining & Transportation Co., Philadelphia.

Eugene Forrer, Budd Lake, N. J., contemplates building an iron and brass foundry near New York City next summer. He will manufacture pipe fittings of an ew type, also, hotel and bottlers' machinery pumps, valves, stop cocks, etc., and will be in the market for shop equipment.

The National Filter Cloth & Weaving Co., 57 Hope Street, Brooklyn, manufacturer of wire cloth, is having plans

This business has grown amazingly and a number of manufacturers are anticipating increasing their capacity.

The past week has been lacking in significant new developments. There has been a little buying, but on the whole trade is still very quiet. A Cincinnati builder received an order for 15 drilling machines; another company in that city received an order for eight machines. The Fisher Ohio Body Co. has bought a small quantity of shop equipment at Cleveland. The New York Central bought two tools and the Delaware & Hudson is closing on a small list. The Illinois Central is expected to put out a list soon for a year's requirements.

The Monarch Machine Tool Co., Sidney, Ohio, has reduced prices on its lathes 10 per cent.

Manufacturers of electric motors have reduced prices about 10 per cent.

prepared for a one-story brick plant, 70 x 200 ft., on property recently acquired at Hamden, Conn. Equipment will be installed for the employment of about 100 operatives.

The Eastern Malleable Iron Co., Twenty-fifth Street, Troy, N. Y., is taking new bids on revised plans for a one-story power plant on site, 50 x 188 ft.

The Todd Shipyards Corporation, 25 Broadway, New York, is planning for the establishment of a ship repair plant on property at Mobile, Ala., recently acquired from the Mobile Shipbuilding Co. It will be operated as a direct branch of the other plants of the company. William H. Todd is president.

Coal-handling equipment will be installed at the new 300-ton coal bunker, 80 x 128 ft., to be constructed by Michael Di Leo, Port Chester, N. Y. Frank Urso, Stamford, Conn., is architect.

Bids will soon be asked for a four-story ice-manufacturing and cold storage plant, 75 x 110 ft., on Webster Avenue, New York, for E. M. Schildwachter, 4180 Park Avenue, estimated to cost about \$1,000,000 with machinery. William H. Meyer, 1861 Carter Avenue, architect, is completing plans.

The Empire Switchboard Co., Inc., New York, has been organized to take over the plant and business of the Empire Engineering & Supply Co., Fourth Avenue and Twenty-eighth Street, Brooklyn, and will continue the manufacture of electrical equipment. Norman P. Findley, manager of the former company, is president and C. E. Schoninger, secretary.

The Detroit-Cadillac Motor Co., Bernard Avenue, Poughkeepsie, N. Y., will take bids at once for a three-story service and repair building, 63 x 105 ft., at Mill and Washington streets. E. C. Smith, 39 Market Street, is architect.

The Ford Motor Co., Detroit, Mich., will commence the erection of its proposed tractor plant at Green Island, N. Y., early in May, for the manufacture of Fordson tractors, motors, and other automotive products, estimated to cost in excess of \$750,000, including machinery. It will give employment to about 10,000 persons when running full. Construction is well under way on a hydroelectric generating plant for works operation, estimated to cost \$2,000,000. Machinery installation will commence in the spring and it is expected to have the plant ready for service in June or July. Stone & Webster, 147 Milk Street, Boston, are engineers.

Freight-handling and conveying machinery, cranes, etc., will be installed in the five-story warehouse and loft building, and two-story superstructure on a pier 550 ft. long to be constructed at Havana, Cuba, by the Havana Docks Corporation, under a lease for the United Fruit Co., 17 Battery Place, New York. The structures will approximate 220,000 sq. ft. of space. Contract for the building has been let to the Turner Construction Co., 243 Madison Avenue, New

York, and will require more than 12 months for completion. Parsons, Klapp, Brinckerhoff & Douglas, 84 Pine Street, New York, are architects and engineers.

The Driscoll Transmission Corporation, New York, has leased the eighth floor of the building at 416-22 West Thirty-third Street, for headquarters for the production of the Driscoll variable speed transmission. Occupancy will be taken at once. Col. M. W. Thompson is chairman of the board.

Merkel Brothers, Chichester Avenue, Jamaica, L. I., will commence the immediate erection of a three-story ice and refrigerating plant, 60 x 75 ft., adjoining their present works. Louis Allmendinger, 20 Palmetto Street, Brooklyn, is architect.

W. C. Durant, president Durant Motors, Inc., 1819 Broadway, New York, is arranging for the manufacture of a complete four-cylinder, five passenger automobile to sell for \$348. Plans will be developed at an early date for facilities for quantity production with a number of branch works in different parts of the country for assembling. It is understood that the car will be handled by a separate organization, the Durant company contracting for the production only. The regular Durant automobile is now being manufactured at the Long Island City plant of the company, which is operating full under a daily production of 100 cars, and the new automobile will have no connection with this plant.

The Board of Estimate, Municipal Building, New York, is considering an appropriation of \$500,000 for the Department of Plant and Structures, Municipal Building, Grover A. Whalen, commissioner, for the construction of dry docks and shops for municipal marine work. About \$200,000 will be used for the shop buildings and machinery.

The New York Edison Co., Irving Place and Fifteenth Street, New York, will commence the immediate erection of a one-story power house, 50 x 100 ft., at Park Avenue and 188th Street, to cost about \$75,000. A new power house will also be built at Yonkers, N. Y., to cost approximately \$250,000. William Whitehill, Buckley-Newhall Building, Forty-first Street and Sixth Avenue, is architect and engineer.

Charles Cohen, 308-10 Oakland Street, Brooklyn, manufacturer of automobile bodies, has filed plans for a two-story brick addition, 25 x 100 ft.

W. L. Fleisher & Co., 31 Union Square, West, New York, engineers, have leased the two-story building, 50 x 150 ft., on South Washington Place, Long Island City, for a mechanical works and laboratory.

The Central Steamship & Commerce Corporation of New York has commissioned Theodore D. Wells, 11 Broadway, naval architect, to prepare plans for 15 freight vessels, to be equipped with Diesel engine electric drive, power plants, refrigerating machinery, hoisting and freight handling machinery, and other equipment. The freighters are estimated to cost \$5,000,000, and will be used for service between New York and Chicago, on the New York and Welland barge canals.

A vocational department will be installed in the new junior high school to be erected in the Greenville district, Jersey City, N. J., for which an appropriation of \$1,560,000 has been asked. Work will commence at an early date.

Fire, March 1, destroyed the two-story building at Tenth Street and Jersey Avenue, Jersey City, N. J., owned by the Erie Railroad Co., and occupied under lease by the Pullman Co., manufacturer of railroad cars, with loss estimated at about \$50,000, including equipment and supplies.

The Eastern Steel & Wire Co., Newark, N. J., is completing arrangements for the purchase of land on Evergreen Avenue, as a site for a new plant to manufacture carriage springs, agricultural implements and general wire products. Contract has been let to the American Concrete Steel Co., 27 Clinton Street, for a one-story structure, 180 x 520 ft., and ground will be broken about April 1. It is estimated to cost about \$300,000. E. A. Henry, formerly connected with the American Steel & Wire Co., Pittsburgh, is president of the company, which was incorporated recently with a capital of \$1,000,000. It is represented by Bilder & Bilder, 790 Broad Street.

Officials of the Submarine Boat Corporation, Port Newark, Newark, have organized a third subsidiary to carry out features of its operations, including steel fabricating, boat construction, terminal operations, etc. The new company will be known as the Newark Bay Terminal Corporation, and will develop a freight terminal, with facilities for storing, handling and conveying materials.

Export Opportunity

Anton Franz Mörkel, Nuremberg, Germany, is in the market for machinery for the manufacture of conical and square shaped shafts for writing purposes.

Chicago

CHICAGO, March 6.

The first week in March was very quiet in the local machine tool market. Some sales of individual machines are being made, but in most cases they are either second hand, or new equipment disposed of at low prices. It is evident that buyers are looking for bargains. The railroads have taken no further action on their pending lists, but the Illinois Central is still working on a three-year program and is expected to put out a list for the first year's requirements soon.

An auction on March 2 in liquidation of the equipment of H. C. Williamson's plant at 321 North Crawford Avenue, Chicago, brought out nothing unusual in the way of prices, some being high and others relatively low. It is to be noted, however, that of the extensive list of machines offered, some 40 per cent failed to bring out any bids.

A pending inquiry from the Universal Portland Cement Co., Buffington, Ind., calling for a number of large machine tools, is still unclosed. The Illinois Steel Co. has asked for prices for estimating purposes on a number of carwheel boring machines, axle lathes and other equipment similar to that in its Gary wheel works.

The Filler & Stowell Co., Milwaukee, has ordered a No. 8 Whiting cupola.

Building permits were taken out in Chicago in February for 634 structures, fronting 20,998 ft. and costing \$13,492,800, as against 311 permits involving 10,608 ft. frontage and \$15,366,000 for the corresponding month of last year. It will be noted that gains were recorded in the number of buildings and in frontage, but a decrease in cost. The total cost of buildings covered by permits issued in February, 1921, however, was the highest in the history of the city.

The Popular Mechanics Co., 6 North Michigan Avenue, Chicago, has taken out a permit for the construction of a seven-story printing office building, 85 x 119 ft., at 202-208 East Ontario Street, to cost \$300,000.

The Bassick Mfg. Co., manufacturer of lubricators and automobile accessories, 361 West Superior Street, Chicago, has purchased the one-story plant of E. Edelmann & Co., manufacturers of automobile specialties, 2638 N. Crawford Avenue. The plant contains 62,000 sq. ft. of floor space and is served by the Chicago, Milwaukee & St. Paul Railroad. The Edelmann company has leased space in the Krasberg Building in East Ohio Street, where it will move its factory and assembling plant.

The Alfred Johnson Skate Co., 2812 West North Avenue, Chicago, is receiving bids on a four-story plant, 50 x 138 ft., at West North and Francisco avenues, to cost \$100,000.

Wagner Brothers, dealers in real estate, 6238 Cottage Grove Avenue, Chicago, have let contract for a one-story automobile salesroom and repair shop, 100 x 108 ft., 6521-31 Cottage Avenue, to cost \$25,000.

J. Smith has let contract for a one-story sheet metal shop, 40 x 74 ft., 2118 South California Avenue, Chicago, to cost \$18,000.

The B & B Motor Co., 1106 Granville Avenue, Chicago, has let contract for a one-story garage, 65 x 230 ft., 6019-23 Broadway, to cost \$30,000.

Charles F. Trapp, 5350 West Chicago Avenue, Chicago, has let contract for a one-story Ford automobile service station, 100 x 127 ft., to cost \$45,000.

The Jefferson Ice Co., Bickerdike Street near Grand Avenue, Chicago, has let contract for a one-story ice plant, 124 x 125 ft., 1445 North Crawford Avenue, to cost \$22,000.

W. J. Kehl, 1225 North Maplewood Avenue, Chicago, has awarded contract for a one-story machine shop, 75 x 111 ft., 1722-28 Walnut Street, to cost \$15,000.

An explosion of paint and oil barrels resulted in a fire which destroyed the plant of Shauger & Johnson, sheet metal manufacturers, Atlantic, Iowa, on Feb. 28. The loss is estimated at \$100,000.

The Arcade Mfg. Co., Freeport, Ill., manufacturer of molding machines, hardware products, etc., is taking bids for a three-story addition, 65 x 100 ft., estimated to cost about \$35,000. B. C. Trueblood is treasurer.

The Common Council, Oskaloosa, Iowa, has plans under way for a municipal hydroelectric generating plant on the Des Moines River, near Harvey, estimated to cost about \$350,000, with machinery. The Fargo Engineering Co., Jackson, Mich., is engineer.

Hendrickson Brothers, Wolverton, Minn., operating a sand and gravel plant, are planning for the installation of new equipment, including gasoline cranes, conveying machinery and loading apparatus.

The Swarts Mfg. Co., Inc., Freeport, Ill., recently organized, will take over and operate the plant and business

of the Swartz Iron Foundry, specializing in the manufacture of pistons for automobile engines. Increased production is planned. Carl H. Swartz, heads the company.

Peterson & Johnson, 406 Swedish-American Bank Building, Rockford, Ill., architects, are preparing plans for a one-story power house to be erected in connection with a new local factory, the owner's name being temporarily withheld.

A vocational department will be installed in the three-story and basement high school to be erected at Danville, Ill., estimated to cost about \$500,000. Lewis & Dougherty, 519 Temple Building, are architects.

The Illinois Traction Co., Mayer Building, Peoria, Ill., has preliminary plans under way for a new one-story power house, estimated to cost in excess of \$500,000.

A vocational department will be installed in the new senior and junior high school to be erected at Scottsbluff, Neb., estimated to cost about \$500,000. R. A. Bradley & Co., Hastings, Neb., are architects.

The Casey Hudson Co., automatic screw machine products, states that the report that this company intended to move to Chelsea, Mich., was incorrect, as it has definitely decided not to move out of Chicago.

Philadelphia

PHILADELPHIA, March 6.

A one-story power house will be erected by Martin H. Walrath, Park and Glenwood avenues, Philadelphia, in connection with an addition to his woodworking plant, 67 x 175 ft.

The A. J. O'Neill Co., construction equipment, 1524 Chestnut Street, Philadelphia, is inquiring for a used compressor, capacity about 300 ft. per min. at 50 lb., belt driven or direct connected.

Benjamin Slatko, 336 East Third Street, Philadelphia, manufacturer of lighting equipment, will rebuild his three-story plant, recently partially destroyed by fire.

A power plant will be constructed by Walter E. Knipe & Sons, Hancock Street, Philadelphia, in connection with their new dyeing and finishing works at Wyoming and G streets, estimated to cost \$257,000. W. E. S. Dyer, Land Title Building, is architect and engineer.

The H. T. Palste Co., 3201 Arch Street, Philadelphia, manufacturer of electrical equipment and supplies, has awarded contract to the Turner Construction Co., 1713 Sansom Street, for a new four-story plant, 104 x 108 ft., at Thirty-second and Cherry streets, to cost in excess of \$100,000. Henry T. Palste is president.

The Bureau of Supplies and Accounts, Navy Department will receive bids until March 14, for 29,500 pounds of sheet steel for the Philadelphia Navy Yard; also for 400 ball bearings, and until March 28, for a quantity of bolts, screws, washers, etc.

A power plant, oven equipment, conveying and other mechanical equipment will be installed in the five-story plant, 100 x 100 ft., to be erected by the Tasty Baking Co., 2335 Sedgley Street, Philadelphia, on Hunting Park Avenue, estimated to cost \$150,000. The Turner Construction Co., 1713 Sansom Street, is the contractor.

Hexter & Kahn, Morris Building, Philadelphia, have awarded contract to Harry Gill, Jr., 2515 Germantown Avenue, for a one-story automobile service and repair building, 40 x 235 ft., at 5931-35 Broad Street, to cost \$90,000.

The Henry R. Fell Co., East Carroll Street, Trenton, N. J., manufacturer of concrete roofing tile, will build an addition to double approximately, the present capacity. New mixing, pressing and other machinery will be installed.

The Warren Webster Co., Point and Pearl street., Camden, N. J., manufacturer of heating equipment heating systems, etc., has preliminary plans under way for a new two-story factory on Federal Street. The Ballinger Co., 105 South Twelfth Street, Philadelphia, is architect. Warren Webster is president.

Fire, Feb. 27, destroyed a portion of the plant of the Light, Railway & Equipment Co., Holmes, Pa., manufacturer of mine trucks, rails, switches, etc., with loss estimated at about \$50,000.

The Peters Motor Corporation, Parker & Logan streets, Trenton, N. J., has purchased the former works of the Bethlehem Paper Co., Bethlehem, Pa., for a new plant, including parts manufacture, assembling, etc. Possession will be taken at once and equipment installed. It is proposed to give employment to about 50 persons for initial operations.

John S. Weaver, Lebanon, Pa., will build a new one-story ice-manufacturing plant, 40 x 100 ft., at Weavertown. Plans have been prepared.

A vocational department will be installed in the new two-story junior high school to be erected at Carbondale, Pa.,

for which John Howley, Traders' Bank Building, Scranton, Pa., architect, has been commissioned to prepare plans.

The Defiance Auto Lock Corporation, recently incorporated, is located at 836 Hamilton Street, Allentown, Pa., and advises THE IRON AGE that it will manufacture patented locking devices for automobiles. At first the lock will be manufactured on contract. Later the company expects to have its own shop and will be in the market for stamping press, milling machine lathe, gear cutter, nickel plating outfit and an acetylene welding outfit.

Buffalo

BUFFALO, March 6.

Jewett & Co., stove works, military Road, Buffalo, have awarded contract to the Hydro Construction Co., Mutual Life Building, for a two-story addition, 75 x 95 ft.

The Quale Garage Co., Inc., 2675 Main Street, Buffalo, is planning for a one-story machine and automobile repair shop, 40 x 200 ft. Grant M. Quale is president.

The Fedders Mfg. Co., Inc., 57 Tonawanda Street, Buffalo, manufacturer of automobile radiators, cans and other metal products, has purchased the former plant of the Laus-Missiquoi Marble Works, Lewis Street, Bridgeburg, Ont., for a new branch plant. Machinery will be installed at once to give employment to about 75 men, to be increased later.

Charles E. Skelton, Syracuse, N. Y., formerly connected with the Skelton-Chapin Co., has organized a company to operate a general machine works at 4025 South Salina Street, for the manufacture of special machinery and parts, with extensive experimental department.

The Yawman & Erbe Mfg. Co., 424 St. Paul Street, Rochester, N. Y., manufacturer of metal filing cabinets, etc., has plans under way for a three-story addition. Smith, Hinchman & Grilles, Detroit, are architects.

Wesley L. Kirchey, 3149 Bailey Avenue, Buffalo, is planning the erection of a one-story machine and automobile repair shop, 32 x 35 ft., in the rear of his present service building.

Electric equipment, hoisting and conveying machinery, etc., will be installed in the elevator plant, 56 x 165 ft., to be erected at Buffalo, by the Archer-Daniels Linseed Co., Twenty-ninth Avenue, S. E., Minneapolis, Minn., estimated to cost \$300,000, including machinery.

The Rochester Gas & Electric Co., 270 Main Street, Rochester, N. Y., will build a new one-story power house on Gorham Street, Canandaigua, N. Y.

John Cellnski, Brighton Street, Buffalo, operating a forge shop and general wagon repair works, has plans under way for a one-story addition, 26 x 60 ft.

The Wright Co., Albion, N. Y., recently organized by William D. Wright, Brockport, N. Y., has leased the former plant of the Albion Wood & Metal Products Co., for the establishment of a new factory to manufacture metal and wood specialties.

Cleveland

CLEVELAND, March 6.

Machine tool manufacturers are predicting a good demand for their products from makers of wireless telephone equipment. Popular interest in the radio 'phone has swept the country and manufacturers of wireless telephone apparatus are reported to be crowded with orders. Orders for one or two automatic machines for making radio equipment were placed with a local machine tool builder the past week and inquiries for several other machines have come from the same industry. Some good orders have also been placed for small parts for radio equipment that are made on automatic machines. The manufacture of radio receiving sets will require small machine tools, probably mostly automatic, semi-automatic and screw machines and punch presses.

Local machine tool manufacturers report a marked improvement in the number of inquiries and a slightly better volume of orders. The amount of prospective business indicates that March sales will show a considerable gain over February. A Cleveland machine tool manufacturer has taken an order for a turret lathe for shipment to Japan, his second order from Japan during the past month. When the slump came there was considerable American machinery on hand in Japan, but it is reported that most of this equipment has been disposed of and the trade looks for some activity from this source during the next few months. It is expected that American machinery will be required in Japan for the manufacture of small motor cars, motorcycles and bicycles.

Business with local dealers picked up somewhat the past week, but orders were mostly for single tools. The New York Central Railroad purchased two machines for its Col-

linwood shops. The Fisher Body Ohio Co. placed some additional machine tool equipment.

Inquiry for electrical equipment shows improvement. The General Electric Co. has just booked a 5000-kw. turbine for the Cleveland Cliffs Iron Co., Warren, Ohio, and an order for two out door sub-stations each with three transformers with a total capacity of 66,000 volts for the Mansfield Sheet & Tin Plate Co., Mansfield, Ohio, and for considerable electrical equipment for the Portsmouth, Ohio, plant of the Wheeling Steel Corporation, the latter order including motor generator sets and large variable speed motors.

The Cleveland Tractor Co., Cleveland, has made a reduction from \$795 to \$595 on its new model farm tractor and plans to increase production from 20 to 60 per cent.

The Ridge Tool Machine Co., Elyria, Ohio, recently incorporated, is reported to be in the market for machinery equipment.

The Leesebeary Machine & Mfg. Co., Fostoria, Ohio, has equipped a plant for the manufacture of piston rings, which is being placed in operation.

The Lincoln Tractor & Implement Co., which has been incorporated with a capital stock of \$1,000,000 will establish a plant in Urbana, Ohio, for the manufacture of tractor plows. It purchased the old plant of the North American Chemical Co., which will be enlarged by the erection of a machine shop, 100 x 250 ft., and a steel and gray iron foundry. R. T. Parish is president; George H. McCracken, vice-president; Lawrence H. Norton, secretary, and Joseph Link, treasurer.

The Blake Pump & Condenser Co., Fitchburg, Mass., is reported to be looking for a new factory location in the Central West, and the Alliance Chamber of Commerce, Alliance, Ohio, is negotiating with the company with a view of having it locate in that city.

The plant of the Franklin Tractor Co., Zanesville, Ohio, has been sold to H. E. Bullock, Chicago, for approximately \$35,000. Mr. Bullock was one of the creditors of the company.

The Cleveland waterworks department, which is planning an extension program this year, will be in the market shortly for 95 valves ranging from 12 to 48 in. in size. The order will aggregate approximately \$100,000.

The Standard Slag Co., Youngstown, Ohio, will shortly begin the erection of a new slag manufacturing plant at Bellaire, Ohio.

New England

BOSTON, MARCH 6.

Sales of machine tools were few and far between the past week, but an increase in inquiries for single machines is noted and for that reason sentiment is more hopeful than during the last of February. Buyers in many instances express a preference for good used rather than new tools, because of the disparity of prices. There is a real scarcity of used equipment in this territory that measures up to requirements, which in a large measure explains that small amount of business booked the past week. At the auction sale last Thursday at the Winnisimmet Shipyard, Inc., Chelsea, Mass., the best machine tools brought good prices, while inferior equipment sold at low figures. The shipyard itself was sold to H. F. Winslow, Boston, for \$200,000. It is assessed for \$800,000.

The most important sale this week of new tools was a 36-in. x 22-ft. lathe to a southern New England textile interest. Other sales include a new 11-in. x 5-ft. new South Bend lathe to a Fall River interest and a 9-in. x 3-ft. to a Portland Street, Boston, chemical laboratory, a 10 x 50 in. used plain Norton grinder and a used Whitney hand milling machine to a North Andover, Mass., textile interest, and a No. 40 used Perkins inclinable power press to a Boston manufacturer. A Vermont marble shipper bought two 3-ton cranes, and a Lowell manufacturer a 5-ton three-motor Northern crane. Stone & Webster have not closed on the new Ford crane inquiry.

The Boston & Maine Railroad is in the market for a gear cutting machine. The Boston & Albany has not yet purchased its brass working lathe. The Central Vermont, the Rutland and the Bangor & Arcootook railroads have asked local dealers to furnish preliminary estimates of certain tools contained in lists considered some time back and set aside for a time, which gives hope the lists are to be put out before long. The Boston Elevated Railway Co. is inquiring for turret tool equipment, but has not decided what it will need for its proposed Everett repair shop to be built later. The Barnett Drop Forging Co., Easthampton, Mass.,

wants two or three high speed drill presses, preferably good used tools, and John H. Stein, Milford, N. H. one 100-lb. board drop hammer.

The small tool business shows expansion and in the aggregate suggests considerable activity among certain shops.

Plans are being drawn for an addition to the plant of the Manchester Traction, Light & Power Co., Manchester, N. H. Barry, Cashman & Co., 200 Devonshire Street, Boston, are engineers.

The W. F. Concannon Shear Co., Milford, Conn., shears and scissors, is about to begin manufacture. It recently was organized with a capital of \$20,000.

The Fairmont Avenue, New Haven, plant, American Steel & Wire Co. will be remodeled to accommodate a new slicing department. The cost of alterations is estimated at \$30,000.

The plant of the Hanscom Cutter Works, Hyde Park, Boston, tool manufacturer, was considerably damaged by fire last week.

The Hampshire Electrical Appliance Corporation, capitalized for \$100,000 has been given a charter to manufacture washing machines, irons, other household devices and mechanical appliances. Laurence K. Foote, Southbridge, Mass., is president; Lewis A. Wilson, Worcester, vice-president, and Ethel S. Brosseau, Southbridge, treasurer. The company is seeking manufacturing quarters in Worcester. Mr. Wilson, during the war, was assistant superintendent Osgood, Bradley Car Co., Worcester, and more recently associated with the Crompton & Knowles Loom Works.

Beaupre Brothers, Franklin, N. H., contemplate rebuilding their foundry. Details have not been worked out.

The announcement in THE IRON AGE on Feb. 23 that the E. Howard Clock Co., Boston, purchased a factory at Peabody, Mass., is denied by the company, which advises that while several factories have been under consideration, including the one at Peabody, no definite action toward the purchase of any property has been taken by the board of directors.

Ricketts & Shaw, Monson, Mass., are considering the installation of new equipment in the power plant at their woolen factory. Reeds & Thorpe, 60 Prospect Street, Hartford, Conn., engineers, will prepare estimates of cost.

The Whitins Machine Works, Whitinsville, Mass., is completing plans for a two-story branch plant, 75 x 160 ft., at Northbridge, Mass. Joseph D. Leland, 41 Mt. Vernon Street, Boston, is architect.

The Oxford Paper Co., Rumford, Me., has completed arrangements for the purchase of the power plant and property of the Rumford Falls Power Co., Rumford. Improvements are being considered. To carry out the acquisition, the company has arranged for a bond issue of \$5,000,000.

The Builders' Iron & Steel Co., 262 Bridge Street, Cambridge, Mass., has construction under way on a new branch plant at Everett, Mass., 70 x 250 ft., and office building, estimated to cost \$65,000. H. F. Thatcher, Malden, Mass., is architect.

A one-story automobile service and machine repair works, 75 x 135 ft., for company cars, will be constructed at Cambridge, Mass., by the National Bottling Co., 28 School Street, Boston, estimated to cost about \$45,000.

The Atlantic Refining Co., 3144 Passayunk Avenue, Philadelphia, has preliminary plans under way for a new branch oil refinery at Fall River, Mass., estimated to cost about \$1,000,000, including equipment.

The Board of Education, Providence, R. I., has plans nearing completion for a new central power house on Pond Street, for service at the high school buildings, estimated to cost \$160,000. Bids will be asked at an early date.

A vocational department will be installed in the proposed junior high school to be erected at Ware, Mass., estimated to cost about \$150,000.

The Savage Arms Corporation, 50 Church Street, New York, has taken title to the plant of the J. Stevens Arms Co., Chicopee Falls, Mass., heretofore held by the Westinghouse Electric & Mfg. Co., Pittsburgh, for approximately \$1,500,000. The purchasing company has been operating at the plant for a number of months.

The Bureau of Yards and Docks, Navy Department, Washington, has completed plans for a new dry dock and power house at the South Boston Navy Yard, and will call for bids under schedule 4550.

The American Electric & Maintenance Co., 51-57 Taylor Street, Springfield, Mass., has work under way on a new plant, 128-130 ft., for electrical repair and parts production. A. M. Soffield is president and general manager.

Detroit

DETROIT, March 6.

The Pere Marquette Railroad Co., Detroit, has plans under way for new car and locomotive shops at Grand Rapids, Mich., to cost about \$1,000,000, including equipment.

The Kirchen Machine Co., Lansing, Mich., has commenced the erection of an addition, to increase the capacity of the general machine department. A portion of the present works will be remodeled.

The Hirsch Mfg. Co., Sturgis, Mich., manufacturer of metal products, has awarded contract to the Citizens' Lumber Co., Sturgis, for a three-story and basement addition, 130 x 200 ft., to cost about \$100,000. Work will commence at once. E. S. Batterson, 405 Hanselman Building, Kalamazoo, Mich., is architect and engineer. C. Hirsch is president.

The Ford Motor Co., Detroit, is arranging to operate power plants of sufficient capacity to provide for all of its works, and has plans under way for increased construction for this purpose. The plant of the Lincoln Motor Co., a recent acquisition, will also be operated by power from the River Rouge generating station of the company. The entire project is estimated to cost in excess of \$400,000.

The Anchor Concrete Machinery Co., Rock Rapids, Iowa, manufacturer of concrete brick and block-making machinery and parts, has acquired the plant and adjoining property of the Adrian Steel Castings Co., Adrian, Mich., for a new factory. Operations will begin at once. The company was incorporated recently with a capital of \$100,000.

Coal-handling and conveying machinery will be installed at the new storage bins, 56 x 200 ft., to be erected by the Schelwo Coal & Coke Co., 6356 Mack Avenue, Detroit. William Hurt is secretary. F. W. Weidmeyer, 412 Campau Building, is architect.

The Cadillac Machinery Co., Boydel Building, Detroit, is in the market for a used 53½ Toledo or 80½ Bliss press or equivalent.

Cincinnati

CINCINNATI, March 6.

While no large orders were reported sales the past week showed an improvement over the week preceeding and the indications are that March will show more bookings than February. The largest order during the week was for eight machines. An inquiry for 15 drilling machines came out but is said to be only for appraisal purposes. Most of the inquiries received are for single machines but many manufacturers are looking for much better business as a result of these inquiries. It is expected that several railroad lists will shortly be issued, as manufacturers state some interest is being shown by purchasing agents. The used machinery market is holding up fairly well, although the month of February was poor compared with January. The only price change of note the past week was that by practically all manufacturers of electric motors, reductions of 10 per cent becoming effective Feb. 27.

The Indianapolis Frog & Switch Co., Springfield, Ohio, has purchased 16 acres adjacent to its property and while no immediate building expansion program is planned, the additional ground will be used to provide more trackage for the company and to enable it to turn out a wider diversity of product.

The Boyet-Ledder Mfg. Co., Covington, Ky., has been incorporated with a capitalization of \$15,000 to manufacture mechanical toys. John F. Boyet and Frederick G. Ledder, Covington, are the incorporators.

Baltimore

BALTIMORE, March 6.

An electrically-operated pumping plant will be installed in connection with the proposed new waterworks to be constructed by the Common Council, Williamsport, Md., estimated to cost about \$100,000.

The Hanson Motor Co., Atlanta, Ga., manufacturer of automobiles, has acquired the plant and property of the American Motors Export Co., Jacksonville, Fla., for a branch, maintaining headquarters at Atlanta. The capacity will be increased.

A crane-runway, 72 x 702 ft., to cost about \$30,000, will be constructed by the Weyerhaeuser Timber Co., Lexington Building, Baltimore, at First Avenue and Charles Street.

A. E. Anderson and W. N. Canter, Bristol, Va., are organizing a company to establish a plant for the manufacture of steel, brass and other metal specialties.

The Common Council, Enfield, N. C., is taking bids until

March 15 for a new municipal power plant, and pumping machinery for the waterworks department. William C. Olsen, Kinston, N. C., is consulting engineer.

J. C. Steele & Sons, Statesville, N. C., manufacturers of brick-making machinery, are making inquiries for a number of machine tools for installation at their plant, including boring mill, heavy duty lathe, planer, bolt-threading machine, and other equipment.

The Atlantic Ice & Cold Storage Co., Kirkwood, near Atlanta, Ga., is arranging for the erection of a new cold storage plant to cost about \$40,000.

The Pittsburgh Plate Glass Co., Pittsburgh, is contemplating the construction of a four-story addition to the plant of its Rennous-Klein Division, 3221 Frederick Avenue, Baltimore, 75 x 205 ft.

The General Purchasing Officer, Panama Canal, Washington, is taking bids, with no closing date stipulated, for 1000 seamless brass condenser tubes.

The Office of the Chief of Air Service, United States Army, Washington, D. C., is taking bids until March 30 for a quantity of seamless annealed copper tubing.

A vocational department will be installed in the high school to be erected at Roanoke, Va., estimated to cost about \$500,000. A similar department will be installed in the new junior high school to be constructed in the South East section, at a cost of about \$130,000. D. W. Persinger is chairman of the board.

The Elizabeth City Iron Works, Elizabeth City, N. C., has plans under way for the construction of a new dry dock and ship repair plant, with general machine shops, estimated to cost close to \$60,000. The installation of a marine railroad is also being considered. Henry and Andrew Sanders head the company.

Indiana

INDIANAPOLIS, MARCH 6.

The Huntington Ice Co., Inc., Huntington, Ind., is contemplating the erection of a new two-story ice-manufacturing plant to cost about \$50,000.

The United States Government Engineers, Evansville, Ind., have surveys under way for a hydroelectric power plant at Newburg, estimated to cost in excess of \$2,000,000.

The Bloomington Brick & Tile Co., Bloomington, Ind., has plans nearing completion for its new works at Unionville, Ind., estimated to cost about \$200,000, including machinery. A. W. Beecher is president.

The Madison County Superior Court has approved of the sale of the plant and property of the Buckeye Mfg. Co., Anderson, Ind., manufacturer of motor driven tractors and engines, to James W. Sanaberry, Anderson, on his bid of \$45,100.

The Midwest Utilities Co., Chicago, a subsidiary of the Commonwealth Edison Co., has acquired the electric plants and property of the Hawks Electric Co., Goshen, Ind., and the Winona Light & Water Co., Warsaw, Ind. The new owner is contemplating extensions in the plants and systems.

Milwaukee

MILWAUKEE, MARCH 6.

Although the machine tool trade is lacking in volume and is devoid of feature, the feeling exists that progress is being made by metal-working industries in getting new business, which sooner or later must be reflected in increased requirements of machine tools. The call for used equipment is relatively better than for new tools, but this is believed to presage the time when the absorption of used equipment will have reached the point where new tools will again have a fair chance of a real market. Foundry operating schedules are steadily increasing and machine shops are feeling a beneficial effect. The automotive industries the past week or two have broadened their inquiries and some milling machine business has resulted. A few sales of miscellaneous machinery have been made to makers of tractor parts and agricultural implements, with improved prospects for more business in 30 to 60 days.

The C. A. Shaler Co., Waupun, Wis., manufacturer of vulcanizing and tire repair apparatus, headlight lenses and other automotive specialties, sustained a loss of close to \$350,000 by fire March 2. The factory, equipment and warehouses are practically a total loss. C. A. Shaler, president and general manager, at present in California, telegraphed March 5 to prepare immediately for the erection of a new plant of fireproof construction, details of which are not yet available. R. B. Dunlap is secretary.

The International Harvester Co., 317 Oregon Street, Milwaukee, will build a garage and service shop costing about \$45,000 at 25-29 Reed Street. Construction contracts have been let.

The Interior Woodwork Co., Park Street and Fifth

Avenue, Milwaukee, is in the market for some additional equipment, for a three-story manufacturing addition, 87 x 158 ft., and a storage and stock addition, two stories, ell-shaped, 90 x 161 ft. The architect is Herman J. Esser, Camp Building. The work will cost about \$100,000 in all.

The Peerless Traveling Goods Co., Mayville, Wis., manufacturer of trunks, bags, etc., has plans for a new factory, two and three stories, 60 x 120 ft., of brick and mill construction, with a separate one-story office building. Considerable new machinery, including special tools for making steel frames and other metal parts, will be installed. The investment is estimated at about \$75,000.

The Moline Typewriter Co., Oshkosh, Wis., manufacturer of writing machines, is raising \$50,000 by an issue of two-year, 7 per cent. notes, to provide additional working funds and finance purchases of supplementary equipment and materials. No extension of buildings is contemplated at present. R. D. Wynn is president and general manager.

The Seamweld Equipment Co., 814 Wanebago Street, Milwaukee, has changed its corporate style to the Fred Pabst Co., and proposes to enlarge its line of activities in the metal-working field. It is controlled by Frederick Pabst, president Pabst Corporation, formerly Pabst Brewing Co., and occupies part of the former brewery group.

The Oswald Jaeger Baking Co., 814-822 Central Avenue, Milwaukee, which is erecting a \$150,000 addition to its bakery, has let the contract for a new refrigeration plant to the Vilter Mfg. Co., Milwaukee.

The Simplex Alarm Co., 129 Michigan Street, Milwaukee, manufacturer of patented burglar alarms and similar specialties, has increased its capitalization from \$75,000 to \$150,000 to accommodate the growth of its plant and business.

The U. S. Tractor & Machinery Co., Menasha, Wis., at its annual meeting authorized an increase in capital stock from \$500,000 to \$1,000,000 and a bond issue of \$250,000 to provide for the construction of a new foundry and additions to the machine shop, assembling floors and storage buildings. These will enable the company not only to manufacture practically all parts of its tractors and tractor implements, but to enlarge the line to embrace other power farm equipment. Officers were re-elected as follows: President, J. M. Robinson; vice-president, G. D. Harris; secretary, Joseph G. Saller; treasurer, A. B. Jensen. Plans are in preparation and it is hoped to start construction work by April 1.

Carl Girnau & Co., 118 South River Street, Eau Claire, Wis., machinists and automobile repairers, have plans for a new shop, 80 x 110 ft., one story, of brick, with steel-trussed roof. With equipment it will cost about \$28,000.

The C. W. Dickover Mfg. Co., Tomah, Wis., has been incorporated with a capital stock of \$25,000 to manufacture shop equipment, fixtures and tools, principally equipment for garages and repair shops. The incorporators are Charles W. Dickover, Alex M. Henry and Earl W. Henry, all of Tomah. The present shop is to be enlarged materially in the spring.

The Madison, Wis., board of public works expects to take bids soon for the installation of two standby generating units, with gasoline engine drive. A portable pumping unit with a capacity of 1000 gal. per minute also will be purchased.

G. A. Huck, Sturgeon Bay, Wis., is organizing a new corporation with a capital stock of \$250,000 to take over the so-called Green stone quarries in Sawyer, a suburb, and install electrically-operated quarrying, conveying, crushing and other machinery, hoppers, screens, etc., estimated to cost more than \$125,000.

The Wisconsin Public Service Co., Green Bay, Wis., has let contract to J. R. McDonald, Iron Mountain, Mich., for a new reinforced concrete dam at Johnson Falls, on the Peshigo River, as the first part of work on a \$500,000 hydro-electric generating project, previously noted. Contracts for the power house will be let within a short time. Specifications of equipment are in preparation. D. R. Pheneck is vice-president and general manager.

The Brill-Saunders Machinery Co., Appleton, Wis., has been organized with a capital stock of \$150,000 by S. A. Saunders, E. L. Brill and W. H. Blake to manufacture machinery, tools and fixtures.

The Board of Education, Superior, Wis., has engaged E. M. Johnson, local architect, to design a new vocational training school building, to be known as the Webster Memorial High School, and cost about \$100,000. Bids will be taken some time in April or May. W. J. Whipple is president of the board.

The Bachman Electric Co., Fond du Lac, Wis., has purchased the entire business and equipment of the M. C. Smith Electrical Repair & Supply Co., and will employ it as a department for rebuilding and repairing motors, rewinding armatures, and otherwise serving industrial electric power

users. M. C. Smith has become associated with the Bachman company as manager of the new department.

O. M. Johnson, River Falls, Wis., has opened a general sheet metal working shop in the Ostness Building. Most of the equipment needs have been provided for.

The American Hide & Leather Co., Chicago, contemplates improvements in its tanneries at Sheboygan, Wis., the principal work being to remodel the power plant and boiler house, install a coal and ash conveyor system and automatic stokers. Edward A. Juul, Sheboygan architect, is preparing plans.

Pittsburgh

PITTSBURGH, MARCH 6.

Activities in the machinery and equipment market lately have been limited. Inquiries the past week have shown a marked falling away and only a few sales of importance have been concluded. Five cranes recently inquired for by the Ritter-Conley Co. have been awarded to Manning Maxwell & Moore, Inc., distributor of the Shaw cranes. The order is for one 10-ton, two 7½-ton and three 3-ton cranes. The latest word about the cranes inquired for by the Wheeling Steel Corporation is that the company is urging makers to have prices in by the latter part of this week, and the expectation is that some, and possibly all of the 20 cranes, will be placed at an early date. There is also a possibility that the National Tube Co. will close soon for a 15-ton crane for its Christy Park works, McKeesport, Pa. Very low prices are understood to prevail for cranes. So few of the makers have any considerable amount of business on their books, that competition for orders is unusually sharp.

Machine tool sales usually are for individual tools, as the shops in and near Pittsburgh are merely replacing obsolete or worn out machines. There is no evidence yet of railroad buying. Eastern systems appear to be recovering less rapidly than those in the West, and railroad equipment manufacturers in this vicinity are not getting much business.

Mechanical conveying equipment, etc., will be installed at the two asphalt plants to be constructed by the county commissioners, Pittsburgh, for the Highway Department. Bids for the buildings and machinery will be asked at an early date. Roy D. Schooley, county road commissioner, is in charge.

D. S. Milloy, Twelfth and Cascade streets, Erie, Pa., manufacturer of planing mill products, has construction under way on a three-story addition, 80 x 200 ft.

A vocational department will be installed in the two-story and basement junior high school to be erected at Twenty-third and Cascade streets, Erie, Pa., estimated to cost \$350,000. W. W. Myers, Library Building, is architect.

The T. & A. Brass Foundry Co., P. O. Box 668, Charleston, W. Va., recently organized, will operate a plant to manufacture roller bearing wheels for traction cars, brass, bronze and aluminum castings, etc. E. T. Thayer is president and manager.

The American Car & Foundry Co., Huntington, W. Va., has issued a call for bids on a general contract for an addition to its plant on Third Avenue, to cost close to \$500,000, including machinery. Headquarters of the company are at 165 Broadway, New York. J. W. Ensign is district manager at Huntington.

The American Thermos Bottle Co., Madison Avenue and Forty-sixth Street, New York, has tentative plans under consideration for a new manufacturing unit at its plant at Huntington, W. Va., totaling about 100,000 sq. ft. of floor space. William B. Walker is president.

The Eagle Mfg. Co., Wellsburg, W. Va., manufacturer of oil containers and other metal products, is planning to immediately rebuild the portion of its factory recently destroyed by fire. W. C. Jacobs, assistant secretary, is in charge.

The Pacific Coast

SAN FRANCISCO, FEB. 28.

The American Aluminum-Metal Products Co., Burbank, Cal., has awarded a contract to R. W. McCrea, Huntington Park, Cal., for its new local plant, estimated to cost close to \$100,000. Richard D. King, 519 Van Nuys Building, Los Angeles, is architect.

A vocational building will be erected by the Board of Education, San Diego, Cal., in connection with its group of high school buildings at Balboa Park, estimated to cost about \$300,000. Theodore C. Kistner, San Diego, is architect.

The Western States Gas & Electric Co., Elks Building, Stockton, Cal., has plans under way for a new hydro-electric generating plant near Placerville, Cal., to comprise two units, each with capacity of about 10,000 kw. Other

units will be constructed later. With transmission system it is estimated to cost in excess of \$1,500,000.

The Ulrich Tubing Drainer Co., Huntington Beach, Cal., manufacturer of oil drainers and other metal specialties, will build a new factory, 48 x 60 ft. Frank Ulrich is head.

The Westinghouse Electric & Mfg. Co., Los Angeles, is completing plans for its new five-story plant at Fifth and San Pedro streets, estimated to cost about \$500,000, including equipment. Noerenberg & Johnson, Los Angeles, are architects.

The Board of Directors, Southern California Edison Co., Los Angeles, has authorized an appropriation of \$22,500,000, to be used during the year for extensions and improvements, including new power plants and equipment, transmission systems, substations, etc.

The Carmichael Irrigation District, Fair Oaks, Cal., has rejected all bids for electrically-operated pumping machinery for its irrigation works, and will call for new bids at an early date.

The General Electric Co., Schenectady, N. Y., with San Francisco offices in the Rialto Building, has acquired about 24 acres at Oakland, Cal., as a site for a new plant, to cost about \$1,000,000. It will be operated in conjunction with the lamp manufacturing plant at West Oakland.

The Thurston & Flavelle Co., Port Moody, Wash., will build a power house and install motors and other electrical equipment in the different departments of its lumber mill. The work will cost about \$60,000.

The Tacoma Ice & Refrigerating Co., Tacoma, Wash., is perfecting plans for a new ice-manufacturing and cold storage plant at Holgate and South Twenty-sixth streets, estimated to cost \$250,000.

The Monroe Shingle Co., Betzen, Ore., is planning to immediately rebuild its shingle mill, destroyed by fire late last year, with loss in excess of \$75,000. A power plant will be constructed and the entire plant electrified, with all machinery operated by individual motor drive. It is estimated to cost about \$100,000.

The City Council, Leavenworth, Wash., has preliminary plans under consideration for a municipal electric power plant.

The Central South

St. Louis, March 6.

The Pennsylvania Tank Line, 25 West Forty-third Street, New York, has awarded a contract to the Kansas City Structural Steel Co., Kansas City, Mo., for new railroad tank car works at Argentine, Kan., consisting of a steel fabricating shop, 80 x 100 ft.; machine shop, 40 x 45 ft., and forge and blacksmith shop, 80 x 100 ft., all one story.

The Kansas City Cold Storage & Warehouse Co., Kansas City, Mo., recently organized, has filed plans for its ice-manufacturing and cold storage plant, estimated to cost \$1,300,000, including machinery. It is a subsidiary of the United States Cold Storage Co., West Thirty-ninth Street and Hoyne Avenue, Chicago. S. Scott Joy, 2001 West Thirty-ninth Street, Chicago, is architect and engineer.

The Automatic Water Pump Mfg. Co., 236 East High Street, Jefferson City, Mo., recently organized with a capital of \$2,000,000 to manufacture automatic pumping machinery and parts, has plans under way for seven buildings, including general iron working department, foundry, machine shop, wood-working department, power house and other structures. The plant will approximate 260,000 sq. ft. of space, and will cost about \$150,000. A list of machine tools and other equipment to be installed is being prepared; bids both for buildings and equipment will be asked in from four to six weeks. Benjamin F. Schuetz is president.

The St. Louis & San Francisco Railroad Co., St. Louis, is arranging its shops at Fort Scott, Kan., to manufacture steel bodies for coal cars used on the system, and will increase the facilities and working force. A portion of the fund of \$485,000, arranged for new equipment during the present year, will be used at the plant. Another appropriation has been made of \$360,000, for rebuilding steel coal cars, including new bodies. For new power plants to be constructed during the year, a fund of \$205,000, has been set aside.

The Graft-Bright Mfg. Co., 441 East Jefferson Street, Louisville, recently organized, will operate a plant for the manufacture of agricultural implements. It is proposed to develop a daily output of 3000 garden hoses, rakes, spades, etc.

A four-story automobile service and repair plant, 130 x 160 ft., for company motor trucks and cars, estimated to cost \$350,000, will be built by the Scruggs, Vandervoort & Barney Dry Goods Co., Tenth and Olive streets, St. Louis. Plans have been prepared. M. L. Wilkinson is president.

The Riverside Light, Power & Gas Co., Abilene, Kan.,

will build a new hydroelectric power plant on local site, estimated to cost in excess of \$100,000. E. P. Callahan is superintendent.

The Pidgeon-Thomas Iron Co., Memphis, Tenn., has had plans prepared for a new steel fabricating shop, one story, 160 x 260 ft. to cost about \$75,000. Work will commence at an early date. E. L. Harrison, Memphis, is architect and engineer.

The Sinclair Refining Co., Coffeyville, Kan., will proceed at once with the erection of its new refinery, work upon which has been suspended for some time. The company will expend about \$3,000,000 on the refinery and other work in this district during the present year. Headquarters are at 111 West Washington Street, Chicago.

The City Commissioners, Parsons, Kan., will take bids up to March 28, for pumping machinery, electrical equipment, etc., for the waterworks system, including a 3,000,000-gal. crank and fly-wheel opposed type pumping engine; 1000 and 1800-gal. motor-driven centrifugal pumps and electrical equipment for the Neosho River pumping station; 1400 and 2100-gal. motor driven centrifugal pumps; two 130 k.v.a. engine-driven generators; two 150-hp. water tube boilers, with accessories and electrical equipment. F. W. Frye is city clerk. Burns & McDonnell, 402 Interstate Building, Kansas City, Mo., are consulting engineers.

The Profit-Sharing Ice Co., 315 James Building, Chattanooga, Tenn., will build a new one-story ice-manufacturing plant, 60 x 100 ft. Bowdre Brown is president.

The Great Eastern Refining Co., Leach, near Catlettsburg, Ky., recently organized with a capital of \$2,000,000, has acquired a site for the construction of a new oil refinery with daily capacity of about 1000 bbl., to cost approximately \$250,000. The output will be doubled in the near future. A large steel tankage department will also be erected. T. H. Gilman is general manager in charge.

The Common Council, Germantown, Tenn., is arranging for the construction of a municipal electric power plant.

The Greenback Brick Co., Greenback, Tenn., is perfecting plans for new works for the manufacture of brick, tile and kindred products, with an initial daily output of about 30,000 bricks. J. L. Jones is proprietor and manager.

The City Council, Nashville, Tenn., is planning to rebuild its municipal electric power plant, recently destroyed by fire with loss of about \$100,000. W. Southgate is city engineer.

The Stafford Motor Works, Twenty-second and Campbell streets, Kansas City, Mo., has awarded a contract to Harvey Stiver, 402 Shubert Building, for a one and two-story machine shop, 65 x 130 ft., to cost about \$30,000. R. A. Curtis, 637 Lee Building, is architect.

The Gulf States

BIRMINGHAM, March 6.

The Collinsville Mfg. Co., Fort Worth, Tex., manufacturer of metal products, has leased the building at 2810 Main Street, Dallas, Tex., for the establishment of a new plant and will remove its present works to the new location. S. A. Menczer is president. J. P. S. Morgan will be manager of the Dallas plant.

The Voth Hardwood Co., Voth, Tex., recently formed with a capital of \$150,000, has acquired the local property of the Keith Lumber Co., and plans a number of additions. An additional band saw mill will be constructed, with machinery to increase the output to 150,000 ft. per day. Lumber handling machinery and conveying equipment will be installed. B. F. Bonner is president, and Carroll Keith, secretary and general manager.

George W. Polk and T. B. Lyster, receivers for the Texas Motor Car Association, Fort Worth, Tex., are arranging for the sale of the company's property, including plant for the manufacture of automobiles and motor trucks, bodies, etc., with machine shop, forge shop, assembly shop, etc.

The Frigid Mfg. Co., 115 Parker Street, Tampa, Fla., recently organized with a capital of \$200,000 to manufacture ice and refrigerating machinery, has acquired a building, 50 x 236 ft., for its plant and will commence the installation of machinery at once. A. N. Duncan is president and treasurer.

The Florida Filter Corporation, 218 West Bay Street, Jacksonville, Fla., lately organized, has acquired a building for the manufacture of water filter equipment. Initial operations will be devoted to the most part to assembling, and equipment will be installed to provide for a capacity of 500 filters a month. The production of parts will be arranged for at outside plants. W. H. Dunbar is general manager.

The Hialeah Producing & Refining Co., 36 Second Avenue, Miami, Fla., E. D. Noel, president, is planning for a

new oil refinery at Hialeah with initial daily capacity of about 1000 bbl. It is estimated to cost about \$200,000.

Fire, Feb. 25, destroyed the machine shop, forge and blacksmith shop, boiler shop and other buildings at the plant of the Gulf & Ship Island Railroad Co., Gulfport, Miss., with loss estimated at about \$75,000.

The Russell Clay Mfg. Co., Equitable Building, Baltimore, Floyd B. Powell, manager, has acquired a plant at Alton, near Birmingham, and will establish works for the manufacture of vitrified paving brick, with initial daily output of about 50,000 brick. Equipment will be installed at once, including about 200 industrial cars.

The Vitrolite Co., 133 West Washington Street, Chicago, with factory at Parkersburg, W. Va., has leased property at 2220 Commerce Street, Dallas, Tex., for a branch plant. Machinery will be installed for cutting, grinding, polishing and finishing the crude vitrolite material from the Parkersburg works.

H. B. Stevens, Naples, Morris County, Tex., has work under way on a new building for an electric power and ice-manufacturing plant for service in this section. It will cost about \$65,000.

The O. K. Battery Co., Dallas, Tex., has leased the building at 2815-17 Main Street, for the establishment of a plant to manufacture electric storage batteries and parts. It is proposed to develop an output of 4,000 batteries a month. C. G. Lippencott is president.

The Valley Ice Co., 1121 Julia Street, New Orleans, La., W. H. McGraw, head, is arranging for the erection of a one-story ice-manufacturing plant with daily capacity of about 100 tons, estimated to cost \$40,000.

The new engineering shop building to be erected by the board of directors, Agricultural and Mechanical College of Texas, College Station, Tex., will comprise machine shops, forge shop, foundry, carpentry, pattern and other mechanical departments, estimated to cost about \$175,000, of which about \$40,000 will be expended for equipment. A list of machinery will be arranged at an early date. A new agricultural building will also be built, to cost \$250,000. The Wattinger Construction Co., Austin, Tex., has the general building contract.

W. E. Hart and Herbert Graves, Fort Worth, Tex., have organized a company with capital of \$200,000 to build a plant to manufacture hand-power laundry and washing machines. Work will commence at an early date. The Industrial Bureau of the Chamber of Commerce, Roscoe Ady, director, is interested in the project. Mr. Hart will be president of the organization.

A vocational department will be installed in the new high school to be erected at Sulphur Springs, Tex., by the local School Board, E. L. Ashcroft, president. Plans have been prepared by Barlebaugh & Whitson, Dallas, Tex., architects.

The Frost-Johnson Lumber Co., Shreveport, La., will consolidate with H. W. Cole, Pine Bluff, Ark., operating a large hardwood mill. The merged company will operate under the Frost-Johnson name, and has plans under way for a new hardwood flooring plant at Shreveport to cost \$300,000, including equipment. The Pine Bluff plant will be continued as a branch. E. A. Frost is president.

Canada

TORONTO, MARCH 6.

The machine-tool business continues on about the same level as that of the past few weeks. Orders are being received in limited numbers for one or two machines with an occasional order for larger quantities, but big lists are absent. Inquiries are increasing, with many considered as good prospects, and it is the general opinion that business is showing slow but steady improvement. The outlook for March is much brighter than either of the two previous months. Salesmen are following up every prospect and in some cases are resorting to price shading when a good order is in view. The demand for drills, taps, reamers, etc., continues steady, with inquiries and a few orders being received for future use. While some shading is being done by dealers no general price revision has been made, although there is a possibility that some reductions may be announced later.

The Standard Steel Construction Co., Welland, Ont., is in the market for a second-hand locomotive crane from 7½ to 10 tons capacity.

It is reported that the plant of the Messervy Battery Co., Brampton, Ont., has been purchased by the Arabel Mfg. Co., New York, and that it will be enlarged and additional equipment installed.

The Thornton Rubber Co., Oshawa, Ont., suffered loss by

fire, Feb. 22, amounting to \$100,000, including building, machinery, etc.

The Canadian National Railways have acquired a large tract of land off the outskirts of Regina, Sask., and will use it for yard extensions, increased grain handling facilities and for the enlargement of its shops.

There is no possibility at present of a plant being established in Toronto by the Canadian Car & Foundry Co., Montreal, stated W. W. Butler, president of the company, when referring to the report that has been circulated recently that such a move was contemplated.

It is reported that the International Harvester Co., Hamilton, Ont., is negotiating for the purchase of the plant of La Machine Agricole de Montmagny, Montmagny, Que.

Announcement was made by the Chamber of Commerce, St. Thomas, Ont., that the Wood-Gorrie Motors, Ltd., a newly incorporated company, formed for the manufacture of the Warwick light six car in four models, has selected St. Thomas, Ont., for the location of its plant. It has engaged temporary quarters in the factory of St. Thomas Boxes, Ltd., which will be used as an assembling plant. Negotiations are underway for the purchase of a 25-acre site, in the new industrial area. W. B. Wood, Toronto, is president of the company; A. J. Gorrie, Montreal, vice-president; C. R. Collard, Toronto, secretary-treasurer, and W. H. Smith, Toronto, chief engineer and designer. At the outset the company will be an assembling concern only, using standard automobile parts.

The preliminary work for the construction of the plant for the Three Rivers Pulp & Paper Co., Three Rivers, Que., which is capitalized at \$3,000,000 will start this month, and it is expected that the plant will be in operation by the end of 1923.

A manufacturing plant will be constructed at Galt, Ont., by the International Tank & Silo Co., Ltd. It has purchased a 4-acre site on which will be erected a one-story factory, 120 x 200 ft. The company will turn out the same products as those manufactured by the Endlock Mfg. Co., Des Moines, Iowa.

Trade Changes

Noel Cunningham, formerly connected with the Coal Washing Equipment Co. has now become associated with the Hardinge Co., Incorporated, 120 Broadway, New York. This change is due to the acquirement by the Hardinge Co. of all manufacturing and sales rights of the James coal washing equipment, formerly handled by the Coal Washing Equipment Co. This machinery is used for the reduction of the ash and sulphur content of all sizes of anthracite and bituminous coals. Mr. Cunningham has been placed in charge of this new department of the Hardinge Co.

The Stowell Co., founder and manufacturer, South Milwaukee, Wis., has changed the location of its Chicago office from 509 Monadnock Block to 620 McCormick Building. E. B. Hansen will continue as manager of the office.

The American Machine & Foundry Co. has acquired a substantial interest in the Gurney Elevator Co. and it is understood that hereafter Gurney elevators will be manufactured in the plant of the American Machine & Foundry Co. in Brooklyn, in addition to the Gurney Elevator Co.'s plant at Honesdale, Pa. This arrangement was brought about to provide increased manufacturing facilities for the rapidly growing business of the Gurney Elevator Co., partly due to its entrance into the field of high-speed gearless elevators.

The name of the American Sheet Metal Stamping Corporation has been changed to the Henson-Blair Mfg. Co. effective March 1.

The Whiting Corporation, Harvey, Ill., foundry equipment, has established a branch sales office in New York at 126 Liberty St., having discontinued its agency agreement with Wonham, Bates & Goode Trading Corporation, N. Y. J. Ross Bates, now a vice-president of Whiting Corporation, is in charge of the new office. He will be assisted in the New York territory by D. Felderman, Jr. and in the New England States by R. C. Maley, who will open an office at Springfield, Mass. All of these gentlemen were formerly associated with Wonham, Bates & Goode Trading Corporation. The Whiting Corporation has also opened a branch office in Indianapolis, 305 Merchants Bank Bldg., in charge of S. E. Stout, formerly at the main office, Harvey, Ill. Mr. Stout will cover southern Indiana and adjoining cities in Ohio and Kentucky. The company's Detroit office has been moved from Penobscot Building to 206 Stahelin Bldg., 3000 Grand River Ave.

The business of William Wieman & Co. dealer in pig iron, steel, coal and coke, and that of C. S. B. Ward & Co., Inc., dealer in coal and coke, have been merged and will be continued under the name of The Wieman & Ward Co., with offices at 997-998 Union Arcade Building, Pittsburgh. William Wieman is president and treasurer and C. S. B. Ward, vice-president and secretary.

Current Metal Prices

On Small Lots, Delivered from Merchants' Stocks, New York City

The following quotations are made by New York City warehouses.

As there are many consumers whose requirements are not sufficiently heavy to warrant their placing orders with manufacturers for shipment in carload lots from mills, these prices are given for their convenience.

On a number of articles the base price only is given, it being impossible to name every size.

The wholesale prices at which large lots are sold by manufacturers for direct shipment from mills are given in the market reports appearing in a preceding part of THE IRON AGE under the general heading of "Iron and Steel Markets" and "Non-ferrous Metals."

Iron and Soft Steel Bars and Shapes

Bars:	Per Lb.
Refined bars, base price.....	2.53c.
Swedish bars, base price.....	10.00c.
Soft steel bars, base price.....	2.53c.
Hoops, base price.....	3.38c.
Rails, base price.....	3.13c.
Beams and channels, angles and tees	
3 in. x 1/4 in. and larger, base.....	2.63c.
Channels, angles and tees under 3 in. x	
1/4 in., base.....	2.53c.

Merchant Steel

	Per Lb.
Tire, 1 1/2 x 1/2 in. and larger.....	2.50c.
(Smooth finish, 1 to 2 1/2 x 1/4 in. and larger) ..	2.70c.
Toe-calk, 1/2 x 3/4 in. and larger.....	3.20c.
Cold-rolled strip, soft and quarter hard..	6.25c. to 7.25c.
Open-hearth spring steel.....	3.55c. to 6c.
Shafting and Screw Stock:	
Rounds.....	3.35c.
Squares, flats and hex.....	3.85c.
Standard cast steel, base price.....	12.00c.
Extra cast steel.....	17.00c.
Special cast steel.....	22.00c.

Tank Plates—Steel

1/4 in. and heavier.....	2.63c.
--------------------------	--------

Sheets

Blue Annealed

	Per Lb.
No. 10.....	3.28c. to 3.53c.
No. 12.....	3.33c. to 3.58c.
No. 14.....	3.38c. to 3.63c.
No. 16.....	3.48c. to 3.73c.

Box Annealed—Black

	Soft Steel C. R., One Pass Per Lb.	Blued Stove Pipe Sheet, Per Lb.
Nos. 19 to 20.....	3.55c. to 3.80c.	.....
Nos. 22 and 24.....	3.60c. to 3.85c.	4.10c.
No. 26.....	3.65c. to 3.90c.	4.15c.
No. 28.....	3.75c. to 4.00c.	4.25c.
No. 30.....	4.00c. to 4.25c.	.....

No. 28 and lighter, 36 in. wide, 10c. higher.

Galvanized

	Per Lb.
No. 14.....	3.85c. to 4.10c.
No. 16.....	4.00c. to 4.25c.
Nos. 18 and 20.....	4.15c. to 4.40c.
Nos. 22 and 24.....	4.30c. to 4.55c.
No. 26.....	4.45c. to 4.70c.
No. 27.....	4.60c. to 4.85c.
No. 28.....	4.75c. to 5.00c.
No. 30.....	5.25c. to 5.50c.

No. 28 and lighter, 36 in. wide, 20c. higher.

Welded Pipe

Standard Steel

	Black	Galv.
1/2 in. Butt... ..	—56	—40
3/4 in. Butt... ..	—61	—47
1 in. Butt... ..	—63	—49
1-3 in. Butt... ..	—60	—46
3 1/2-6 in. Lap... ..	—56	—34
7-8 in. Lap... ..	—56	—34
9-12 in. Lap... ..	—55	—33

Wrought Iron

	Black	Galv.
1/2 in. Butt... ..	—30	—18
3/4 in. Butt... ..	—32	—15
1 in. Lap... ..	—27	—10
2 1/2-6 in. Lap... ..	—30	—15
7-12 in. Lap... ..	—23	—7

Steel Wire

BASED PRICE* ON NO. 9 GAGE AND COARSE

	Per Lb.
Bright basic.....	3.50c. to 3.75c.
Annealed soft.....	3.50c. to 3.75c.
Galvanized annealed.....	4.25c. to 4.50c.
Coppered basic.....	4.00c. to 4.25c.
Tinned soft Bessemer.....	5.50c. to 5.75c.

*Regular extras for lighter gage.

Brass Sheet, Rod, Tube and Wire

BASE PRICE

High brass sheet.....	13 1/2c. to 17 c.
High brass wire.....	17 c. to 17 1/2c.
Brass rod.....	14 1/2c. to 14 3/4c.
Brass tube, brazed.....	26 c. to 27 1/2c.
Brass tube, seamless.....	18 1/2c. to 19 c.
Copper tube, seamless.....	20 1/2c.

Copper Sheets

Sheet copper, hot-rolled, 24 oz., 20 1/2c. to 21c. per lb. base.	
Cold rolled, 14 oz. and heavier, 2c. per lb. advance over hot rolled.	

Tin Plates

Bright Tin		Coke-14-20		Primes Western	
Grade "AAA" Charcoal 14x20	Grade "A" Charcoal 14x20				
		80 lb.	\$6.05		\$5.80
		90 lb.	6.15		5.90
		100 lb.	6.25		6.00
IC..	\$10.00	IC..	6.40		6.15
IX..	11.50	IX..	7.40		7.15
IXX..	13.00	IXX..	8.40		8.15
IXXX..	14.25	IXXX..	9.40		9.15
IXXXX..	16.00	IXXXX..	10.40		10.15

Terne Plates

8-lb. Coating 14 x 20

100 lb.....	\$7.00
IC.....	7.25
IX.....	7.50
Fire door stock.....	10.00

Tin

Straits, pig.....	32c.
Bar.....	37c. to 42c.

Copper

Lake ingot.....	15 c.
Electrolytic.....	14 1/2c.
Casting.....	14 1/2c.

Spelter and Sheet Zinc

Western spelter.....	6 1/2c. to 7c.
Sheet zinc, No. 9 base, casks.....	10 1/2c. open 11c.

Lead and Solder

American pig lead.....	5 1/2c. to 6 1/2c.
Bar lead.....	6 1/2c. to 7 c.
Solder, 1/2 and 1/2 guaranteed.....	24c.
No. 1 solder.....	22c.
Refined solder.....	18c.

*Prices of solder indicated by private brand vary according to composition.

Babbitt Metal

Best grade, per lb.....	75c.
Commercial grade, per lb.....	85c.
Grade D, per lb.....	85c.

Antimony

Asiatic.....	5 1/2c. to 6c.
--------------	----------------

Aluminum

No. 1 aluminum (guaranteed over 99 per cent pure), in ingots for remelting, per lb.....	25c. to 27c.
---	--------------

Old Metals

Business has been very quiet during the week and values are generally stationary. Dealers' buying prices are nominally as follows:

	Cents Per Lb.
Copper, heavy crude.....	10.50
Copper, heavy wire.....	9.75
Copper, light and medium.....	8.00
Brass, heavy.....	5.00
Brass, light.....	4.50
Heavy machine composition.....	7.25
No. 1 yellow brass turnings.....	5.00
No. 1 red brass composition turnings.....	6.75
Lead, heavy.....	2.75
Lead, tea.....	2.50
Zinc.....	2.50

THE IRON AGE

New York, March 16, 1922

ESTABLISHED 1855

VOL. 109, No. 10

Tensile Strength Increase by Cold Drawing

Development of a Law Covering the Tendency of Steel
to Increase in Tensility- - Variations and
Breaking Points in Curves

BY E. J. JANITZKY*

CHANGING relations of tensile strength have been noticed in cold drawing as drafting progresses either from the green or annealed rod, from the process annealed wire, or from the patented rod or wire. By green rod is meant the rod in the natural state, as it leaves the rod mill; the process annealed wire refers to that which has been annealed at about 1100 deg. Fahr. in order to relieve strains without attempting recrystallization; the patented wire rod or wire is in the normalized condition. The scope of this article is necessarily so restricted that it is not possible to consider the mechanical technology of wire drawing, as such.

Treating this subject from a practical standpoint, one is obliged to deal with wire rods of approximately 0.207 in. in diameter, that is, No. 5 American wire gage, since drawing from larger sections would not allow the high range of percentage of reduction that can be obtained normally without intermittent thermal treatment in drawing directly from a smaller rod or wire.

Like all natural laws, those governing the behavior of steel in cold drawing are inexorable, and our understanding of the results obtained depends primarily upon the determination of those laws. It is not claimed that the underlying laws of cold working are unknown, but it has been noted that in literature pertaining to this subject, there is lacking a clear definition and interpretation of those laws.

The most admirable contributions to the subject of cold drawing are:

(1) Goerens, "The Influence of Cold Working on the Properties of Iron and Steel," Carnegie Scholarship Memoirs, 1911, Volume III.

(2) Percy Longmuir, "Some Aspects of Wire Drawing," Iron and Steel Institute, 1912, Volume LXXXVI.

(3) J. F. Tinsley, "How Heat Treating Affects Wire," American Iron and Steel Institute, 1914.

All investigators agree that the tensile strength is increased, while the maximum elongation and the contraction are reduced, by cold working. Goerens concludes by saying, "Summarizing, it may be said concerning the mechanical properties that the tensile strength is increased by drawing in proportion as the deformation of the material is greater. The extent to which this may be carried depends on the composition of the material and on the size of the sections undergoing deformation. The tensility developed by cold working of

steel is hence dependent also on the following three factors:

- "1. The capacity of the material for cold working.
- "2. The chemical composition.
- "3. The original dimensions."

Longmuir concludes, "In neither case does the increase in tensile strength possess an exact ratio to the amount of flow."

As is obvious, the amount of flow can be measured only by the change in the reduction of area, thus:

$$R = \frac{A - A_0}{A_0} \times 100$$

in which R = reduction in percentage from original area
 A_0 = area of original section in square inches

A = area in sq. in. of section to which wire or rod has been drawn

Based on diameters, this formula reads:

$$R = \frac{D_0^2 - d^2}{D_0^2} \times 100$$

in which R = reduction in percentage from original area
 D_0 = diameter of original section in inches

d = diameter in inches of section to which wire or rod has been drawn

Data from J. F. Tinsley, as given in the following tables, represent three steels, a 0.10-per cent carbon, a 0.50-per cent carbon and a 0.70-per cent carbon steel, as noted in figures and tables.

As is apparent from the tables, the increase over the initial tensile strength of the rod in the foot lb. system is equal to the reduction in per cent, multiplied by 1000. This product, added to the initial tensile strength of the rod, gives the total tensile strength in lb. per sq. in., as recorded experimentally by the tensile test machine.

It is important to note that neither the heat treatment nor the initial size or shape of the section has any influence whatever, in cold drawing, on the rate of increase of tensility over the initial tensile strength before drawing. In other words, the original rod or wire may be either a green rod, or it may have been process annealed or patented, and of any shape or section, and still the same formula holds good. The effect of chemical composition will be considered later.

Therefore, the general formula for calculating the tensile strength of cold drawn wire can be expressed by the following:

$$T = \frac{A_0 - A}{A_0} \times 100 \times 1000 + T_0$$

$$\text{or } T = \frac{D_0^2 - d^2}{D_0^2} \times 100 \times 1000 + T_0$$

in which T = the tensile strength after cold drawing.

*Metallurgical engineer Illinois Steel Co., South Chicago

Table I—0.10-Per Cent Carbon Steel (Tinsley)
(Tensile Strength in Lb. per Sq. In.)

No. of Draft as Given by Author	Gage, * In.	Initial Tensile Strength of Rod or Wire T_0	Actual Tensile Strength after Drawing T	Total Percentage of Reduction R	Increase over Initial Tensile Strength of Rod or Wire		Total Tensile Strength of Wire Calculated $A_0 - a$
					Actual ($T - T_0$)	Calculated $A_0 - a$	
					$1000 \times \frac{A_0 - a}{A_0} \times 100$		$1000 \times \frac{A_0 - a}{A_0} \times 100 + T_0$
2	0.207	68,000	Green Rod				
	0.151		113,000	47.0	45,000	37,000	115,000
3	0.088		150,000	82.0	82,000	82,000	150,000
	0.088	60,000	After first process annealing				
1	0.071		93,000	35.0	33,000	35,000	95,000
3	0.048		130,000	70.0	70,000	70,000	130,000
5	0.034		145,000	85.0	85,000	85,000	145,000
	0.034	62,000	After second process annealing				
1	0.030		82,000	21.0	20,000	21,000	83,000
3	0.021		124,000	62.0	62,000	62,000	124,000
5	0.015		143,000	80.0	81,000	80,000	142,000
7	0.012		151,000	88.5	89,000	88,000	150,500

*As Tinsley's figures give only the percentage of reduction, the gages have been computed.

- A₀ = area of original section in sq. in.;
a = area of section to which wire or rod has been drawn;
D₀ = diameter of original section in inches;
d = diameter of section to which wire or rod has been drawn;
T₀ = initial tensile strength before cold drawing.

However, this formula, which is parabolic in char-

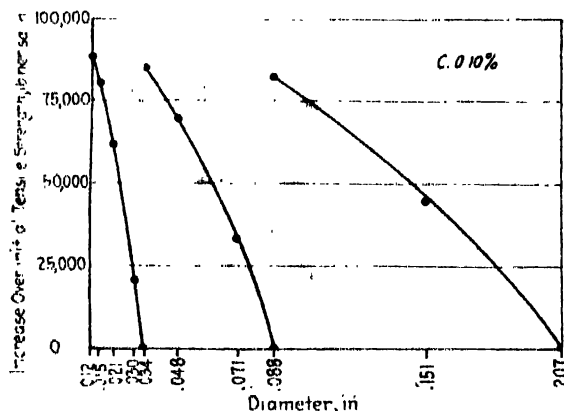


Fig. 1. Curves for Tinsley's 0.10 Per Cent Carbon Steel, with Intermittent Process Annealing. Refer to Table I

Note: In all these figures, on this and the succeeding pages, the dots represent experimental values; the lines show calculated values.

acter, does not seem to hold good for the actual curve in its entirety. At a reduction of 90 per cent in a 0.10 per cent carbon steel, there appears to be a break in the curve, and so beyond this point the formula loses applicability in its present form.

By dissecting the actual values, beyond a reduction for which the formula holds good, it is noted that the values for the increase in tensile strength obtained by multiplying the percentage of reduction by 1000 are much too low. One also comes to the conclusion that the new curve, starting from the breaking point, is again parabolic, but steeper in slope than the previous

curve. Further reduction of the wire by drafting shows that there are still more breaking points to be found in the curve.

For the sake of simplicity, let us call the breaking points in the curves, in order of their occurrence as the wire or rod is being drawn, B₁, B₂, B₃, etc., respectively. Using the areas of the wires at which these breaks occur as bases for the new parabolas, and using the total tensile strengths of these cold drawn wires as bases for T₀, the curves beyond these breaking points will follow the formulas given below.

However, these new increases in tensile strengths, that is, beyond the first breaking point, calculated by

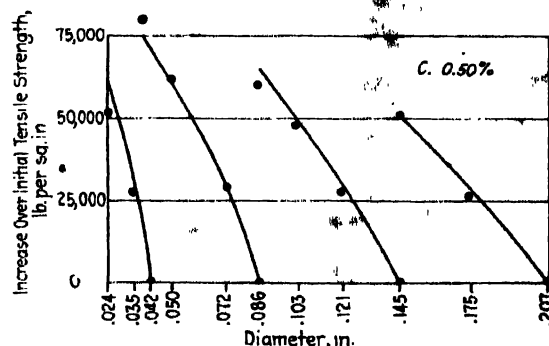


Fig. 2. Curves for Tinsley's 0.50 Per Cent Carbon Steel, with Intermittent Patenting. Refer to Table II

using the breaking points as bases, are in proportion to only one-half the percentages of reduction, thus:

$$\frac{A_1 - a}{2A_1} \times 100, \text{ or } \frac{A_n - a}{2A_n} \times 100$$

$$T = \frac{A_1 - a}{2A_1} \times 100 \times 1000 + T_1$$

$$T = \frac{A_2 - a}{2A_2} \times 100 \times 1000 + T_2$$

$$\text{or, generalized, } T = \frac{A_n - a}{2A_n} \times 100 \times 1000 + T_n$$

in which T = tensile strength after cold drawing;

Table II—0.50-Per Cent Carbon Steel (Tinsley)
(Tensile Strength in Lb. per Sq. In.)

No. of Draft as Given by Author	Gage, * In.	Initial Tensile Strength of Rod or Wire T_0	Actual Tensile Strength After Drawing T	Total Percentage of Reduction R	Increase over Initial Tensile Strength of Rod or Wire		Total Tensile Strength of Wire Calculated $A_0 - a$
					Actual ($T - T_0$)	Calculated $A_0 - a$	
					$1000 \times \frac{A_0 - a}{A_0} \times 100$		$1000 \times \frac{A_0 - a}{A_0} \times 100 + T_0$
	0.207	95,000	Green Rod				
1	0.176		122,000	28.5	27,000	28,500	123,500
2	0.145		146,000	51.0	51,000	51,000	146,000
	0.145	115,000	After first patenting				
1	0.121		143,000	30.0	28,000	30,000	145,000
4	0.086		176,000	65.0	61,000	65,000	181,000
	0.086	128,000	After second patenting				
1	0.072		156,000	30.0	27,000	30,000	158,000
3	0.050		190,000	66.0	62,000	66,000	194,000
4	0.042		208,000	76.0	80,000	76,000	204,000
	0.042	156,000	After third patenting				
1	0.035		184,000	30.0	28,000	30,000	186,000
3	0.024		218,000	66.0	62,000	62,000	224,000

*As Tinsley's figures give only the percentage of reduction, the gages have been computed.

Table III—0.70-Per Cent Carbon Steel (Tinsley)
(Tensile Strength in Lb. per Sq. In.)

No. of Draft as Given by Author	Gage, In.	Initial Tensile Strength of Rod or Wire T_0	Actual Tensile Strength After Drawing T	Total Percentage of Reduction R	Increase over Initial Tensile Strength of Rod or Wire		Total Tensile Strength of Wire Calculated $A_0 - a$
					Actual ($T - T_0$)	Calculated $\frac{A_0 - a}{A_0} \times 100$	
1	0.185 0.122	160,000	After patenting 212,000	56.0	52,000	$1000 \times \frac{A_0 - a}{A_0} \times 100$ 56,000	$1000 \times \frac{A_0 - a}{A_0} \times 100 + T_0$ 216,000

A_0 = area in sq. in. of wire at which last break in the curve occurred;
 a = area of section to which wire or rod has been drawn;
 T_0 = tensile strength of wire where last break in the curve occurred.

This halving seems to hold good for low and medium carbon steels, whereas in 0.70-per cent carbon and

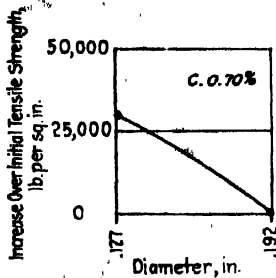


Fig. 3. Curve for Tinsley's 0.70 Per Cent Carbon Steel, after Patenting. Refer to Table III (Left)

Fig. 4. Longmuir's Tensile Curve from Rod Drawn Directly from 0.201 In. Diameter to 0.023 In. Refer to Table IV (Right)

probably higher carbon steels (it cannot be said definitely, as no data are at hand) as shown in Table VII, the increase in tensile strength beyond the first breaking point in the curves is in proportion to the entire percentage of reduction, thus,

$$\frac{A_1 - a}{A_1} \times 100, \text{ or } \frac{A_0 - a}{A_0} \times 100.$$

Below is a table giving actual and calculated data on a 0.10-per cent carbon steel taken from Longmuir. The figures are excellent for demonstrating three breaking points, the reduction having been carried to 0.024 in., a percentage of 98.6. The following gives the details of the drawing as carried out by Longmuir on the above steel.

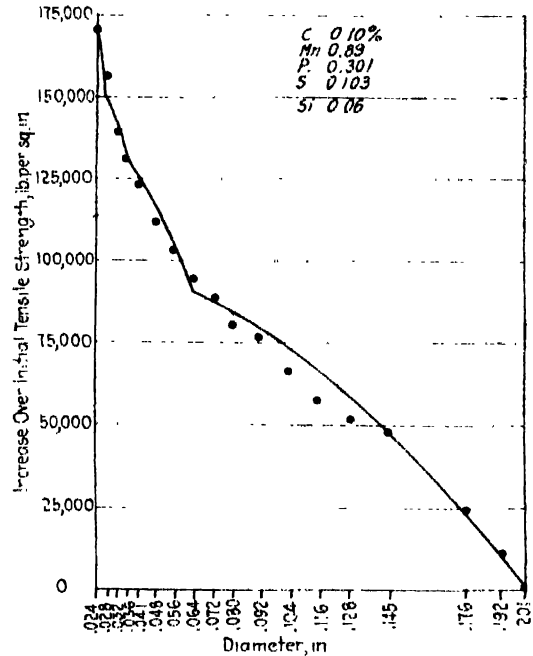
Original rod diameter 0.201 in.

0.201-in. rod reduced in 0.001-in. drafts to 0.192 in.

0.192-in. rod reduced in 0.001-in. drafts to 0.176 in.

0.176-in. rod reduced in 0.001-in. drafts to 0.160 in.
 0.160-in. rod reduced in 0.001-in. drafts to 0.145 in.

Rod drawn to 7-gage, then to 9-gage wire, and the following samples drawn from the 9-gage wire in 0.001-in. reduction per draft from 0.145 in. to 0.092 in.*



Figures given for 0.145 in., 0.128 in., 0.116 in., 0.104 in. and 0.092 in. in our table.

Rod drawn to 5-gage, 7-gage, 9-gage, 11-gage and 13-gage, and then the following samples drawn from

Table IV—Longmuir's 0.10-Per Cent Carbon Steel
(Tensile Strength in Lb. per Sq. In.)

No. of Draft as Given by Author	Gage, In.	Initial Tensile Strength of Rod or Wire T_0	Actual Tensile Strength After Drawing T	Total Percentage of Reduction R	Increase over Initial Tensile Strength of Rod or Wire		Total Tensile Strength of Wire Calculated $A_0 - a$
					Actual ($T - T_0$)	Calculated $\frac{A_0 - a}{A_0} \times 100$	
9	0.201	80,595	After annealing at 700°-720° C. 91,302	8.75	10,707	$1000 \times \frac{A_0 - a}{A_0} \times 100$ 8,750	$1000 \times \frac{A_0 - a}{A_0} \times 100 + T_0$ 89,345
25	0.192		104,877	23.3	24,282	23,300	103,896
56	0.176		128,083	47.9	47,448	47,900	128,495
19	0.145		132,160	59.5	51,565	59,500	139,095
31	0.128		139,171	66.8	58,576	66,800	147,395
43	0.116		147,034	73.4	66,439	73,400	153,995
55	0.104		159,040	79.0	78,445	79,000	159,595
17	0.092		160,966	84.2	80,371	84,200	164,795
25	0.080		169,411	87.2	88,816	87,200	167,795
33	0.064		174,989	90.0	94,394	90,000	170,595
Total Tensile Strength Used as Basis in the Following Calculations					Actual	Calculated $\frac{A_1 - a}{2A_1} \times 100$	Calculated $\frac{A_1 - a}{2A_1} \times 100 + T_1$
		T_1	T		($T - T_1$)		
22	0.064	174,989					
15	0.056		183,680	23.4	8,691	11,700	186,689
22	0.048		192,640	43.8	17,651	21,900	196,889
22	0.041		203,750	59.0	28,761	29,500	204,489
11	0.036		211,680	68.4	36,691	34,200	209,189
		T_2	T		($T - T_2$)		
15	0.036	211,680					
10	0.032		219,520	20.8	7,840	10,400	222,080
	0.028		237,440	39.5	25,760	19,750	231,430
		T_3	T		($T - T_3$)		
16	0.028	237,440					
	0.024		250,880	26.5	13,440	13,250	250,690

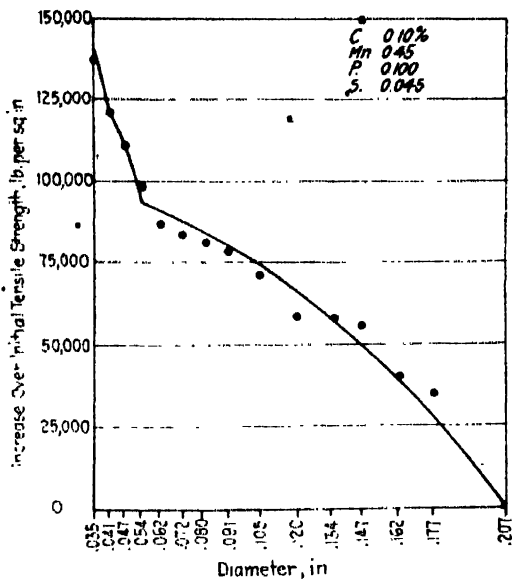


Fig. 5. Author's Tensile Curve from Rod Drawn Directly from 0.207 in. Diameter Down to 0.035 in. Diameter. Refer to Table V.

the 13-gage wire in 0.001-in. reduction per draft from 0.092 in. to 0.072 in. Figures given for 0.080 in. and 0.072 in. in our table.

Rod drawn to 5-gage, 7-gage, 9-gage, 11-gage, 13-gage and 15-gage, and then the following samples drawn from the 15-gage wire in 0.001-in. reduction per draft from 0.072 in. to 0.056 in. Figures given for 0.064 in. and 0.056 in. in our table.

Rod drawn to 5-gage, 7-gage, 9-gage, 11-gage, 13-gage, 15-gage and 17-gage, and then the following samples drawn from the 17-gage wire in 0.001-in. reduction per draft from 0.056 in. to 0.041 in. Figures given in our table for 0.048 in. and 0.041 in.

Rod drawn to 7-gage, 11-gage, 13-gage, 15-gage, 17-gage and 18½-gage, and then the following samples drawn from the 18½-gage wire in 0.001 in. reduction per draft from 0.041 in. to 0.030 in. Figures given in our table for 0.036 in. and 0.032 in.

Rod drawn to 7-gage, 9-gage, 11-gage, 13-gage, 15-gage, 17-gage, 18½-gage and 20-gage, and then the following samples drawn from the 20-gage wire in 0.001 in. reduction per draft from 0.030 in. to 0.024 in. The figures given in our table are for 0.028 in. and 0.024 in.

Analysis of this steel is as follows: carbon, 0.10 per cent; manganese, 0.45 per cent; phosphorus, 0.100

per cent; sulphur, 0.103 per cent; silicon, 0.06 per cent. Table V gives actual and calculated data on the cold drawing of a 0.10-per cent carbon steel. The figures are from an Eastern steel company. Analysis of the steel is: Carbon, 0.10 per cent; manganese, 0.45 per cent; phosphorus, 0.100 per cent; sulphur, 0.045 per cent.

Attention is called to the fact that, whereas in the previous case, as shown in Table IV, the wire was drawn to 0.024 in. and there are three breaking points, in this case the wire has been drawn to 0.035 in. and there are only two breaking points. If the wire had been drawn further, a third breaking point would have been encountered.

Table VI given in the following shows actual and calculated data taken from Longmuir's 0.50-per cent carbon steel. The cold drawing was executed by Longmuir in the following manner:

Original rod diameter, 0.214 in. Original rod reduced to 0.092 in. diameter, 0.001 in. reduction per draft. Figures given in our table for 0.192 in., 0.176 in., 0.160 in., 0.145 in., 0.128 in., 0.116 in., 0.104 in. and 0.092 in.

A 5-gage rod drawn to 7 gage, 9 gage, 11-gage and 13 gage. Then the following samples drawn from the 13-gage wire in 0.001-in. reduction per draft from 0.092 in. to 0.072 in. Figures given in our table for 0.080 in. and 0.072 in.

A 5-gage rod drawn to 7 gage, 9 gage, 11 gage, 13 gage and 15 gage. Then the following samples drawn from the 15-gage wire in 0.001 in. reduction per draft from 0.072 in. to 0.056 in. Figures given in our table for 0.064 in. and 0.056 in.

Analysis of this steel is carbon, 0.48 per cent; manganese, 0.87 per cent; phosphorus, 0.050 per cent; sulphur, 0.039 per cent; silicon, 0.058 per cent.

It has been previously stated that the tensile strength, as calculated by the formulas given in this paper, is not influenced in any way by the shape of the section which is being cold drawn. As proof of this, the following data from Longmuir on a 0.67-per cent carbon steel, drawn in rectangular rather than circular section, is cited:

Analysis of this steel is carbon, 0.67 per cent; manganese, 0.78 per cent; phosphorus, 0.032 per cent; sulphur, 0.027 per cent; silicon, 0.126 per cent.

As the first breaking point for this curve does not occur at a draft given by the author, it was necessary to calculate it. From the figures given by Longmuir the indication was that the breaking point lay at a point between a reduction of 63.7 per cent and that of 72.8 per cent. An interpolation for a reduction of 68

Table V. An Eastern Steel Company's 0.10-Per Cent Carbon Steel (Tensile Strength in Lb. per Sq. In.)

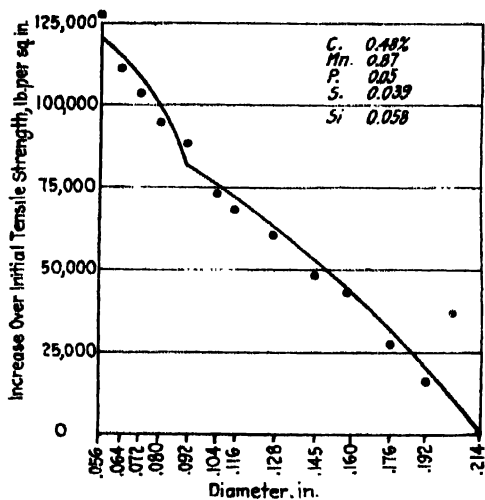
No. of Draft as Given by Author	Gage In.	Initial Tensile Strength of Rod or Wire T_0	Actual Tensile Strength After Drawing T	Total Percentage of Reduction R	Increase over Initial Tensile Strength of Rod or Wire		Total Tensile Strength of Wire Calculated $A_0 - a$
					Actual ($T - T_0$)	Calculated $1000 \times \frac{A_0 - a}{T_0} \times 100$	
	0.207	65,000	Green Rod				
1	0.162		100,178	26.8	35,178	26,800	91,800
2	0.147		120,725	38.8	55,725	38,800	103,800
3	0.134		121,256	49.6	56,256	49,600	114,800
4	0.120		122,006	58.2	57,006	58,200	123,200
5	0.105		136,856	66.4	71,856	66,400	131,400
6	0.091		143,747	74.2	78,747	74,200	139,200
7	0.080		146,221	80.7	81,221	80,700	145,700
8	0.072		148,594	85.2	83,594	85,200	150,200
9	0.062		152,381	87.8	87,381	87,800	152,800
10	0.054		163,740	90.2	98,740	90,200	155,200
11	0.041			93.2		98,200	158,200
Total Tensile Strength Used as Basis in the Following Calculations					Actual ($T - T_1$)	Calculated $1000 \times \frac{A_1 - a}{T_1} \times 100$	Calculated $1000 \times \frac{A_1 - a}{T_1} \times 100 + T_1$
12	0.054	163,740			12,062	24,100	175,890
13	0.041		175,802	24.3	21,823	21,150	184,890
14	0.041		185,563	42.3		$1000 \times \frac{A_2 - a}{T_2} \times 100$	$1000 \times \frac{A_2 - a}{T_2} \times 100 + T_2$
	0.041	185,563			17,116	13,550	199,118
15	0.035		202,679	27.1			

Table VI—Longmuir's 0.50-Per Cent Carbon Steel
(Tensile Strength in Lb. per Sq. In.)

No. of Draft as Given by Author	Gage, In.	Initial Tensile Strength of Rod or Wire T_0	Actual Tensile Strength After Drawing T	Total Percentage of Reduction R	Increase over Initial Tensile Strength of Rod or Wire		Total Tensile Strength of Wire Calculated $A_0 - a$
					Actual ($T - T_0$)	Calculated $A_0 - a$	
		97,395	After annealing at 700°-720° C		$1000 \times \frac{A_0 - a}{T - T_0} \times 100$	$1000 \times \frac{A_0 - a}{T - T_0} \times 100$	$1000 \times \frac{A_0 - a}{T - T_0} \times 100 + T_0$
22	0.214		114,240	19.5	16,845	19,500	116,900
38	0.192		125,440	32.3	28,045	32,300	129,695
54	0.176		140,806	44.8	43,411	41,300	141,695
69	0.145		145,800	54.1	48,205	54,100	154,495
86	0.128		165,760	64.2	68,365	64,200	161,595
98	0.116		165,760	70.7	68,365	70,700	168,095
110	0.104		170,240	76.4	72,845	76,400	173,795
122	0.092		185,920	81.6	88,525	81,600	178,995
Total Tensile Strength Used as Basis in the Following Calculations							
		T_1	T		Actual ($T - T_1$)	Calculated $A_1 - a$	Calculated $A_1 - a$
		185,920			$1000 \times \frac{A_1 - a}{T - T_1} \times 100$	$1000 \times \frac{A_1 - a}{T - T_1} \times 100$	$1000 \times \frac{A_1 - a}{T - T_1} \times 100 + T_1$
16	0.092		192,640	24.4	6,720	12,500	198,120
24	0.080		201,600	38.7	15,680	19,350	205,270
13	0.064		206,080	51.7	20,160	25,850	211,770
21	0.056		224,000	63.0	38,080	31,500	217,420

per cent was made, and this taken as a basis for the first breaking point.

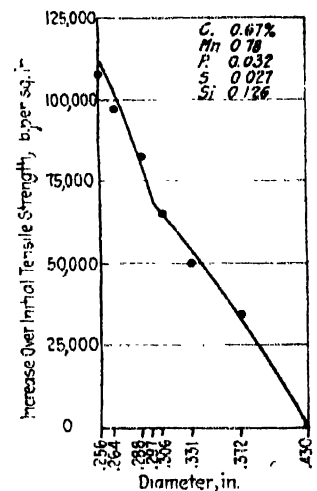
It will be noted that, despite the diversified drawing practices of the different investigators whose data were



bon steel the first breaking point seems to take place for a reduction of 90 per cent; in a 0.50-per cent carbon steel, at a reduction of about 80 per cent; and for

Fig. 6. Longmuir's Tensile Curve from Rod Drawn Directly from 0.214 In. Diameter to 0.056 In. Refer to Table VI (Left)

Fig. 7. Longmuir's Curve for 0.67 Per Cent Carbon Steel, Cold Drawn in Rectangular Section. Refer to Table VII (Right)



taken for analysis, and regardless of the difficulty of obtaining accurate results on account of irregularity of section, non-uniform cooling of coil, different finishing temperatures, probable acid brittleness, etc., the tendency of the increase of tensile strength as expounded in this article has been shown to follow a definite law.

In regard to chemistry, the carbon content influences the increase in tensile strength, as drawing progresses, only indirectly. It appears that, the higher the carbon content, the earlier the breaking point in the curve will first occur, thus for a 0.10-per cent car-

a 0.70-per cent carbon steel, at about 70 per cent reduction.

Also, it is to be noted that, from the initial rod to the first breaking point in the curve, carbon has no influence whatever on the rate of increase of tensile strength, whereas beyond the first breaking point, in low and medium carbon steels, the increase is proportional to one-half the reduction from the breaking point used as a base, and in high carbon steels proportional to the entire reduction.

In concluding the author hopes that the question treated may arouse interest so that more light will be thrown on this particular problem.

Table VII—Longmuir's 0.67-Per Cent Carbon Steel
(Tensile Strength in Lb. per Sq. In.)

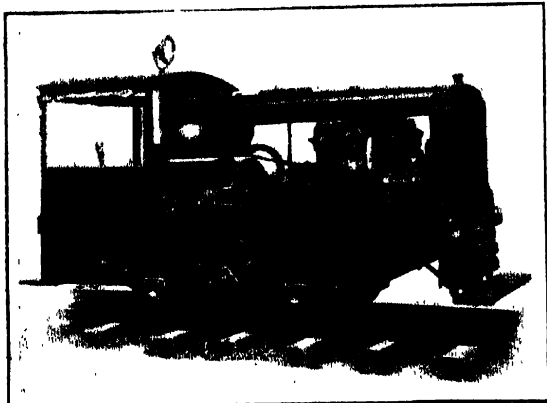
Gage of Wire Before Drawing, Inches	Initial Tensile Strength of Rod or Wire T_0	Actual Tensile Strength After Drawing T	Total Percentage of Reduction R	Increase over Initial Tensile Strength of Rod or Wire		Total Tensile Strength of Wire Calculated $A_0 - a$
				Actual ($T - T_0$)	Calculated $A_0 - a$	
Thickness				$1000 \times \frac{A_0 - a}{T - T_0} \times 100$	$1000 \times \frac{A_0 - a}{T - T_0} \times 100$	$1000 \times \frac{A_0 - a}{T - T_0} \times 100 + T_0$
Width						
0.228	0.365					
0.171	0.330					
0.138	0.305					
0.105	0.288					
0.026681 sq. in.*						
Total Tensile Strength Used as Basis in the Following Calculations						
	T_1	T		Actual ($T - T_1$)	Calculated $A_1 - a$	Calculated $A_1 - a$
	177,700*			$1000 \times \frac{A_1 - a}{T - T_1} \times 100$	$1000 \times \frac{A_1 - a}{T - T_1} \times 100$	$1000 \times \frac{A_1 - a}{T - T_1} \times 100 + T_1$
0.026681 sq. in.*						
0.086	0.275	190,803	11.2	13,043	11,200	188,960
0.068	0.255	206,618	34.9	28,858	34,900	212,660
0.060	0.249	219,900	43.8	42,140	43,800	221,560

*It was necessary to calculate this item, as drafts taken by Longmuir were too far apart to determine the first breaking point.

New Gasoline Locomotive

The Industrial Equipment Co., formerly the Cummings Machine Co., Minster, Ohio, has placed on the market the new model gasoline locomotive, shown in the accompanying illustration. It is known as the Minster, Model F, and is made in 6 and 7-ton sizes, and is said to embody several new features.

A Buda engine is used and also Westinghouse starting and lighting equipment, Stromberg carburetor, Duplex governor, Splittorf aero-model magneto with inclosed impulse automatic starter, Hyatt roller bearings, New Departure ball bearings, Willard storage battery and Diamond roller chain. There has been no change in the method of transmitting power from the engine to the wheels, the new model having the



Engine and Drive Disk Assembly Are Combined in One Unit

friction and chain drive used heretofore. The frame is of all-steel box-girder construction, and the axles, jack shaft and friction disk shaft of special high-manganese chrome-alloy steel. Carnegie rolled steel wheels are used.

The engine and drive disk assembly are combined in one complete unit with a two-point suspension, an arrangement intended to assure maximum transmission of power and proper alignment of all working parts. By changing the method of braking a number of parts have been eliminated, it is claimed; when the brake is applied two heavy iron shoes, placed diametrically opposite, grip a steel brake wheel on the jack shaft. This method, it is claimed, is 100 per cent efficient, and with a pressure of about 25 lb. the wheels can be locked. A special feature is claimed in the stationary hand-wheel method of shifting the fiber wheel across the face of the disk to get forward, reverse or change of speeds.

A primer, attached to the engine manifold, is manually operated from the cab, a feature that facilitates starting. For signaling a Fulton exhaust whistle is incorporated. The cab is said to be large, and to contain all control levers conveniently located.

Foreign Loans and American Industries

The National Foreign Trade Council has sent a letter to other trade organizations and chambers of commerce throughout the country requesting their co-operation in a plan which it believes will assist in reducing unemployment in the United States by providing that part at least of the proceeds of foreign loans floated here shall be spent for American products.

The council urges American investors to insist that the underwriters of foreign loans shall require the inclusion in the loan agreement, wherever practicable, of a stipulation covering such use of the loan proceeds. The council points out that it is the settled practice of British and other European bankers to require such a stipulation as a condition precedent to making a foreign loan, and adds that the effect of such a practice in providing employment for the industries of the country furnishing the money is obvious.

The National Foreign Trade Council includes in its membership the United States Steel Corporation,

Standard Oil Co., Pullman Co., Consolidated Steel Corporation, Westinghouse Electric Co., Hupp Motor Car Co., International Harvester Co., American Locomotive Co., General Electric Co., Foundation Co., and American Radiator Co.

Detroit Companies Merged

The Ewing Bolt & Screw Co. has acquired the plant of the Detroit Machine Co., and new capital is being provided for the development of both concerns.

The Detroit Machine Co., located in the east end, on Hillger Avenue, builds machinery, dies, tools, and does general production work, but plans contemplate the sale of the property and the construction of a new plant in the River Rouge, near the Ford steel plant, on property owned by the Ewing Corporation.

The Ewing Bolt & Screw Co. has been in operation less than a year, and manufactures wood screws, bolts and rivets. Myles E. Ewing, president, and J. A. Hale, secretary-treasurer of the company, are now also president and secretary-treasurer, respectively, of the Detroit Machine Co.

David W. Pell, manager of the Detroit Machine Co., has been made production manager at the Ewing Bolt & Screw Co. plant.

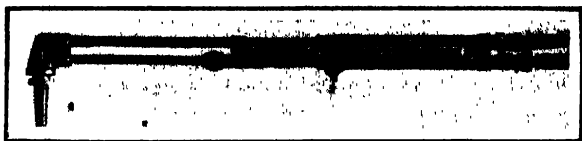
The directors are Hal. H. Smith, Frank W. Blair, Arthur T. Waterfall, David W. Pell, A. N. Marion, Myles E. Ewing, J. A. Hale, Detroit; and H. J. Douglas and David L. Rockwell, of Cleveland, the latter being vice-president.

New Cutting Torch

The cutting torch shown in the accompanying illustration is a new design recently brought out by the Davis-Bournonville Co., Jersey City, N. J.

It differs from the company's standard torch in that two tubes instead of three connect the head with the handle, the preheating gases, oxygen and acetylene or other combustible gases being mixed in a chamber between the handle and the head. This change involves a new form of tip, inasmuch as mixing of the preheating gases takes place before the gases reach the tip.

The tubes are silver soldered in the head, which is a copper forging. The ratio of mixed gases is controlled by two needle valves, one having a crossbar handle and the other a knurled disk handle. The cutting oxygen valve is operated by a finger lever connected to a linkage designed so as to hold it in either



Two Tubes, Instead of Three, Connect Head with Handle

the closed or open position. The operator may continue cutting without holding his finger on the trigger, the linkage serving to hold the valve open until such time as he wishes to stop the cut, when reverse pressure on the trigger closes the valve. The pressure of the spring holds it closed until the trigger is again pulled to the open position.

The weight is less than that of the previous model. Provision is made for easily removing the back end in case it becomes necessary to clean the screen or to renew the oxygen cutting valve seat. The tips are of copper and are held in a taper seat by a bushing nut. They are made with the cutting oxygen hole in the center and the preheating holes around it, the number of preheating holes varying from two to six depending on the gas used and the manner in which the torch is applied, also the metal to be cut.

The new torch is said to have superior characteristics for cutting wrought iron, steel and cast iron and the distribution of mixed gases to the tip to assure that all preheating flames are uniform in balance. Gases of low calorific value such as butane, hydrogen, carbo-hydrogen and even illuminating gas, are said to be used efficiently although acetylene is recommended.

Design of a Modern Automobile Plant

Providing the Power, Heating, Water Supply and Other
Services for a 10,000-Employee Development—The
Industrial Institution of the Future

BY PAUL L. BATTEY*

THE location of the power plant was difficult owing to the restricted area of the site and the necessity for non-interference with manufacturing space and routing. It is located practically in the center of the circle of product routing and does not in the least interfere with it. It is also an integral part of the main building structure practically the same superstructure steel work being used as for the remainder of the manufacturing section.

A reinforced concrete coal storage bin is located immediately adjacent and occupies the major portion of the light court between the manufacturing shop section and the stock building. Coal is received on a spur of one of the incoming tracks serving the stock building and concrete depressed track hopper for unloading is located adjacent to the boiler room and under the

Ashes are removed from the hoppers under stokers by means of a steam jet conveyor, which discharges into a concrete bin located just outside boiler room over track, so that ashes can be loaded by gravity chutes into railroad cars or auto trucks. The bin has capacity for four to five days' run and hoppers under grates for full day's run, so that removal may take place at off peak periods. This type of conveyor was chosen for its simplicity, and cleanliness, with particular reference to painting and varnishing. The chimney is of reinforced concrete, and the boiler breeching is of $\frac{3}{4}$ -in. asbestos lumber within a steel framework and lined with 1 in. fire felt pointed up with high temperature cement.

In the turbine room are provided two 2500 and one 3750 kva. generators with suitable turbine and electro-



The Testing Plant at the End of the Assembly Building Has a Steel Structure Designed for Ready Superposition of Additional Stories

electric overhead traveling bucket crane covering the storage bin and the elevated coal bunker over the stokers. The craneway extends out beyond the building thus to cover also a second track from which coal in emergencies can be unloaded directly from cars by the bucket crane. The receiving hopper has a capacity of four cars. The outside storage bin has a capacity for 7500 tons of coal. The overhead bunker has capacity for 400 tons and from this coal is discharged by gravity direct to the stoker hoppers by means of motor driven weighing larry.

An analysis of the coal supply available in the district led to the selection of buckwheat anthracite of about 11,500 B.t.u. calorific value per pound, burned on chain grate stokers with forced draft. The design of flat arch and combustion chambers gives absolutely smokeless combustion.

The boiler plant equipment adopted consists of six water tube boilers of the four drum type, each with a capacity of 200 per cent normal rating of a little over 1200 hp., although maximum economy in operation is obtained at about 1000 hp. The boilers are placed in batteries of two in thoroughly insulated settings. The operating steam pressure is 175 lb., and superheaters for 100 deg. are installed. Boiler room auxiliaries are turbine driven. All coal is weighed and water measured into boilers and daily evaporation record kept. A complete combustion indication and control equipment is provided.

driven exciter units and two 2500 cu. ft. compound two-stage air compressors. In addition to these main units full equipment of turbine driven auxiliary apparatus is provided. The power plant has an equivalent capacity of 8000 kw., including the two air compressor units.

The turbines driving generators are of the mixed pressure bleeder type arranged to utilize all excess exhaust steam throughout the year in connection with the air compressors, heating system and steam requirements for various drying rooms and kilns. Condensers and cooling tower are provided for summer months, the cooling tower, of the forced draft type, being located on the roof of the power house. The power house is immediately adjacent to the dry kilns, the heating units and fans for which are located in a basement room below the kilns connecting with the basement of the power house, so that they are entirely taken care of by the power house operators, besides making possible a short steam connection.

It will further be noted that the power house is very close to the wood shop, from which provision is made to remove all refuse by exhaust line to a separator on the power house roof, from which it leads to storage hopper and chute to two boilers fitted for burning wood refuse. A wood hog prepares all refuse as it leaves the shop.

The water supply developed into somewhat of a problem as the public supply was inadequate. Four 8-in. wells 600 ft. deep were driven on property of the company, the capacity of each being approximately 200 gal. per min., using Weber air lifts with solenoid operated air supply valves arranged for remote control at the power house switchboard. The discharge line from

*Consulting engineer, 123 West Madison Street, Chicago. For the past 2 1/4 years consulting engineer for the Willis Corporation, the Willis Overland Co. and allied interests and formerly vice-president of the Arnold Co., Chicago. Article is concluded from page 656, issue of March 9.



From the Testing Floor the Completed Automobiles Go into the Storage Building and Thence on a Covered Ramp Spanning the Incoming and Outgoing Railroad Tracks Reach the Car Loading Docks

the wells leads to the 750,000 gal. low level reservoir immediately adjacent to the power house. These wells also supply the drinking fountains by means of centrifugal pump circulation.

The large storage reservoir was provided because of the insistence of the insurance companies upon an-

partment, as an analysis demonstrated that the piping of this water to the reservoir would cost no more than the usual down spout and sewer connections. Further, this reservoir, through the excess 250,000 gal. over the fire storage requirement, is utilized as an integral part of the condensing system for the power generating units and water supply to the boilers. Pumping is done in off peak periods, thus increasing the use factor of both the reservoir and the power plant. City water, containing a considerable amount of the incrustible solids, is not used except in emergency. A mixture of the water from the deep wells, which contains only a nominal amount of scale forming solids, and the rain water from the roof makes an excellent boiler water. An analysis of the rainfall records over a period of years indicates that the plant will be provided with an ample supply, using the well water and roof water together.

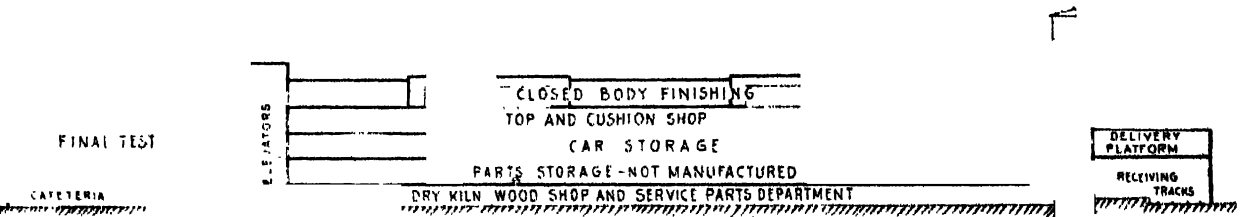
The decision upon the 750,000 gal. capacity for the reservoir was based upon a careful analysis of all factors of water supply and cost. To have saved all of the roof water would have involved an additional investment for reservoir capacity, the fixed charges upon which were in excess of the cost of otherwise providing the water. The reservoir is an integral part of the building construction, as it is simply the north basement under the 40 ft. shop bay walled off from the rest of the space and waterproofed during construction. This basement was of less importance in its location as factory storage space than the rest of the space on this level, and therefore meant little or no sacrifice in using it for the reservoir.

The plumbing and sewer lines were worked out to provide for modification of the departmental relationship which would probably change the number of employees in these departments. All of the toilet rooms are designed as multiple units exactly alike throughout the entire plant. Waste lines below ground provide for the maximum grouping estimated. All the toilet room compartments and doors are of steel baked enameled and are interchangeable. The doors are fitted with a gravity type of hinge. There are one to four wash bowls in each toilet room, all with uniform arrangement, but the main wash rooms, of which there are two at the extreme northwest and southwest corners of the plant, have each a capacity for approximately 3000 men. The wash sinks in both rooms being uniformly arranged in multiple unit grouping, each pair of sinks for ten men.



In the Light Court Between the Manufacturing Shops and the Stock Building Is a Reinforced Concrete Coal Storage Bin of 7500 Tons Capacity

other source of water supply additional to the city mains and the elevated storage tanks connected to the sprinkler system and fire lines. The required reservoir capacity was 500,000 gallons, and as it involved considerable investment, effort was made to turn it to as many other uses as possible. In addition to the city water line connection and the discharge from the deep wells, a large portion of the rainwater from the roof is piped to the reservoir through a sedimentation com-



The Car Storage Floor of the Storage Building Is Reached Directly at One End from the Testing Room, and at the Other End at This Level Is the Platform Connecting with the Ramp to the Shipping Docks

Close to each wash unit is located a group of lockers so that every employee has a locker immediately adjacent and practically an equal distance from his wash sink. Each of these wash rooms is provided with local hot water heating tanks.

The plant is heated throughout, with the exception of the shipping docks, with exhaust steam. The motor shop, assembly, test and stock buildings are heated by direct wall radiation, and the new manufacturing bays are heated with indirect Sirocco fan units located on the several balconies along the center line of the shop. The fan units provide for air circulation in the summer months. Steel plate and other stock carried in the basements under the 40 ft. bays is highly susceptible to corrosion on account of the salt atmosphere. The basements are used as return air ducts, the crane hatchway at each end of the 60 ft. crane aisles serving as inlets to the basement for recirculation of a large portion of the air in the shop and the intake of the fan unit connecting by duct to the basement at the center of the bay. The fan units have connection to the roof from which inlet the proper amount of fresh air is introduced into the shop. The distribution of warm air from the fans is accomplished by means of flat ducts

fuel oil tanks are provided, together with a full complement of steel tanks of various sizes for the storage of other materials.

A complete system of pumps and pipe line distribution is installed supplying with fuel oil the heat treatment furnaces and the heater units for the enameling ovens, together with a number of other miscellaneous furnaces for the manufacturing department. Local oil heating equipments throughout the plant are duplicated as far as possible and furnaces are of regenerative type.

An item which may be of interest is a new type of heating equipment installed in connection with the enameling ovens. Each of the ovens is provided with a "Merrill process" unit, consisting of heat absorber, of Foster superheater elements, circulation pumps, and welded pipe radiation sections in the ovens, of the locomotive superheater type, valves, connecting pipes and expansion tank. This system is essentially the same as an ordinary hot water heating system with high flash point oil used for the circulating medium, the ovens carrying a temperature of 450 deg. The heating units are located immediately under the ovens in each case in tile walled compartments. Complete automatic control



From the 400-Ton Overhead Bunker in the Boiler Room the Coal Is Discharged to the Stoker Hoppers Through a Weighing Larry. The larry may be seen in the background

located immediately under the overhanging balcony platforms, the concrete floor on top and the supporting floor beams forming three sides of the duct, it being simply necessary to close the bottom with properly ribbed sheet steel with adjustable outlets located on 20 ft. centers throughout the shop. This location for the distribution ducts makes the usual clumsy blast fan duct system happily absent and puts the distribution ducts in the best possible position from a heating and circulating standpoint, and further entirely eliminates any interference with the installation of shaft hanger supports under the balcony structures. The entire piping system for exhaust steam distribution for heating was welded on the job and is a most excellent example of the economy and character of work resulting from this improved method of making up piping. Bends are used wherever possible with resulting flexibility.

The receiving and storage of fuel oil, lubricating oils, paints, varnish and other miscellaneous inflammable materials is taken care of in a specially constructed reinforced concrete vault 32 x 240 ft. located beneath the east shipping dock at the extreme north end where means for gravity unloading from tank cars and trucks is provided. Duplicate 50,000 gal. concrete

equipment is provided of both temperature and pressure types so that the regulation in the ovens is expected to be fully equal to those of the electrically operated type.

Owing to the situation with regard to the supply of electric power and because of the unusually favorable location with regard to fuel oil supply, it was decided that the direct heating method adopted would show a large saving as compared with electric heating and at the same time provide equally as good regulation and cleanliness, these being the principal advantages of the electric ovens. Two ovens have been equipped with an oil heated closed circuit, direct radiation hot air system, which promises good results.

All necessary locations in the plant are supplied by piping systems for gasoline and kerosene, with substations for distribution of lubricating oils, cutting compounds, etc. Tanks for the storage of gasoline are below ground adjacent to the oil room and arranged to be filled by gravity from tank cars or trucks, a water displacement system being used for tanks and distribution.

A complete bell automatic telephone plant of 200 stations is located in the center of distribution with ample outside trunk line connections. Extensive sys-

tams for watchmen's clock, fire-alarm and auto-call is provided.

The best possible floor is provided where men stand at work in all manufacturing space.

Cresoted blocks known to the trade as Kreolite are used throughout the plant. So far as is known, this installation contains the largest area of wood block floor in any industrial plant. This type of floor is considered as near ideal as is possible to provide from the standpoint of permanence and satisfactory trucking.

The entire plant is co-ordinated on 20 ft. centers, the bays being numbered from the northwest corner south and from the same corner along the north of the corresponding bays are lettered. Floor levels are identified by suffixed numbers so that it is possible to describe any spot 20 ft. square, in the plant by one or two figures, a letter and suffix figure.

In construction the multiple unit idea was developed along many lines because of its reduction in cost and expedition of work. The original make-up of forms was used through the entire work and upon completion of many of the sections were sold for a unit built garage with an accompanying erection plan* thus realizing three times the usual salvage value. Some 800 oak trees upon the site were removed and by a small temporary sawmill cut into railroad ties for the track work and smaller pieces cut into foot blocks for shop containers. Some of the quantities involved in the construction carry an idea of the size of the plant, such as 70,000 cu. yd. of earth excavation, 75,000 cu. yd. of concrete work, 10,000 tons of steel, both reinforced and structural, 350,000 sq. ft. or about 8 acres of steel sash windows, 30 acres of wood block floors, 7000 horse power electric motors and 1½ miles of railroad track. The maximum force of construction men employed on the work was approximately 2000 and had it not been for the delay due to general business conditions, the entire work would easily have been completed in a little over a year. Eighty per cent of the structural steel is represented in six different pieces.

Expansion and the Future

It was decided in the beginning to make provision for only approximately 25 per cent future additional space, which could be obtained by three additional stories on the test building, and the rebuilding of the old mill constructed motor shop, by extension of the unit construction embodied in the new plant, if at some later time developments in the construction of automobiles should involve the necessity for providing this additional space. The possibility of any material enlargement of the plant was definitely disposed of with the conception of limiting the number of employees to approximately 10,000 men, as it was thought undesirable to have a larger aggregation in one location. One of the principal reasons for the choosing of the Newark district for the location of this plant was its distance from the vortex of automobile production and its diversity of manufacturing which from many economic aspects is highly advantageous, as compared to the extremely specialized centers.

This plant within itself is, however, an example of extreme concentration and while embodying many useful and effective conditions, from the standpoint of production and supervision, it is the writer's firm belief that generally with the future will come further decentralization and reduction in size of plant units for economic reasons involving the human element rather than the physical equipment. Too little consideration is given to environment of men employed in factories and our present labor situation is largely the result of concentration of industry in large units where the human relationship is entirely lost in the magnitude of organization. Henry Ford's pioneering in the division of his factories into comparatively small units sufficiently removed from each other, properly co-ordinated, (and here the wireless telephone and aeroplane may be useful) should bring back the old-fashioned harmonious relationship between the "old man" in charge, who knows by name all "the boys" who are getting out the work. Mr. Ford having previously pioneered in the development of quantity production, is quite the logical one to take the lead in the decentralization of the industry. There is one factor in connection with this move-

ment, however, which should receive consideration, and that is the inherent tendency for the pendulum to swing from one extreme to the other and where a happy compromise is again the best answer.

Industry in general and, in fact, our entire civilization, seems to be entering upon a new era which will bring within a comparatively few years widespread changes. The entire development centers around increased facilities for the production and distribution of electrical energy. Our railroad facilities have frequently been called the arteries of the nation, but now comes a complete new nerve system through which the control and distribution of industry, of transportation and commerce will be affected. With the realization of a complete network of electric power distribution, inter-connecting power production plants of large capacity and economic location as to hydraulic and fuel energy supply, complete electrification of trunk line railroads will quickly follow and this, together with the general establishment of permanent roadways throughout the country, with the broad adoption of automotive equipment for short haul traffic, will bring about further decentralization of industry and population. Workers will again begin to live normal open air lives in homes and factories, as under the new conditions practically every comfort and advantage of city life would be available, in what are now considered isolated locations. In other words, the logical evolution of co-ordinated power supply, transportation and industry will bring us back to the conditions of previous generations in home life and happy, useful employment, where all can feel personal interest in work and the spirit of craftsmanship be reborn.

There is a further phase of unified power distribution which will materially affect industry and that is the use of coal for other than power production purposes. With electrification, 25 to 30 per cent increased capacity of the railroads would be available for commercial purposes by the freeing of rolling stock and trackage from the handling of their own fuel supply. Factories, offices, homes and public buildings will, however, have to be supplied with heat in our climate and until this can be done electrically, due to betterment of diversity and load factors of power system, coal or oil will probably have to be used.

Electric heating has the inherent disadvantage, roughly, of the 10 to 1 conversion ratio and cannot be generally adopted until we begin to design our factories, buildings and homes along the line of greater heat conservation, similar to what is being realized in the present industrial electrically heated ovens and insulated domestic cooking ranges, with not inconceivably, regenerative heating systems. Such construction practically adapted would insure cool and comfortable buildings in summer months and above all, conserve our diminishing coal supply. It would greatly relieve congestion of transportation from unnecessary fuel movements, and cleanse the atmosphere of partially consumed products of combustion.

General development along these lines is undoubtedly a matter of many years owing to present investments, but it is not a thing that would under ordinary circumstances be accomplished by broad, simultaneous application. It is entirely conceivable that in the near future, with these general possibilities before us, entirely new methods of building construction, with the idea of heat conservation, will be developed, and who couldn't be happy in a factory (where many men spend the larger proportion of their daylight hours) when supplied with an abundance of sunlight, pure air and cheerful physical and social environments, whether he be manager or worker; and happiness is the goal of civilization and the foundation of permanent nations?

Those interested in the scientific congress which is to be held by the Association of Engineers graduated from the technical school of Liege can obtain a detailed list of the questions to be discussed by addressing a request to the secretary-general of the association at 16, Quai des Etats-Unis, Liege, Belgium. The technical meetings are scheduled for June 11 to 16 inclusive and simultaneous with these will be conducted an exhibition, which will extend to July 14.

Design of Open-Hearth Furnaces

Regenerator Computations for the Volume and Weight of Checkerwork Required—Temperature Changes Based on Time of Reversals

BY A. D. WILLIAMS*

IN THE IRON AGE of Feb. 12, 1920, page 475, several rules were given for arriving at the amount of checkerwork required. According to Gruner, from 50 to 70 lb. of checker brick were required per pound of coal burned per reversal. In the case considered 188 cu. ft. of gas was used per second, each pound of coal producing 70 cu. ft. of gas. The coal consumption, therefore, is 2,686 lb. per second. The weight of checker brick for this amount of coal would be from 60 lb. to 85 lb. According to this rule, the amount of checker brick would be:

For 15 min. (900 sec.) reversals..	50 to 1	70 to 1
	120,220 lb.	168,320 lb.
	54,540 kg.	76,360 kg.
20 min. (1200 sec.) reversals..	54,540 kg.	76,360 kg.
	160,300 lb.	224,430 lb.
	72,720 kg.	101,810 kg.
25 min. (1500 sec.) reversals..	200,410 lb.	280,550 lb.
	90,910 kg.	127,250 kg.

Told suggests 6m³ 00 (212 cu. ft.) or 2850 kg. (6283 lb.) of brick per cubic meter (35.3 cu. ft.) of air per second per 100 deg. Cent. (180 deg. Fahr.) rise in temperature. According to this rule the checker brick would be:

$$2850 \times 8.51 \times 9 = 218,250 \text{ kg. (478,900 lb.)}$$

$$6 \times 8.51 \times 9 = 459 \text{ m}^3 \text{ 65 (16,228 cu. ft.)}$$

	Gas on Gas	Air on Air	Gas on Waste Gas	Air on Waste Gas
The free volume required for the passes may be determined:				
Q ₀ of gas, air, products of combustion, cu. ft.	188	300	181	270
t ₀ average in checker, Deg. Cent.	850	750	1,200	1,100
Deg. Fahr.	1,562	1,382	2,192	2,012
1 + at for average t ₀	4.120	3.753	5.404	5.087
Q ₁ = Q ₀ × (1 + at) = cu. ft.	775	1,126	978	1,360
Temperature change, average, Deg. Cent.	700	900	800	1,000
Deg. Fahr.	1,260	1,620	1,440	1,800
With a temperature change of 360 deg. Fahr. (200 deg. Cent.) per second, the average time in the checker will be, seconds	3.5	4.5	4.0	5.0
Basing the pass volume on the gas and air heating time, the volume required = cu. ft.	2,713	5,067	....	....

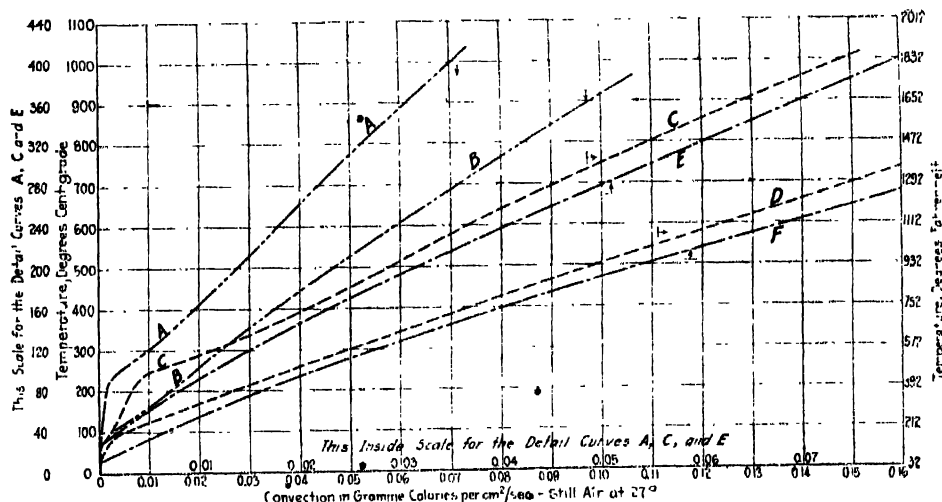


Fig. 4. Convection Factor Curves Based on Longmuir Experiment

This last is reasonably close to the quantities arrived at, providing Told referred to the chambers at one end only.

The weight of the checker brickwork will be determined upon the basis of a temperature change of 200 deg. Fahr. (111 deg. Cent.), 70 per cent of the brick being considered effective. The specific heat average of fire brick is about 0.25. Its weight, 112 lb. per cu. ft. = 1800 kg. per cu. m.

15 minute, 900 second cycle:

Gas: 6,937,000 ÷ [200 × 0.25 × 0.70] =	Gas, Lb.	Air, Lb.
Air: 12,690,000 ÷ [200 × 0.25 × 0.70] =	198,180	362,580

20 minute, 1200 second cycle:

Gas: 9,250,000 ÷ 35 =	264,260
Air: 16,920,000 ÷ 35 =	483,400

25 minute cycle, 1500 seconds:

Gas: 11,562,000 ÷ 35 =	330,300
Air: 21,150,000 ÷ 35 =	604,250

The volume occupied by the checker brick = weight × 1 ÷ 112 = 0.008929 F.

On this basis, the cubic feet of brick required =

For 15 minute, 900 second cycle.....	1,770	3,237
20 minute, 1200 second cycle.....	2,360	4,316
25 minute, 1500 second cycle.....	2,949	5,395

Regenerators Continued
Average time in checker of waste gases, revised to pass volume:

	Gas	Air
Seconds	2.774	3.726
Average temperature change per second, revised:		
Deg. Cent.	288	268
Deg. Fahr.	518	482

Total checker volume = pass volume plus brick volume:
for 15 minute cycle = cu. ft. 4,483 8,304
for 20 minute cycle = cu. ft. 5,073 9,353
for 25 minute cycle = cu. ft. 5,662 10,462

The percentage volume and area of passes and brick will be = 15 minute cycle,
brick = 39.48 39.00
passes = 60.52 61.00
20 minute cycle, brick = 46.53 46.02
passes = 53.47 53.98
25 minute cycle, brick = 52.08 51.57
passes = 47.92 48.43

To provide a margin for contingencies, the 25 minute cycle will be used. Using square passes, the side of the square for the pass unit will be = $\sqrt{0.4792} = 0.6923$

Portion of unit square occupied by brick = $\sqrt{0.4843} = 0.6960$
1.0000 - 0.6923 = 0.3077
1.0000 - 0.6960 = 0.3040

Making the wall between the passes 2.5 in., and making passes for both chambers alike, the side for the unit square = $2.5 \div 0.3077 = 8.125$ in.
The brick thickness = 2.500 in.
Side of square pass = 5.625 in.

*Box 92, Newark, N. J.

Table 1—Regenerator Computation

	Gas on Gas	Air on Air	Gas on Waste Gas	Air on Waste Gas
Temperature assumptions				
Top of checker,				
Deg. Cent.	1,200	1,200	1,600	1,600
Deg. Fahr.	2,192	2,192	2,912	2,912
Bottom of checker,				
Deg. Cent.	500	300	800	600
Deg. Fahr.	932	572	1,472	1,112
Average,				
Deg. Cent.	850	750	1,200	1,100
Deg. Fahr.	1,562	1,382	2,192	2,012
Change,				
Deg. Cent.	700	900	800	1,000
Deg. Fahr.	1,260	1,620	1,440	1,800
Heat capacity of gases, in B.t.u. per cu. ft., from curve Fig. 1.				
Per box, Aug. page 577, March 2, 1922				
Waste gases at				
Deg. Cent. Deg. Fahr.				
600 (2912)	...	...	183	183
Air or gas at				
Deg. Cent. Deg. Fahr.				
1200 (2192)	...	73	...	...
Waste gases at				
Deg. Cent. Deg. Fahr.				
800 (1472)	...	...	80	...
Waste gases at				
Deg. Cent. Deg. Fahr.				
600 (1112)	...	...	...	58
Products at				
Deg. Cent. Deg. Fahr.				
500 (932)	19	...	...	...
Air supply at				
Deg. Cent. Deg. Fahr.				
300 (572)	...	17	...	...
B.t.u. absorbed by				
gas or air, given				
off by waste gases	31	76	103	125
B.t.u. assuming two				
units of gas burnt				
31 x 2 =	62	...	...	...
76 x 2 =	...	112	...	...
B.t.u. total required				
and available				
62 + 112 =	...	174	...	...
103 + 125 =	...	...	228	...
Percentage required				
for gas				
62 ÷ 174 =	35.63	...	...	...
Percentage required				
for air				
112 ÷ 174 =	...	64.37	...	...
B.t.u. required for				
gas				
228 x 0.3563 =	...	...	81	...
B.t.u. required for				
air				
228 x 0.6437 =	...	...	...	147
Percentages from				
waste gases				
81 ÷ 103 =	...	...	78.64	...
147 ÷ 125 =	...	...	...	117.60
Reducing to basis of				
100				
40.08	...	...	59.92	...
B.t.u. per cu. ft. gas				
burnt				
103 x 0.4008 =	...	...	41	...
125 x 0.5992 =	...	...	...	75
Volume per second of				
gas, air and prod-				
ucts of combustion,				
32 deg. Fahr., 29.92				
in, barometer				
gas, cu. ft.	188	...	...	...
air, cu. ft. . . . .	...	300	...	...
Products of combus-				
tion				
451 x 0.4008 =	...	...	181	...
451 x 0.5992 =	...	...	...	270
B.t.u. per second re-				
quired				
188 x 31 =	5,828	...	...	...
188 x 56 =	...	10,530	...	...
188 x 41 =	...	...	7,708	...
188 x 75 =	...	...	...	14,100
B.t.u. per cycle =				
15 min. 900 sec.	5,245,000	9,477,000	6,937,000	12,690,000
20 min. 1200 sec.	6,994,000	12,636,000	9,250,000	16,920,000
25 min. 1500 sec.	8,742,000	15,795,000	11,562,000	21,150,000

Any change in the assumptions made will alter these values in a corresponding manner. The change in temperature of the gas and air and the waste gases will vary the quantity of heat available. The cyclic change in temperature may be varied, and this will change the volume of brick required to store up the heat, and the surface required for heat interchange. The heat storage capacity must be sufficient to supply the desired preheat and the loss through the chamber walls, when on air or gas. Too much checker adds to first cost. Too small a checker increases operating cost. The conditions will be changed by other fuels, as well as by changes in the ratio of the air supply.

As the unit pass has been made the same for both of the chambers, the volume of brick and pass for the air checker will be changed slightly, as follows:

Brick volume = $10462 \times 0.5208 =$ cu. ft. 5449

Pass volume = $10462 \times 0.4792 =$ cu. ft. 5013

The pass unit will be different with different wall thicknesses, and several variations might be tried in arriving at a desirable arrangement. The lineal amount of checker is found by dividing the brick and pass volumes by the area of brick and pass in a unit pass:

Area of unit pass $\frac{\text{Gas}}{\text{Air}}$
 $= 8.125 \text{ in.} \times 8.125 \text{ in.} \div 144 = 0.45844 \text{ sq. ft.}$
 Area of pass
 $= 5.625 \times 5.625 \div 144 = 0.21973 \text{ sq. ft.}$
 Area of brick = difference = 0.23871 sq. ft.
 Lineal ft. brick for
 $\frac{\text{Gas} = 2949 \div 0.23871 = 12,353 \text{ ft.}}$
 $\frac{\text{air} = 5395 \div 0.23871 = 22,600 \text{ ft.}}$
 $\frac{\text{pass for gas} = 2713 \div 0.21973 = 12,347 \text{ ft.}}$
 $\frac{\text{air} = 5067 \div 0.21973 = 23,070 \text{ ft.}}$
 A checkerwork height of 23 ft. has been assumed, to illustrate the effect of the high checker. On this basis the number of passes will be:
 $\frac{\text{for gas} = 12,347 \div 23 = 537}$
 $\frac{\text{for air} = 23,070 \div 23 = 1003}$
 The ground area occupied by the checkerwork will be:
 $\frac{\text{for gas} = 5662 \div 23 = \text{sq. ft. } 246.35}$
 $\frac{\text{air} = 10462 \div 23 = \text{sq. ft. } 454.90}$

Any convenient length or width of chamber that will give this area may be used. Preferably, when a square pass is used, the length and width of the chambers should be multiples of the pass dimensions, the length of both chambers being the same. The chamber length will be: $(8.125n + 2.5) \div 12 = l$, in which $n =$ number of passes. Preferably, the number of passes should be changed to give an even number of passes in the width and length.

Let $n = 40$, then $l = 27 \text{ ft. } 3\frac{3}{4} \text{ in.} = 27.29 \text{ ft.}$
 For the width let $n = 14$ and 26, then
 $l = 9.48 \text{ ft. } 17.60 \text{ ft.}$
 The nearest inch values would be used in practice, but the decimals of a foot are here used for convenience.
 The number of passes will revise to: 560 1,040
 The area occupied will revise to, sq. ft. 288.70 480.30
 The checker volume will revise to, cu. ft. 5,950 11,040
 The heating surface per pass = sq. ft. 44.06
 The total heating surface in sq. ft. = 24,675 45,830
 The total area in the passes = sq. ft. 118.63 228.51
 Perimeter of one pass, lineal feet. 1.875
 Perimeter, total in lineal feet. 1,012.6 1,950.0
 Average velocity, ft. per second, gas 6.532 4.928
 Waste gases = 8.243 4.971
 Meters per second, gas and air = 1.99 1.50
 Waste gases = 2.51 1.52

For the usual checker construction, the method of arriving at the heating surface is somewhat similar to the above, the space occupied by the brick being $0.5208 \div 0.29 = 1.79$ rows per foot; and the gage or space between being $0.4792 \div 1.79 = 0.2677 \text{ ft.} = 3 \frac{3}{16} \text{ in. (about).}$

From these figures the heating surface may be arrived at, as well as all of the other data necessary in determining the size of the checker chambers for gas and air. When properly laid to secure stability, a 9-in. shape makes a checker which gives the maximum heat storage utilization of the volume occupied.

Regenerators Continued	Gas on Gas	Air on Air	Gas on Waste Gas	Air on Waste Gas
Heat transfer per second				
Total B.t.u. =	5,828	10,530	7,708	14,100
Per sq. ft. B.t.u. =	0.2362	0.2298	0.3124	0.3077
Per m ² , calories =	0.6407	0.6233	0.8474	0.8346
Average temperature differential gas to brick or brick to gas:				
Deg. Cent.	175	175	175	175
Deg. Fahr.	315	315	315	315
Convection factor to still air, according to Langmuir curve, Fig. 4, calories per m ² per sec.	0.294			
Correction factor for velocity =				
$K = \sqrt{\frac{35 + v}{35}}$ =	2.59	2.30	2.86	2.31
$v =$ velocity in cm. per second				
Convection corrected for velocity in calories, per m ² per second	0.7615	0.6763	0.841	0.6792
In B.t.u. per sq. ft. per sec.	0.2807	0.2493	0.310	0.2504

These transfer values seem to indicate the provision of sufficient heating surface for the desired rate of heat transfer to take place. Langmuir's work is probably as accurate as obtainable, but the writer has assumed that his temperature differential holds with higher initial temperatures, his values being based upon still air at 80 deg. (27 deg. Cent.). Whether these assumptions are correct or not cannot be fixed without further research.

All of the computations are based upon an assumed rate of fuel consumption, and will vary as that rate changes. Other variations will be introduced by different fuels, and different working conditions, than those which were fixed initially for the base of the computation. However, there is no basic reason why the design of a furnace cannot be reduced to rational methods. When the method of operation and the design are

fixed, it is possible to predict the fuel consumption within a reasonable margin, as well as the performance of the furnace as a heat-transfer apparatus. The main difficulty in arriving at the heat losses from the exterior walls of the checker chambers arises more from their exposure to stray air currents and variations of the cycle of operation. When the cycle is fixed, these losses can be reduced to mathematical analysis.

Observations on the Surface of Liquid Steel*

Microscopic Examination of Particles Thrown Off—Optical Pyrometer Observations

BY COSMO JOHNS

THE appearance of liquid steel as it flows from the launder of an acid open-hearth furnace was described in a communication by the author to the Faraday Society,† while the evidence for the existence of the vapor of iron or steel was reviewed in the course of a lecture‡ to the West of Scotland Iron and Steel Institute. Attention was specially drawn to the fact that an optically clean surface can be observed to persist for an appreciable length of time.

An optical pyrometer using monochromatic light of a suitable wave length is a very convenient instrument for exploring such a liquid metal surface. The higher the temperature of the steel the longer does the liquid steel preserve its oxide-free surface. This can very conveniently be studied if a small quantity of liquid is poured into an open chill mold. If the temperature is sufficiently high and the pouring carefully done, the upper surface remains clear for several seconds, but, as the freezing point is approached, an oxide film begins to form and soon covers the surface. The same thing can be observed when liquid copper is poured into an open mold and is allowed to freeze.

The preservation of the optically clean liquid metal surface was attributed by the author to the presence of the vapor of the metal, and the subsequent formation of the oxide film to the lowering of the vapor pressure as the freezing point of the liquid metal was approached. The presence of vapor of iron or steel above the bath of the open-hearth furnace seemed necessary to explain the gradual accumulation of oxide of iron, chiefly Fe_2O_3 , in the pores of the silica bricks that line the hearth, and the well-known emission of reddish-brown iron oxide fume from the chimney during the stage in manufacture known as the boil.

When, however, this apparently rather obvious explanation was again advanced§ it failed to secure acceptance, and a marked divergence of views was apparent among those taking part in the discussion which followed. Professor H. Louis doubted the possibility of iron vapor being formed, and suggested the possibility of the formation of iron carbonyl. Dr. W. H. Hatfield could not agree as to the vaporization of iron, and said that if a stream of metal were watched the conviction grew that the occluded gases were coming off and protecting the stream, and that if iron vapor were present there would be ocular evidence of its combustion and the formation of oxide.

Professor Carl Benedicks thought that the main reason for the preservation of the surface was that the stream carried the air along with it, and that it was not running through air, but was protected by a covering of nitrogen. Only E. H. Saniter agreed with the author, that the facts could best be explained on the assumption of the vaporization of iron.

In the face of this divergence of opinion, it was clear that further experimental evidence was desirable, and the object of this communication is to submit this further evidence. When a stream of steel, such as has been described above, is closely observed, a continuous shower of brilliant sparks can be seen to be ejected from the surface. Most of them end their flight as luminous objects by exploding with a brilliant flash. The length of the flight depends, of course, on their initial velocity and angle of emergence, but it is also related to the temperature of the steel and its chemical composition. The "sparks" can be collected in the exploded state and also examples found where disruption had not occurred.

From their examination it could be seen that the miniature explosion, which had ended the luminous career of so many, was caused by the accumulation of gas in the interior globule of steel during its oxidation in the course of its flight through the air, and that the hollow sphere of iron oxide had ruptured when the pressure became too great. Sometimes rupture occurred with the formation of two hemispheres and sometimes by the blowing out of a portion of the shell less in size than a hemisphere.

The most probable explanation is that small globules of the steel are detached as a result of turbulence, and projected away from the surface as spray. These globules during flight would become oxidized and the gaseous products of the combustion of the carbon would accumulate in the interior, as oxidation progressed from outside to inside. It is just possible, however, that this explanation is not complete, and that their life history is not so simple.

Now, above the stream of steel, and easily distinguished from the sparks, a well-defined fume can be seen, rising like smoke from the liquid metal surface and floating away to a considerable distance. It is evolved in greatest quantity near the tap-hole where it emerges into the air. There does not appear to be any graduation from "sparks" to fume; the sparks are distinct entities and can be separately distinguished from the fume. Samples of the fume were, therefore, collected—a few sparks would be included, but they would not be many in number. The sample could be collected on suitable collecting surfaces placed some distance away, but as the sample would represent only the portion that had been sorted out by gravity at that particular point it might not be representative. A simpler method was to use a magnet and collect the fume a few feet above the surface of the steel.

An examination of the samples made it clear that the method of collection could be decided by convenience alone, for the fume was found to consist of small globules of iron oxide, most of them beautifully spherical. When the collection was made by allowing the falling particles to be caught on a receiving surface, the size of the globules did not vary much, and the absence of extremely small spheres was noticeable. The fume collected with a magnet over the stream contained examples of all sizes, including a few "sparks," which could be distinguished.

There was, however, one very striking difference in habit between the globules, constituting the fume, when

* A paper read before Section B of the British Association, at Edinburgh; Reprinted from *Engineering*.

† Cosmo Johns, "The Determination of the Temperature of Liquid Steel under Industrial Conditions." Transactions of the Faraday Society, Vol. XIII, 1918.

‡ Cosmo Johns, "The Solid and Liquid States of Steel," Journal of the West of Scotland Iron and Steel Institute. Lecture delivered December 20, 1918.

§ Journal, Iron and Steel Institute, No. 11, 1919, page 180 et seq.

collected with a magnet and those caught at a distance on a receiving surface. Those collected by gravity displayed no tendency to adhere or to attract each other. Owing to their spherical form it was difficult to retain them on a glass slide for examination.

On the other hand, those collected with a magnet displayed a marked tendency to run together and form straight or curved lines, in which spheres of all sizes could be seen. Occasionally small groups of these little spheres could be observed, but the more common habit was to string themselves out in straight or curved lines, which could be moved about on the glass slide without coming apart, unless the length of the string of spheres was excessive.

This habit of adhering, and forming strings or groups, on the part of the globules that cooled in a magnetic field appears to be similar to that recently described by Professor Elihu Thomson* as characteristic of the "smoke" given off by the iron arc when used for electric welding. The agglomerating habit is, therefore, to be ascribed to the cooling of the iron oxide globules in a magnetic field which has rendered them magnetic.

The investigation was now directed to determining the origin of the fume. If it proved to be a form of spray, finer than the larger form which gave the sparks, then no light would be thrown on the nature of the medium, if any, protecting the surface of the liquid steel from oxidation. If, however, it could be shown that the minute globules represented the vapor phase of the metal after condensation and oxidation, an explanation would have been found. Samples of steel were, therefore, carefully collected from steel of varied but unknown composition.

Now, an analysis of the fume, when recalculated to an oxygen-free basis, would enable fume and original steel to be compared. If the fume was mere fine spray, then the oxygen-free fume and original steel would have analyses in substantial agreement. If the fume represented condensed and oxidized vapor, then differences should appear for, on theoretical grounds, the various metals which are soluble in iron and can be investigated, in various concentrations, as alloy steels, would not be expected to vaporize at the same relative rate.

Fume samples from several steels of varying compositions were collected and analyzed.† When recalculated to an oxygen-free basis, they were all consistent in that the alloy metals differed as regards their percentage from those in the original steel, and made it clear that the fume in great part, if not almost entirely, represented the condensed and oxidized vapor of the steel.

As the investigation will be continued, only one analysis will be given here, and that one contains the largest number of dissolved metals. The sample was carefully collected, and the oxide globules separated from the small quartz and fireclay particles and other impurities, which had been swept up from the sides of the launder by the strong convection currents found near the liquid steel. The ratio of the percentage of each metal in the original steel and its percentage in the fume, recalculated on an oxygen-free basis, was as follows:

Element	Original Steel	Fume
Tungsten	1	0.58
Chromium	1	0.97
Iron	1	1.00
Nickel	1	1.23
Manganese	1	2.50

These values should be regarded as approximate only.‡ They serve to decide the point at issue, for they can represent only the vapor of a complex alloy steel whose constituents have evaporated at differential rates. They cannot possibly be construed as proving that the fume is the oxidized spray of the steel. As in many other recorded investigations, the solution of the immediate problem in hand only serves to suggest many new ones. Though it is proved that the fume

does represent the condensed and oxidized vapor of the steel, it does not follow that the ratios tabulated give the absolute rate at which each of the metals evaporate at the temperature of liquid steel.

There are difficulties in securing samples sufficient in weight for reliable analyses from steels of known composition. When collected with a magnet any non-magnetic material in the fume would escape collection. If the cooled fume be collected as it falls at some distance, then gravity separation would have been effected and the result is unknown. Collecting the fume by aspiration or some other method from near the surface of the steel involves difficulties which have not been overcome. Thus there are considerable difficulties in collecting the sample. Then the results which have been obtained suggest that the degree of concentration of the various metals have some effect on the rate of evaporation, and it is just possible that the presence of other elements in the solution is a factor not entirely negligible.

A search through relevant literature, admittedly not complete, failed to disclose any experimental work on the nature of the vapor of alloy steels. Our knowledge of the state of molecular association of the elements, in such a complex liquid alloy as that studied, is practically nil. What is clear, however, is that a most interesting field of research has been opened out. The work is of great scientific interest, but it also has important industrial applications. The use of optical pyrometers for the determination of the temperature of liquid metals has been successful only where the method of observation has been standardized, and the pyrometer readings used directly for comparison without any attempt being made to apply corrections to obtain real temperatures.

The presence of the vapor of the steel as a protecting atmosphere around the stream would mean that the absorption of the light emitted by the liquid metal would vary with the angle of observation. The condensed and oxidized vapor rising in a cloud would also mean considerable absorption of light. The phenomena are not confined to steel, for they should be still more marked with the non-ferrous alloys, especially those containing the more easily vaporized elements, and possibly explains the difficulty experienced in applying optical methods for the determination of their apparent or real temperatures.

Papers to Be Read at Foreign Trade Convention

"A Foreign Trade Policy for Americans" will be the subject of an address by James A. Farrell, president United States Steel Corporation, at the ninth National foreign trade convention in Philadelphia, May 10, 11 and 12, over which Mr. Farrell will preside. His address will be the keynote of the campaign for a great business and industrial revival in this country.

Mr. Farrell will emphasize the necessity for a definite foreign trade policy if America's export trade leadership is to continue. He will stress the importance of foreign trade to the prosperity, not only of American industries but to the public in general.

Financing and expansion of the nation's overseas commerce is the primary purpose of the convention. It will be a working gathering from the opening to the final session.

Charles M. Muchnic, vice-president American Locomotive Sales Corporation, will make an address on "The Factor of Depreciated Currency in Competition."

Under the general topic of export sales promotion, J. W. Mason, vice-president American Surety Co., will talk on "Bonded Service as a Selling Argument." "The Essentials of a Market Survey" will be discussed by William Menkel of the Association of National Advertisers.

New concrete docks and warehouses will be constructed in the Parana River ports of Baradero and Villa Constitucion, Argentina, for the accommodation of river boats, according to Trade Commissioner George S. Brady. The work will be under the direction of the Argentina director of navigation and ports, and approximately 700,000 pesos will be spent at each port.

* Nature, June 23 and July 14, 1921.

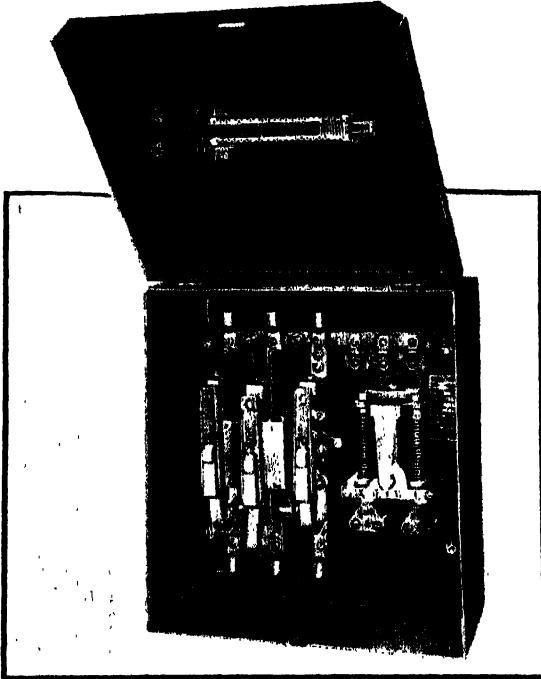
† I have been much indebted to J. H. Huxley, F.I.C., A.R.S.M., under whose supervision the several analyses were made, for the interest he has taken in the investigation.

‡ A less complete series of varying ratios was communicated at the time the paper was read.

Thermal-Limit Motor Starter

A thermal-limit starter which is said to permit an induction motor to exert six or seven times its normal power for a limited period, at the same time protecting it from a prolonged overload as small as 25 per cent, has been developed by the Monitor Controller Co. of Baltimore. The device is also said to take care of changes in temperature automatically, protecting the motor under all conditions of operation.

The starter, known as the Thermaload, is shown in the accompanying illustrations, and consists of a 3-pole



The Starter Consists of a Three-Pole Magnetic Contactor and a Thermal Limit Relay. The expansion unit is shown in the insert in the cover

magnetic contactor and a thermal-limit relay, mounted on a slate panel and inclosed in a metal cabinet. It is operated by push buttons from one or more points. The apparatus is said to give overload and low-voltage protection, prevent damage from single-phase running of polyphase motors and yet give full current, full voltage and full-torque start. It is available in all sizes up to 3 hp. 110 volts single phase, 5 hp. 220 volts single phase, 110 volts polyphase, 10 hp. 440 volts single phase, 220 volts polyphase. All sizes are available in voltages up to and including 550 volts.

The thermal-limit relay consists essentially of two units which expand between a fixed support and a hinged contact arm, the arm being arranged in a way to multiply the motion of the expansion units several times at the contact. Each expansion unit consists of a double-wall tubular receptacle, the inner wall being smooth and closed at one end and the outer wall corrugated and closed at both ends, the construction being shown in the insert. The space enclosed between the walls is filled with tetra-chloride of carbon, a non-corrosive, non-freezing liquid. The thermal element which operates the expansion unit consists of a form-wound coil of asbestos-insulated wire attached to a piece of insulating material by brass eyelets which are formed under pressure around the end of the wire, forming the terminals. These eyelets register with two brass binding posts and are clamped by brass screws. The binding posts furnish mechanical support as well as serving as electrical connections.

The full-load rating of the thermal element is stamped on the sheet insulation and all elements have the same mechanical dimensions. A relay can be changed from one rating to another merely by inserting the proper elements. The small amount of power

required to operate the relay, 2.14 watts, is said to be an outstanding feature. The resistance also is said to be extremely low and likewise the voltage drop. The low resistance permits using resistance wire of large diameter, affording a self-supporting element, capable of withstanding rough usage.

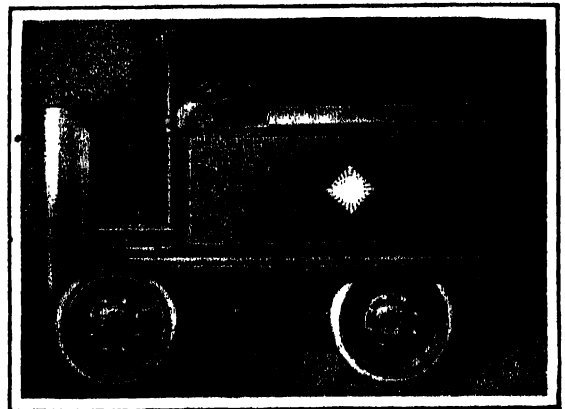
Develops Heavier Storage-Battery Tractor

There is a tendency to use the electric storage-battery tractor in harder service than heretofore, they often being called upon to operate in soft-dirt yards, in pulling loads up inclines and under other similar heavy-duty conditions. For this service a new and heavier tractor, built in two models, has been placed on the market by the Elwell-Parker Co., Cleveland.

The 4-wheel tractor for steel-plant or foundry service is shown in the illustration, the other model being a 3-wheel machine for heavy duty around the congested floors of a warehouse. As compared with the company's other types the new design is characterized by several new features.

The battery compartment has openings at both the top and back so that the battery can be taken out either way. Solid side plates are used instead of loose plates that are in danger of being torn off in case the tractor rubs against some obstruction. The dash grooves into a wood bumper strip set in the side channel of the frame, this bumper strip being protected by a 1/4-in. metal strip. The weight of the motor has been increased 65 lb. An additional safety feature is that when the operator leaves his seat he not only opens the circuit breaker but sets the brake.

A new type of spring suspension is provided. Coil springs are used in which oil-saturated wool waste is packed, the oil from which runs down through the axle blocks to the axle guides which are provided with renewable liners. This permits a side sway of the truck without forcing the wheels out of alignment. The 3-wheel tractor has a spring suspension on the fork of the single front wheel similar to the rebound spring fork of a motorcycle. The power plant is supported on this forward end by a ball socket. A ball and socket steering rod extends from the lower end of the



When the Operator Leaves the Seat the Circuit Breaker Opens and the Brakes Set

steering column to a single lever attached to the center of the axle, with right and left ball and socket reach rods connected to the wheel knuckles. A pressure oiling system is used.

The 4-wheel tractor has 2-wheel steer and 2-wheel drive. Its draw-bar pull capacity is 675 lb. normal, and 2600 to 2700 lb. maximum and its no-load speed is 530 ft. per min. Its weight with Edison battery is 4375 lb. The 3-wheel tractor has a draw-bar pull capacity of 450 lb. normal and 1800 to 1900 lb. maximum and a no-load speed of 600 ft. per min. It swings on a 5 ft. 4 in. radius. Its weight with Edison battery is 3050 lb. Both types have three speeds in either direction.

SILICA AND FIRE BRICK

Production and Other Statistics of Refractories Manufacturers' Association

CHARTS prepared by the Refractories Manufacturers' Association, giving production, shipments and stocks, new orders minus cancellations, unfilled orders, new orders and cancellations of fire clay and silica brick have been issued covering the month of January, and going back to January, 1919.

In January this year shipments of fire clay brick reached 40 per cent of the monthly economical producing capacity, exceeding production by about 2 per cent, while there was a decrease of about 3 per cent in the stock. New orders ran above 40 per cent of producing capacity, resulting in a slight gain in the

normal output of 25,448,838 silica brick; the 1921 figures on 27,305,500 brick. For fire clay brick, the 1919 figures are based on an output of 71,572,186 brick; the 1920 figures on 73,526,103, and the 1921 figures on 78,645,942 brick; all expressed in 9-in. equivalents.

Tandem Cold Strip Mills for Worcester Company

New precision 6 x 4-in. tandem cold rolling mills for flat strip steel which are being built by the United Engineering & Foundry Co. for the Worcester Pressed Steel Co., Worcester, Mass., will be installed ready for operation about May 10. An exclusive feature is the adjustment of the rolls by means of wedges instead of screws. This is to insure an accurate adjustment of the rolls for gage and to eliminate the lost motion possible with screw adjustment. The mills will be equipped with steel rolls 6 in. in diameter, with 4 in.

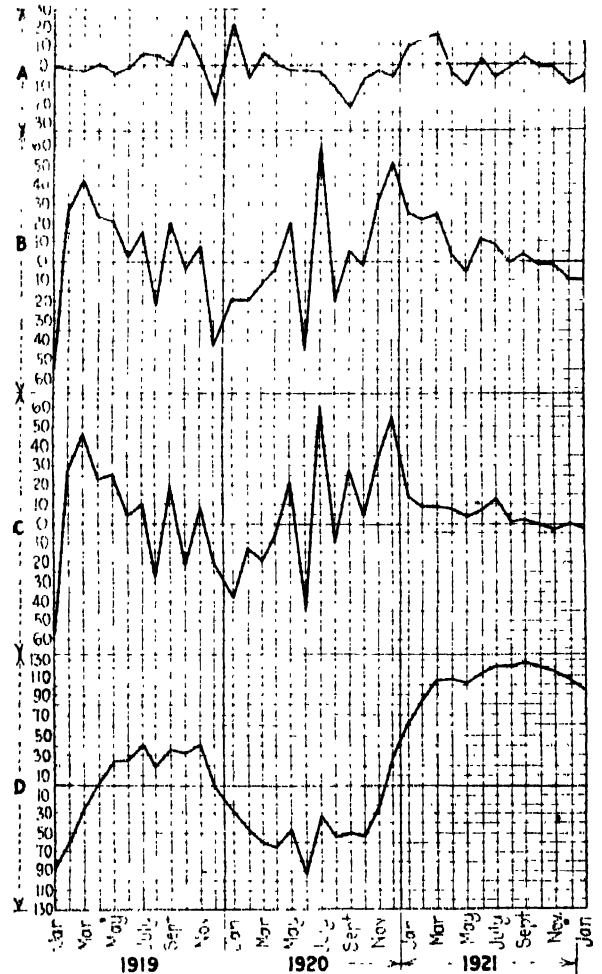
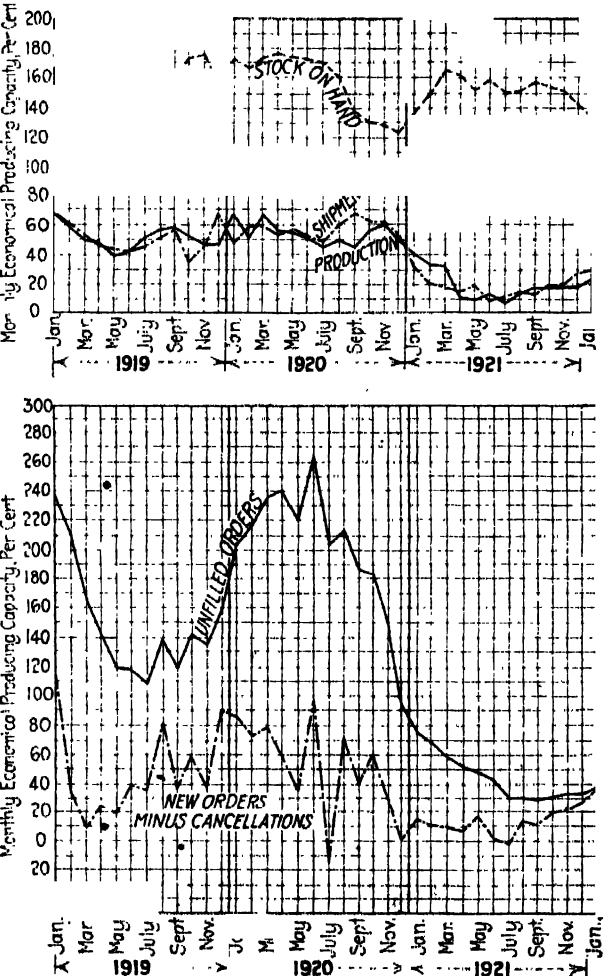


Chart "A" Shows the Divergence of Production and Shipments. Where production exceeds shipments, the degrees of divergence are shown above the zero line, and vice versa. Chart "B" shows the divergence of production and new orders. Where production exceeds new orders, the degrees of divergence are shown above the zero line, and vice versa. Chart "C" shows the divergence of shipments and new orders. Where shipments exceed new orders, the degrees of divergence are shown above the zero line, and vice versa. Chart "D" shows the divergence of stock and unfilled orders. Where stock exceeds unfilled orders, the degrees of divergence are shown above the zero line, and vice versa.

unfilled orders, since cancellations were practically nil. The silica brick chart shows similar drifts. Shipments reached 30 per cent of capacity and, while production moved upward, it was less than the gain in shipments and there was a substantial decline in stocks. Unfilled orders increased, since new orders gained and, like fire clay, cancellations were unimportant.

These data are furnished not only to the members of the association, but also to the Department of Commerce. The figures are based exclusively on reports from members of the association and, while not a full report on the industry, furnish an excellent picture of the activities of a large majority of refractories manufacturers. The 1919 and 1920 figures are based on a



(Charts for Silica Brick; the Charts for Fireclay Brick Are Similar)

face, the maximum width of stock that will be rolled on these mills being 3½ in. The wider and heavier sizes will be produced in the Worcester company's present equipment of two-high and three-high mills, which produce strips from 3 to 15 in. with a capacity of 70 tons per day.

The minimum delivery speed of the mills operated in tandem will be 201 ft. per minute, while the maximum may be 350 ft. per minute. Each mill will be driven by a 60 to 70-hp. adjustable speed direct-current motor controlled by a special automatic controller. The motor driving the No. 1 mill has a 1.69 to 1 range in speed and the motor driving the No. 2 mill has a 2 to 1 range. A new motor driven coiling reel will be installed with these mills. This reel will be fitted with a spool only 8 in. in diameter to produce tight small core coils for annealing or shipping without the necessity of an extra recolling operation.

PITTSBURGH BASING POINT

Northwestern Companies Claim Practice Prevents Competition

MINNEAPOLIS, March 10.—Hearings of the Federal Trade Commission in the taking of testimony in its complaint against the United States Steel Corporation, in the Pittsburgh basing point case begun here March 1, were brought to a close yesterday. Examiner J. W. Bennett adjourned the hearing to March 20, when it will be resumed in Chicago.

The second week of the testimony taking was somewhat livelier than the first week, the prosecution saving its most important witnesses until toward the close of the session. Railroad, State and county officials were brought into the second week and officials of the Minneapolis Steel & Machinery Co., Minneapolis, and American Hoist & Derrick Co., St. Paul, also added interest to the hearing.

Probably outstanding among the individual witnesses was George M. Gillette, president Minneapolis Steel & Machinery Co., who has been a fabricator of steel for 32 years and who has consistently and vigorously opposed the Pittsburgh basing practice since its inception about 20 years ago.

Mr. Gillette was the principal witness on the final day of the hearing. He made the assertion that several independent steel rolling mills acting independently and competitively could compel the United States Steel Corporation to cease its Pittsburgh basing practice. On the other hand, he said, the corporation could swing the independents to harmonize in any policy it promulgated.

Eighty per cent of the annual steel consumption of the Minneapolis Steel & Machinery Co., Mr. Gillette said, had been purchased from Duluth and Gary since the opening of the Duluth mill, and that prior to the opening of the Duluth mill, the bulk of the steel consumed by the company had been purchased in Gary. The trade field of his company, Mr. Gillette said, had gradually been reduced, as Eastern competitors took up the manufacture of lines which the Minneapolis concern was featuring. Foreign business, he said, had been practically wiped out in the last few years through the alleged advantage of Eastern competitors gained by the Pittsburgh basing practice.

Witnesses testified that the following alleged toll had been taken in Minnesota through operation of the Pittsburgh basing practice; \$32,472 in school buildings erected in Minnesota from 1919 to 1921; \$12,262 in steel in University of Minnesota buildings erected since 1916; \$40,420 in bridges erected by the State Highway Commission in 1920; \$33,920 in bridges erected by the State Highway Commission in 1919; an amount three times as great as that alleged to have been contributed by the State said to have been paid in by counties in bridge construction.

Samuel A. Chalmers, building inspector for the Minnesota Department of Education, testified that in the years 1919 to 1921, inclusive, school buildings erected in Minnesota cost \$10,155,056.

A. H. Schuett, structural engineer for the same department, testified that 5077 tons of steel went into the buildings.

Downer Mullen, secretary of the Minnesota State Board of Control, said University of Minnesota buildings erected since 1916 cost \$3,923,623. Mr. Schuett said the steel entering into the construction of these buildings was 1916 tons.

J. T. Ellison, bridge engineer for the State Highway Commission, testified that contemplated bridge construction in the next two years would far exceed that of the two previous years.

Both W. W. Corlett, general solicitor, and C. A. Severance, counsel for the corporation, objected strenuously to the admission of testimony such as that offered by Minnesota State officials regarding steel consumption on the grounds that it was irrelevant. Examiner Bennett noted the objections, but allowed the testimony to stand.

R. J. Elliott, assistant purchasing agent for the

Northern Pacific, and E. T. Stone, purchasing agent for the Soo Line, testified as to the amount of the annual steel consumption of their roads, the latter placing his consumption at 2503 tons annually, and the former, his figure at 3200 tons annually, some items being excluded, however.

W. O. Washburn, partner in the American Hoist & Derrick Co., St. Paul, testified that his company had undergone the experience of witnessing its Eastern business dwindle to a negligible quantity, because, he said, of Eastern competition aided through the Pittsburgh basing practice. Machines sold by his company in the East, the principal field of trade for his products, Mr. Washburn said, were marketed only on their merits or through predetermined preference.

O. W. Morton, purchasing agent, American Hoist & Derrick Co.; R. B. Deatherage, purchasing agent, and E. H. Reudelsterz, sales manager, Puffer-Hubbard Mfg. Co., Minneapolis, and E. J. Ellertson, assistant secretary of the Russell Grader Mfg. Co., Minneapolis, were the other witnesses during the week.

The testimony, in general, was to the effect that competition to the east of Chicago by Northwest fabricators of steel was maintained at a loss to the Northwest competitors, whereas competition in the West with Eastern manufacturers was maintained with each about on an equal basis. Only in the immediate Northwest are the Northwest concerns at an advantage over Eastern competitors, it was asserted.

Mr. Severance and Mr. Corlett objected to any form of testimony not bearing directly on the competition issue, and in a few instances their objections were sustained. Frequently they were able to gain from the witnesses statements tending to discredit other bits of testimony and also to obtain admission of ability of the Northwest manufacturers to compete successfully in most sections of the country.

Slight Improvement in Pennsylvania

HARRISBURG, PA., March 13.—Conditions in the metal trade in Pennsylvania are believed to be on the verge of picking up, according to the semi-monthly report of the Pennsylvania State Department of Labor and Industry, just issued.

The metal trades show some improvement, according to this report, in most of the districts. Altoona, however, reports "no noticeable improvement." Erie said that there is a slight improvement, while Johnstown says that the industry "has shown considerable life" recently. McKeesport declared the iron and steel works are operating better than during all of 1921. "No particular change" was noted in Pittsburgh. The Harrisburg district reported 3900 men in the metal and machinery trade out of employment.

The number of unemployed throughout all of Pennsylvania showed a decrease of about 5000 during February, according to the bulletin. The unemployed on March 1 was 308,450 as compared to 313,835 on Feb. 1.

Secretary Hoover Will Stay in Cabinet

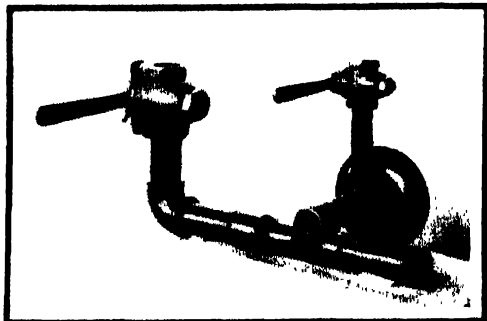
WASHINGTON, March 14.—In a letter addressed to Mayor J. Hampton Moore of Philadelphia last Friday, Secretary of Commerce Herbert Hoover declined the offer of the position as director-general of the Sesqui-Centennial exposition to be held in that city. Mr. Hoover stated that the President had strongly expressed the wish that he remain in the Cabinet, and added that he felt that, having undertaken the reorganization of the Department of Commerce in the hope that he may build it into a greater service for the community, he would not be justified in abandoning that task until it has reached further advancement. The offer made to Mr. Hoover carried an attractive salary.

A paper on "Ball Steel" was presented before the monthly meeting of the Detroit Chapter of the American Society for Steel Treating, March 13, by H. G. Freeland, metallurgist Hoover Steel Ball Co., Ann Arbor, Mich.

Air-Gas Inspirator for Gas Furnaces

The surface combustion low-pressure air-gas inspirator heretofore used exclusively on the furnaces of the Surface Combustion Co., 366 Gerard Avenue, New York, has been redesigned for use with any make of gas furnace. The device is shown in the accompanying illustration.

The manufacturers claim that this inspirator is essentially a gas furnace carburetor. The entire operation of a furnace equipped with this device is controlled through one valve. An increase or decrease of



Air-Gas Inspirator for Gas Furnaces

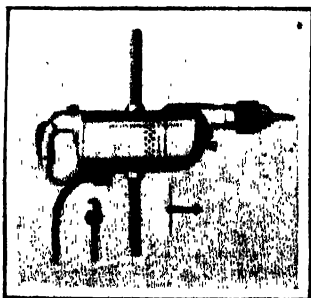
the air supply automatically increases or decreases the gas so that the mixture proportions remain in a constant fixed ratio. The gas cock is used only when starting or stopping and is either full on or full off; no adjustment of it is required. With this system it is said that no explosive mixtures are possible in any part of the distribution mains, as the gas and air are mixed only at the point of supply to the burners.

The advantages claimed are automatic supply of the exact proportions of air and gas to the furnace under all conditions of operation; thorough and homogeneous mixing just prior to entering the furnace, and instantaneous combustion.

Combination Portable Drill and Grinder

A combination portable electric drill and grinder is being placed on the market by the Wodack Electric Tool Corporation, Chicago.

The combination tool is shown in the illustration and is intended for drilling metal or wood. It has a drilling capacity of $\frac{1}{4}$ to $\frac{1}{2}$ in. in steel and when used as a grinder carries a 6 by $\frac{1}{4}$ in. grinding wheel. Two separate speeds are provided, slow speed for drilling and high speed for grinding. The motor which is of the universal type can be operated on both direct and



Combination Drill and Grinder. The motor can be operated on both direct and alternating current

alternating current of the same voltage and develops $\frac{1}{2}$ hp. under load. The switch is located in the top handle and is of the quick make-and-break automatic-stop type permitting close control of the tool.

Aluminum castings and ball bearings are used throughout. The weight complete is 18 lb. All components, including the motor, are built at the company's factory.

The Bethlehem Spark Plug Co., Inc., Bethlehem, Pa., has contracted to fill the entire spark plug requirements of the Packard Motor Car Co., of Detroit. About 250,000 plugs are required each year.

Fluorspar in 1921

The fluorspar shipped from mines in the United States in 1921, according to Hubert W. Davis, of the U. S. Geological Survey, amounted to approximately 35,600 net tons, a decrease of 81 per cent as compared with 1920. The general average selling price per ton f.o.b. cars at shipping points for all grades of fluorspar in 1921 is estimated at \$19.89, which is \$5.37 less than the average price in 1920. The total shipments in 1921 were the lowest recorded for any year since 1908. The shipments from Kentucky exceeded those of Illinois for the first time since 1904.

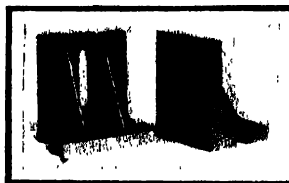
Imports of fluorspar into the United States in 1921 showed a decrease of 75 per cent as compared with those in 1920. The imports in 1921 were equivalent to about 22 per cent of the domestic shipments of fluorspar of fluxing grade, as compared with about 16 per cent in 1920.

Reports from steel manufacturers who produce about two-thirds of the basic open-hearth steel made in the United States show that they consumed 46,341 net tons of fluorspar in 1921, as compared with 80,545 tons in 1920. This group of steel manufacturers also reported stocks of fluorspar on hand Jan. 1, 1922, amounting to about 19,800 tons, as compared with 45,125 tons on Jan. 1, 1921. These reports therefore show that these steel plants consumed only 1,216 tons of fluorspar more than they had in stock at the beginning of 1921.

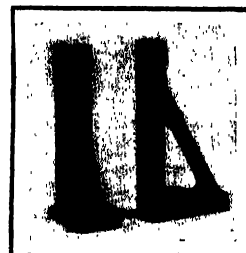
Precision Angle and Measuring Irons

The angle irons shown at the left in the accompanying illustration and the measuring irons at the right have been placed on the market recently by the Simplex Tool Co., Woonsocket, R. I.

The angle irons are of cast iron and carefully worked out to size, so that each size is shaped to accommodate the work intended for it. Three sizes are made from 4 x 5 x 5 in. to 8 x 10 x 12 in., and are de-



Angle Irons Are Shown Above and Measuring Irons at Right



signed to provide a variety of combinations suitable to the general run of work in any shop.

The measuring irons are designed to be clamped to the table of any machine and are said to be especially adaptable for accurate boring purposes. By setting them parallel to the machine table, they are useful in locating or measuring a variety of work and can be used also for clamping work that is to be machined. To facilitate setting up a slot for keys is provided in the bottom, as shown. The irons are of close-grained iron castings, with front face and bottom ground accurately and square. Two sizes are furnished, $2\frac{1}{2}$ x 6 x 12 in. and 4 x 8 x 21 in.

The Republic Iron & Steel Co., Youngstown, Ohio, has blown in No. 4 blast furnace in its Haselton group at Youngstown on basic iron, due to increased merchant demands and broader open-hearth furnace operations, requiring more iron for steel-making. The company is now producing iron from two furnaces in this complement. No. 5 stack has been active for more than four years.

K. L. Flickinger, secretary-treasurer of the Niagara Stone Products Co., Youngstown, Ohio, announces that operations have started at the company's dolomite and limestone quarries at Bellefontaine, Ohio. Present capacity of the property is 500 tons of road stone per day and 100 tons of agricultural stone.

Chrome and Nickel-Molybdenum Steels¹

Comparison with Other Alloy Steels for Automobile Use— Forging and Machining Qualities—Nickel- Molybdenum for Case-Hardening

BY C. N. DAWE

IN venturing to cover this pertinent subject it should be stated that there are so many more data yet to be obtained that it is impossible, at this time, to make a definite statement that fully covers the situation with regard to the application of commercial chrome-molybdenum steels. Such propaganda has been spread with reference to these steels and so much has been written regarding the history, possibilities, sources of supply and physical properties obtained, that there

that the recent papers of Dr. John A. Mathews¹ and Dr. G. W. Sargent² be read.

Molybdenum Steel Usage

The Studebaker Corporation of America has had made and shipped to its plants over 2000 tons of molybdenum steels of various analyses. This steel has been put through production in the form of rear axle shafts, transmission gears and shafts, steering knuckles,

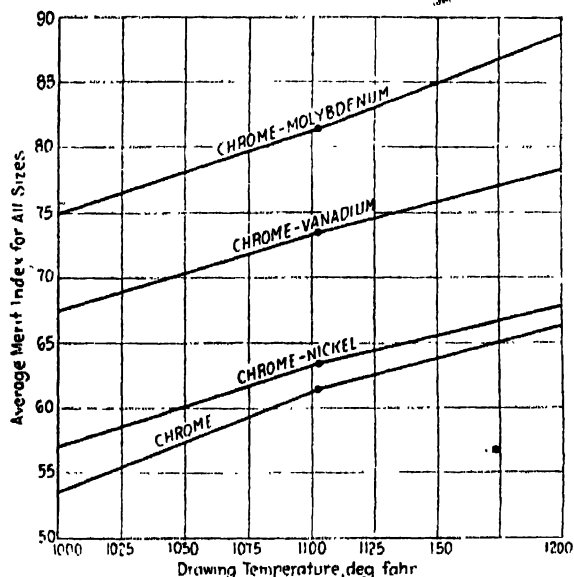


Fig. 1. Curves Showing the Relation Between the Drawing Temperature and the Average Merit Index for Various Alloy Steels

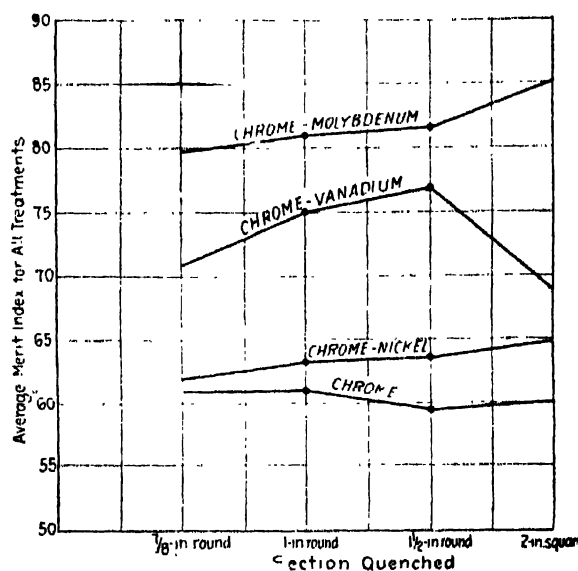


Fig. 2. Curves Showing the Relation Between the Average Merit Index of Alloy Steels and the Size of the Section Quenched

are many consumers as well as manufacturers who are looking on in a doubtful yet open frame of mind, desiring to gain further information, particularly with reference to application.

It is with this in mind that I present some actual data with reference to commercial molybdenum steel, noted from the viewpoint of a large consumer and not that of a fabricator or salesman. We, as consumers, attempt to strike rock-bottom and note what the material will actually do under production requirements.

I wish to emphasize the fact that every manufacturer of automobiles and automobile parts has his own peculiar problems and that frequently the means to an end in one plant is not applicable in another; therefore, there undoubtedly will be some criticism and discussion of the publication of the information given herein, although it is presented from a strictly neutral attitude and with no idea of promoting or discouraging the use of molybdenum steels.

A theoretical discussion of the causes of the manner in which molybdenum steels act will be avoided, since this phase already has been well covered by those whose opinions and discussions carry much more weight because of their many years of experience in the manufacture and application of molybdenum steels. For those who are sufficiently interested, it is recommended

steering-knuckle pins, ring gears and drive pinions; in fact, all parts for which alloy steel is specified.

Our first efforts were to determine the advisability of the adoption of that class of chrome-molybdenum steel which would be adaptable to heat-treated forgings such as steering knuckles, steering arms and rolled axle shafts, water quenching of these being desired. By a process of elimination it became clear that steel containing molybdenum approximating 0.30 to 0.40 per cent, with chromium 1.00 per cent and carbon above 0.30 per cent, should be avoided when water is desired as the quenching medium and where cracker shearing is used. An analysis showing a carbon content below 0.30 and above 0.23 per cent, with a chromium content of 0.70 to 0.90 per cent and molybdenum 0.30 to 0.40 per cent, gives satisfactory results with water as a quenching medium, there being no cause for concern pertaining to the development of quenching cracks.

As a rule, our first interest is turned toward the physical properties of a steel as compared to those with which we already are acquainted. Having this in mind, an extensive test was run involving the pulling of approximately 400 tension pieces turned from heat-treated stock varying in size from 3/4-in. round to 2-in. square. The sizes used were 3/4, 1 and 1 1/2-in. rounds and 2-in. squares. The three smaller sizes were obtained by forging down from the 2-in. square hot-rolled forging bars. The 2-in. square test pieces were taken directly from the bar, no work having been put upon them.

Wide Treatment Range Not Necessary

The wide heat-treating range of a given steel is a

¹From a paper presented at the annual meeting of the Society of Automotive Industries in New York, Jan. 10 to 13. The author is metallurgical engineer Studebaker Corporation of America, Detroit.

²See THE IRON AGE, Feb. 24, 1921, p. 505.

³See Transactions American Society for Steel Treating, vol. 1, p. 589.

property upon which great stress always seems to be laid but, in our tests, no attempt has been made to determine this. In this present day of accurate metallurgical control we do not need a 100 to 200-deg. quenching range. What we as consumers are mostly interested in is to determine the lowest quenching temperature that can be used commercially and still obtain the maximum physical properties. With this in mind, quenching temperatures ranging from 1550 to 1650 deg. Fahr. were used in the case of the chrome-molybdenum,

average of results including good and bad, which we must admit is the proper way to form conclusions on a problem of this kind. The chemical analyses of the various types of steel tested are shown in Table 1.

Quenching and Drawing Temperatures

As has been stated, three quenching temperatures were used for each type of steel for each size, except for the 2-in. square as noted. Also, three drawing temperatures were used for each quench for each size, 1000,

Table 2—Results of Tests of 1/2-In. Round Steels

Grade of Steel	Quenching Temperature	Drawing, Deg. Fahr.	Yield Point as Elastic Limit, Lb. per Sq. In.	Ultimate Strength, Lb. per Sq. In.	Elongation in 2 In., Per Cent	Reduction of Area, Per Cent	Number of Tests Made	Merit Index
Chrome-molybdenum	1,550 to 1,650	1,000	146,850	158,530	21.2	55.6	9	72.8
Chrome-vanadium	1,550 to 1,650	1,000	148,900	167,770	19.4	54.6	9	65.5
Chrome	1,550 to 1,650	1,000	124,637	140,124	16.9	58.1	9	53.4
Chrome-nickel	1,475 to 1,575	1,000	119,861	135,164	18.5	59.5	9	58.2
Chrome-molybdenum	1,550 to 1,650	1,100	122,733	136,966	22.5	60.7	9	74.3
Chrome-vanadium	1,550 to 1,650	1,100	127,570	140,030	22.7	57.5	9	71.5
Chrome	1,550 to 1,650	1,100	104,911	121,108	20.5	64.0	9	64.3
Chrome-nickel	1,475 to 1,575	1,100	107,266	122,888	20.6	62.8	9	63.4
Chrome-molybdenum	1,550 to 1,650	1,200	100,980	118,900	26.5	68.4	9	92.3
Chrome-vanadium	1,550 to 1,650	1,200	113,000	131,323	23.6	60.6	9	75.2
Chrome	1,550 to 1,650	1,200	97,111	113,699	21.7	64.8	9	65.0
Chrome-nickel	1,475 to 1,575	1,200	94,804	111,800	21.7	65.0	9	64.0

chrome-vanadium and chrome steels, while 1475 to 1575 deg. Fahr. were used with the chrome-nickel steel.

Methods of Testing

To obtain results as nearly accurate commercially as possible, each group of test pieces was quenched from a production furnace in the same manner as small forgings would be handled in receiving similar treatment. The drawing operations were carried on in a laboratory electric furnace so that the effect of the

1100 and 1200 deg. Fahr.; that is, nine pieces of 1/2-in. round stock were quenched from a given quenching temperature and three were drawn at 1000 deg., three at 1100 deg., three at 1200 deg. Fahr., and so on through the series. The results obtained, as shown by averages, are given in Tables 2, 3, 4 and 5.

Generally speaking, in performing tests of the above nature where we desire to note a comparison of the physical properties of certain steels in terms of the elastic limit, ultimate strength, reduction of area and percentage of elongation, sometimes we are confused because of the variations we obtain, and because it is practically impossible, over a large number of test pieces, to hold any one or two factors constant so as to note the variation in the remaining factors. If we could heat-treat the test pieces so that the elastic limit would be the same in all, the variation in the other three remaining factors would tell the story.

The Merit Index for Comparison

After having made hundreds of tests, the question then presents itself as to how best to interpret the results obtained. Without entering into any discussion on this point, I take the liberty of using the merit index suggested by H. T. Chandler, and presented in a paper

Table 1—Chemical Analysis of Various Types of Steels Tested

	Chrome-Molybdenum, Per Cent	Chrome-Vanadium, Per Cent	Chromium, Per Cent	Chrome-Nickel, Per Cent
Carbon	0.260	0.320	0.310	0.280
Manganese	0.570	0.750	0.850	0.720
Sulphur	0.020	0.033	0.012	0.012
Phosphorus	0.025	0.025	0.020	0.020
Chromium	0.800	1.030	0.910	0.580
Molybdenum	0.360			
Vanadium		0.160		
Nickel				1.270

drawing temperature would be defined sharply. The physical properties we obtained, true to our expectations, showed occasional variations which were to our

Table 3—Results of Tests of 1-In. Round Steels

Grade of Steel	Quenching Temperature	Drawing, Deg. Fahr.	Yield Point as Elastic Limit, Lb. per Sq. In.	Ultimate Strength, Lb. per Sq. In.	Elongation in 2 In., Per Cent	Reduction of Area, Per Cent	Number of Tests Made	Merit Index
Chrome-molybdenum	1,550 to 1,650	1,000	153,880	162,200	19.4	55.9	9	69.7
Chrome-vanadium	1,550 to 1,650	1,000	147,750	158,770	19.8	54.8	9	67.2
Chrome	1,550 to 1,650	1,000	124,872	138,066	17.0	57.9	9	53.1
Chrome-nickel	1,475 to 1,575	1,000	120,860	136,086	18.1	59.9	9	58.0
Chrome-molybdenum	1,550 to 1,650	1,100	112,400	129,000	24.7	64.7	9	84.6
Chrome-vanadium	1,550 to 1,650	1,100	127,100	139,300	23.4	58.3	9	74.3
Chrome	1,550 to 1,650	1,100	99,706	116,526	20.6	63.8	9	61.5
Chrome-nickel	1,475 to 1,575	1,100	103,740	121,330	21.1	63.6	9	65.2
Chrome-molybdenum	1,550 to 1,650	1,200	99,320	117,400	27.1	66.7	9	88.8
Chrome-vanadium	1,550 to 1,650	1,200	101,950	116,500	26.9	64.8	9	83.4
Chrome	1,550 to 1,650	1,200	86,390	112,766	21.9	66.2	9	67.7
Chrome-nickel	1,475 to 1,575	1,200	92,590	111,013	22.1	65.5	9	65.2

dislike, but were fairly evenly distributed over the four types of steel. In this connection, in nearly all cases, in publishing the physical properties of a given steel there is such an exact uniformity of the superiority of one steel over another, or such an exact uniformity in the variations of the elastic limit and ultimate strength with respect to the elongation and reduction of area under different treatments, that it is apt to throw an element of doubt into the mind of one who can appreciate the very peculiar and pronounced variations that do exist under the most accurate handling of test pieces. The ultimate findings of the tests given herewith, however, were derived from a very broad

by John D. Cutter¹, and of expressing the results obtained above in terms of the equation

(I = 0 1/2 e (E + S) + (100 - R)

where

- I = the merit index
- e = the percentage of elongation in 2 in.
- E = the elastic limit in terms of 1000 lb. per sq. in.; in the tests it is taken as the yield point
- R = the percentage of reduction in area
- S = the ultimate strength in terms of 1000 lb. per sq. in.

The results are noted in Tables 2, 3, 4 and 5, while a general average is shown by the curves in Figs. 1 and 2. The above data or tests have indicated to us that

¹ See Transactions of the American Society for Steel Treating, vol. 1, p. 138.

chrome-molybdenum steel for heat-treated automobile parts has considerable merit. In view of the fact that this steel apparently can be produced in unlimited quantities with no danger of shortage of molybdenum, and because it has been produced and sold at a lower price than its closest competitor, chrome-vanadium steel, its adoption has been sanctioned.

Forges Easily and Scales Readily

With reference to its action through various stages

The next step consisted in obtaining a higher carbon steel to lower the quenching temperatures required and to find, if possible, a steel that would give the desired results by a single quenching temperature after carbonizing. The chemical composition of the heats obtained ran very consistently as follows: Carbon 0.190, manganese 0.546, sulphur 0.010, phosphorus 0.025, chromium 0.700 and molybdenum 0.370 per cent.

The first tests made on the above analysis apparently warranted an extensive trial of this grade and,

Table 4—Results of Tests of 1½-In. Round Steels

Grade of Steel	Quenching Temperature	Drawing, Deg. Fahr.	Yield Point as Elastic Limit, Lb. per Sq. In.	Ultimate Strength, Lb. per Sq. In.	Elongation in 2 In., Per Cent	Reduction of Area, Per Cent	Number of Tests Made	Merit Index
Chrome-molybdenum	1,550 to 1,650	1,000	147,900	157,600	20.3	57.0	9	72.2
Chrome-vanadium	1,550 to 1,650	1,000	129,800	140,200	20.9	57.6	9	66.6
Chrome	1,550 to 1,650	1,000	101,370	122,178	18.1	60.8	9	51.6
Chrome-nickel	1,475 to 1,575	1,000	103,360	123,036	18.7	61.1	9	54.1
Chrome-molybdenum	1,550 to 1,650	1,100	118,500	131,900	24.0	64.4	9	84.3
Chrome-vanadium	1,550 to 1,650	1,100	117,800	134,900	23.5	61.0	9	76.1
Chrome	1,550 to 1,650	1,100	86,770	109,710	21.9	65.0	9	61.4
Chrome-nickel	1,475 to 1,575	1,100	87,720	110,492	22.3	65.5	9	64.0
Chrome-molybdenum	1,550 to 1,650	1,200	92,900	112,400	26.9	68.8	9	88.7
Chrome-vanadium	1,550 to 1,650	1,200	102,400	118,600	26.5	67.0	9	82.8
Chrome	1,550 to 1,650	1,200	78,250	103,453	23.7	67.2	9	65.6
Chrome-nickel	1,475 to 1,575	1,200	80,417	103,577	24.6	67.8	9	70.3

of production, I would say that it forges entirely satisfactorily, with the particular advantage that the scale formed breaks away from the forgings very easily. With proper composition and for sizes within ordinary limits, it cold shears as readily as the other grades of commercial alloy steels. It responds very readily to the heat-treating operations, the percentage of forgings falling outside of the required Brinell hardnesses being very small.

As to its machining qualities, no figures can be given to corroborate the claims that have been made with regard to the reduction of tool costs and the like. However, we have satisfied ourselves by noting the machinability of the tonnage that has passed through our shops that chrome-molybdenum steel machines at least as well as the best there is. We have not heard of a failure of any part made of this steel out of the 50,000 cars that have thus far been produced since its adoption.

Case-Hardening Grades

Very few if any data have been recorded regarding the case-hardening grades, especially from the viewpoint of the consumer. Our first attention was to note whether any of the various grades of the low carbon steels could be applied to case-hardened gears, knuckle pins and shafts. The Studebaker Corporation

as a result, steel for 5000 cars was ordered. Upon getting into production with this material, with which all transmission parts and rear axle gears and drive pinions were produced, certain peculiarities were noted that ordinarily could not be observed with a few trial test pieces, the principal one perhaps being the fact that a satisfactory core fracture could not be obtained regularly; that is, after subjection to shock, the fracture would not show what is commonly called toughness but have a crystalline or granular appearance. This condition is particularly objectionable in parts that are subjected to a straightening operation and in clash gears.

A further investigation proved that to obtain much better results, the part to be heat treated had to be subjected to prolonged heating above the critical temperature of the core to bring about the proper condition before quenching and the lower heat for hardening had to be applied as quickly as possible to prevent the core from being subjected to lengthy heating at the lower temperature. This can be expressed more practically by stating that a certain gear, when heated for exactly 3 min. in a lead pot at 1425 deg. Fahr. and then quenched in oil was a fairly satisfactory product; but, if held 4 min. or more in the lead pot at the same temperature, it

Table 5—Results of Tests of 2-In. Square Steels

Grade of Steel	Quenching Temperature	Drawing, Deg. Fahr.	Yield Point as Elastic Limit, Lb. per Sq. In.	Ultimate Strength, Lb. per Sq. In.	Elongation in 2 In., Per Cent	Reduction of Area, Per Cent	Number of Tests Made	Merit Index
Chrome-molybdenum	1,550 to 1,600	1,000	108,500	125,400	27.6	62.0	2	85.0
Chrome-vanadium	1,550 to 1,600	1,000	104,400	119,500	24.2	61.5	2	70.3
Chrome	1,550 to 1,600	1,000	94,375	113,050	20.7	61.3	2	55.4
Chrome-nickel	1,475 to 1,575	1,000	96,250	119,690	19.9	62.5	2	57.9
Chrome-molybdenum	1,550 to 1,600	1,100	100,500	117,200	25.4	66.5	2	82.8
Chrome-vanadium	1,550 to 1,600	1,100	112,800	127,800	24.3	59.0	2	71.3
Chrome	1,550 to 1,600	1,100	89,750	105,700	21.8	65.0	2	59.0
Chrome-nickel	1,475 to 1,575	1,100	89,375	111,350	21.8	65.0	2	62.5
Chrome-molybdenum	1,550 to 1,600	1,200	78,800	100,800	29.0	70.0	2	86.7
Chrome-vanadium	1,550 to 1,600	1,200	107,500	123,800	23.4	59.0	2	66.1
Chrome	1,550 to 1,600	1,200	77,875	99,375	24.2	68.5	2	68.1
Chrome-nickel	1,475 to 1,575	1,200	78,750	102,900	25.3	68.7	2	73.4

is a large user of case-hardened gears and must demand the best commercial grade of steel for the purpose.

The chemical composition of the first heat experimented with showed carbon 0.130, manganese 0.400, sulphur 0.025, phosphorus 0.016, chromium 0.610 and molybdenum 0.350 per cent. This analysis was abandoned for the reason that such high temperatures were required for double heat treatment as would prove commercially impracticable. Quenching directly from the carbonizing box and using a single lower heat for hardening did not produce the desired results as regards core fracture.

became very brittle. This prolonged heating necessary above the critical temperature indicates, I think, a sluggishness peculiar to chrome-molybdenum steels and may account for the higher drawing temperature permissible in the forging grades.

[The author here discusses the effects of carbonizing and hardening and gives a table of physical tests of steels after case-hardening.]

To obtain the best possible results with the case-hardened parts it was necessary to quench from the carbonizing box into oil and follow this by the regular double heat treatment and a final draw at 375 to 400 deg. Fahr., each operation being carefully timed.

There are two particular advantages that should be noted, however, in that chrome-molybdenum steel will take on a given case-depth in 10 per cent less time than chrome-nickel steel; also, there will result an average increase in Shore hardness of 5 to 7 points.

Nickel-Molybdenum Steel for Case-Hardening

In spite of the fact that we have not received any complaints with regard to failures of case-hardened parts of chrome-molybdenum steel, and I feel assured we will not in the future, we have seen fit to discontinue this particular grade for this particular purpose. Chrome-nickel steel apparently still holds the first place among commercial steels for case-hardening of important parts, but it is the opinion that nickel-molybdenum steel will be a serious contender. At present we have a heat of approximately 100,000 lb. of nickel-molybdenum steel of the following analysis: Carbon 0.130, manganese 0.380, sulphur 0.022, phosphorus 0.020, nickel 1.580 and molybdenum 0.200 per cent. This material is being made into gears, knuckle pins and the like. It is stated that this steel should prove a serious contender with chrome-nickel steel for case-hardening purposes, because of its ability, in the hot-rolled condition, to harden in oil after carbonizing. This statement may not be wholly clear to some, but it is a fact that a piece of hot-rolled steel of a given composition after carbonizing will not harden in oil to the degree that a piece of the same composition will if first subjected to forging.

The steering-knuckle pin has been one of our problems. This pin is made from $\frac{3}{4}$ -in round hot-rolled stock and from alloy steel. It is case-hardened and a

Shore hardness of 70 is required after final grinding. It always has been necessary to water-harden this piece, irrespective of the type of steel we use and, as a result, there is always a certain percentage of loss due to straightening. To illustrate, in one lot of 1949 nickel-molybdenum pins carbonized and hardened in oil, only 10 fell below 75 above hardness, none was lost in straightening or because of softness after final grinding. This we think is a remarkable record in view of the fact that chrome-nickel, chrome-vanadium, chrome-molybdenum and $3\frac{1}{2}$ per cent nickel steels have all been tried without success.

To summarize this portion of the subject briefly, our observations lead us to believe that, for carbonizing purposes, chrome-molybdenum steels should prove entirely satisfactory for parts in which hardness alone is the chief factor, but should be considered carefully before being used for important parts in which combined toughness and hardness are requisite, such as gears, steering-knuckle pins and the like.

The results thus far obtained with nickel-molybdenum steel are very satisfactory in every way when compared with chrome-nickel steel, with the added advantage of the greater hardness that can be obtained from an alloy steel of the former type.

There are many more details that could be added to the above, but I feel that they might serve to confuse rather than enlighten those desiring a frank statement of conditions pertaining to two important grades of chrome-molybdenum steel. In connection with the oil-hardening and spring steels we are at present in the midst of exhaustive investigation, but are not yet in a position to express an opinion.

Electrically Operated Japanning Oven of New Design

Built on Sectional Bookcase Principle—Details of First Installation—Accessory Equipment

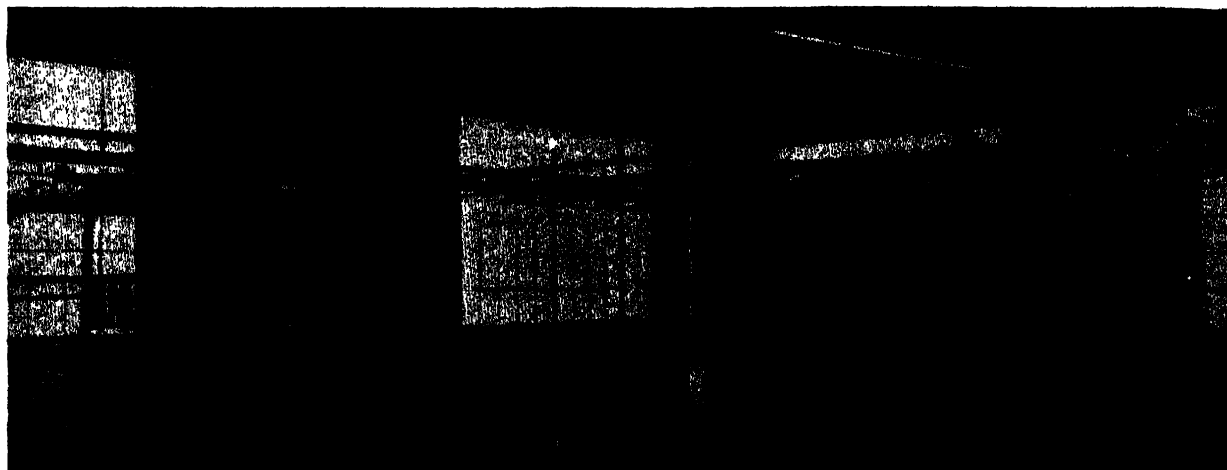
AN electric japanning oven built on the sectional bookcase principle, making it easy to lengthen or shorten and permitting installation of additional adjoining units, has been brought out by the Ohio Body & Blower Co., Cleveland. The sides of the oven are built of sheet-steel panels, 2 ft. wide, that fit into a specially designed joint. The joint seals the panels both on the inside and outside of the oven.

In this design the use of tee iron in joining the sections of the oven, or other supporting members, is eliminated and the use of bolts extending through the side walls, also. The sides of the oven are thus completely insulated. The only structural members are channels at the bottom and light angles at the top to make the structure rigid. The oven is easily assembled, a feature which reduces erecting costs.

The oven is ventilated by a Sirocco blower, direct connected to a motor located on top of the oven. The

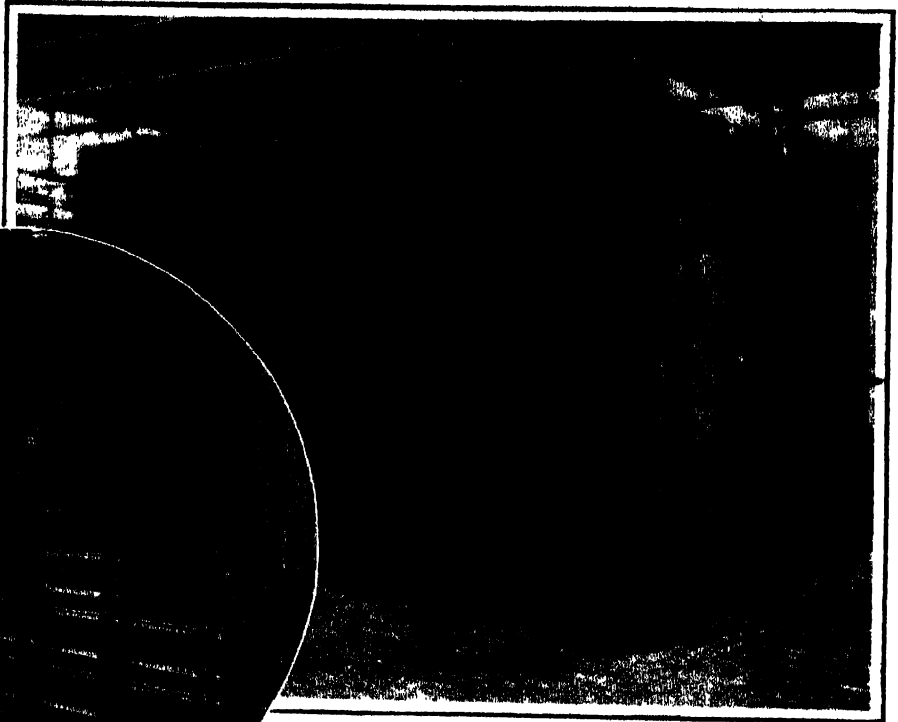
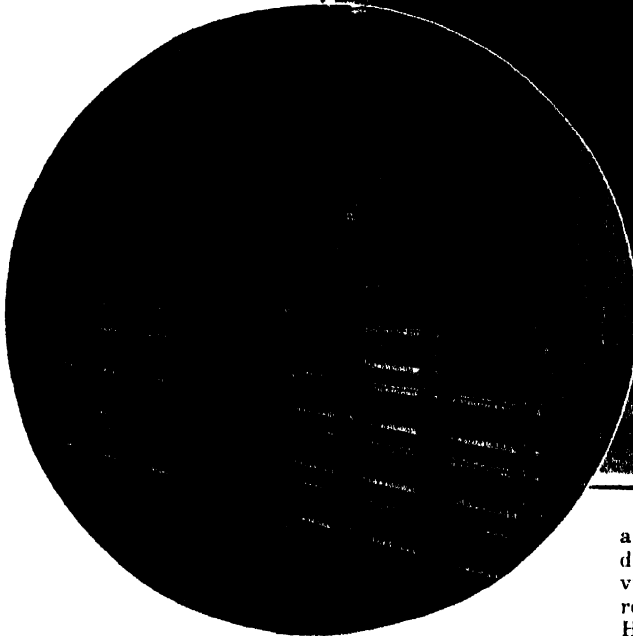
exhaust outlet is placed in the center of the oven floor, and cold air inlets are provided at the front of the oven on each side of the doors. The cold air passes through the heating units at each side and when heated rises to the top of the oven. The action of the fan in exhausting the air at the bottom provides a constant circulation and uniformity of temperature throughout the oven. A red light shows at the side of the oven when the exhaust system is operating, and should the fan stop, the light goes out. The doors have thrust ball-bearing hinges so that their operation is easy.

The first oven of this design, which is illustrated, has been installed at the new plant of the Lima Sheet Metal Products Co., Lima, Ohio, for use in japanning automobile parts and other sheet metal stampings. The entire equipment in the japanning department was installed by the Ohio Body & Blower Co. An overhead double-track conveying system extends through the



Arrangement of Japanning Department. The dipping tank and carrier are shown at the left, with the drip board beneath the carrier

The Sides of the Oven Are of Sheet-Steel Panels That Fit into a Special Joint. No bolts are used. The interior view below shows the heating units



oven, which has doors at both ends. The conveying equipment was supplied by the Loudon Machinery Co., Fairfield, Iowa. The oven is 16 ft. deep, 11 ft. wide and 9 ft. 6 in. high. It has 42 heating units and is of 105 kw. capacity, the electric current being supplied at 220 volts, 3-phase, 60 cycles. The heat is automatically controlled by a Taylor Instrument Co. thermostat providing a range of temperature from 100 to 530 deg. Fahr. Parts are japanned in various colors, some of which require much lower baking temperature than others, and for this reason the wide range in temperature control was provided.

The work is dipped in a portable dipping tank at one end of the japanning room and this has two side wheels and a swivel wheel at one end. After dipping it is hung from a sectional rack that is suspended from the overhead carrier and drips upon a drip board beneath. When fenders or other large parts are being japanned, the lower part of the rack is removed and the parts are suspended from the upper framework. If the parts are small the entire rack is used as shown in the illustration, the work being suspended from the cross members that are inserted as required. The racks are 8 ft. long, 7 ft. wide and 4 ft. 6 in. high. Six racks are used, two being placed in the oven at one time.

The track system is arranged so that the rack does not turn when reaching the right angle turn in the track in front of the oven, but retaining its relative position, passes into the oven sideways. After leaving the oven the rack with its load is pushed along the track to its assembling and shipping department, where there is a return track leading back to the dipping tank.

Tests have shown that from a cold oven the temperature has been brought up to 450 deg. in 1 hr. and 500 deg. in 1 hr. 45 min. A temperature of 350 deg. in an hour is guaranteed. The maximum baking load, including conveyor, is 3500 lb. per hour. The current consumption has been shown by test to be approximately 75 kw. for an hour.

Hardwood Association Reorganizes

The American Hardwood Manufacturers' Association has adopted the recommendation made last week of the board of directors that it disband and organize

an association of lumber men to gather statistics and distribute them to the public and perform other services. The action was recommended in view of the recent decision of the Supreme Court in the so-called Hardwood Lumber case, which held that the open competitive plan and the use by the association of its organization to influence prices was illegal. L. C. Boyle, general counsel of the association, in explaining the purpose, said: "It is a new and an original departure from former methods whereby an independent corporation renders service on equal terms to the buyer and the seller." The name of the new organization will be the American Hardwood Institute, and J. E. Starke of Memphis has been appointed to perfect the organization.

Advocates of Metric System Organize

WASHINGTON, March 14.—That proponents of the metric system are going to stimulate efforts looking to the establishment of this plan of measurement, has become evident. An organization of the local section of workers for the installation of the metric system and the passage of the Britten-Ladd bill was effected last Friday night at George Washington University Law School. Officers were elected as follows: President, E. J. Henning, Assistant Secretary of Labor; vice-president, G. F. Weeks, editor of the *Mexican Review*; second vice-president, Dr. H. L. Hodgkins; secretary and treasurer, W. Peters.

The executive committee consists of Dr. Harvey Wiley, chairman; John Barrett, S. J. Macfarren, Dr. C. L. Parsons, and Stephen Kramer, Assistant Superintendent of Schools.

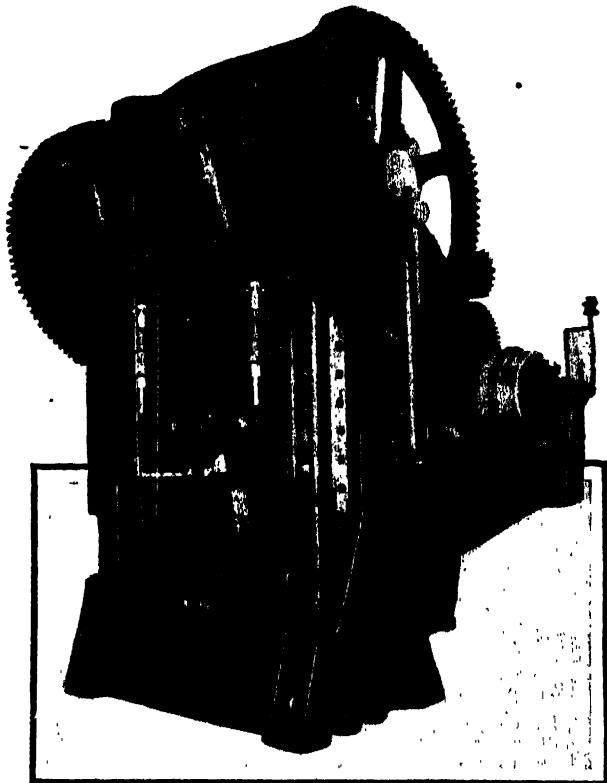
It is also proposed to name an "educational" committee in order to acquaint the people of the country with the alleged benefits that would arise from the metric system. Senator C. F. Ladd, of North Dakota, spoke of an amendment to his bill which would provide that in 1926 all Government specifications and engineering works be done with the use of the metric system.

Owing to the continued high cost of materials entering into industrial plant construction, the Youngstown Steel Co., Youngstown, Ohio, is not likely to proceed this year with its proposed mechanical puddling plant at Warren, Ohio. Several years ago the company acquired a site at Warren and planned to proceed with its plant this year. The mechanical puddler which it will employ is the invention of E. L. Ford of Youngstown.

Large Press for Drawing Axle Housings

Competition between guns and armor plate in the construction of warships seems to be somewhat paralleled in the last few years in the pressed metal industry, between presses and stampings. The large double-crank toggle drawing press shown in the accompanying illustration, built recently for the Crosby Co., Buffalo, by the E. W. Bliss Co., Brooklyn, N. Y., is a typical result of the see-sawing tendency between the expanding requirements of the stamping trade and the equipment needed to keep pace with them.

The press illustrated is for use in drawing pressed-steel axle housings for automobile trucks. These housings, which are intended to replace those of cast iron formerly used, are drawn in two sections and welded together, the material being $\frac{3}{8}$ -in. steel. The



Power is Transmitted to the Outside Slide from Both Ends of the Press. This is followed also in connection with the crankshaft which operates the inner slide

press is of tie-rod construction, twin-driven and triple-gear, the ratio of the gearing being 85 to 1. The gears of the entire train are of steel with machine-cut teeth.

Power is transmitted from the main driving gears to the outside slide or blank holder through a series of toggles and a dwell of 120 deg. is obtained. The number of toggles and connections incorporated is the lowest consistent with the most efficient results. To maintain this simple and effective construction and at the same time avoid torsional strain, the power is transmitted to the outside slide from both ends of the press. This is followed also in connection with the crankshaft which operates the inner slide, this being twin driven by means of a driving gear on either end.

The small number of connections or links used in transmitting power to the outer slide is intended to assure the minimum of power consumption, and also to afford simple, compact and strong construction with minimum of wear. The connection pins are hardened and ground, which is intended as a further provision against wear.

The adjustment of the inner slide or plunger is made by a 15-hp. motor mounted on the front of the crown. The machine itself is driven by a 100-hp. motor and controlled by a powerful hand-actuated friction clutch of the double-grip type. The distance from bed to inner slide, stroke down and adjustment up, is 59

in.; and from the bed to the outer slide, 56 in. The stroke of the inner slide is 28 in.; that of the outer slide, 20 in. The area of the bed is 60 x 116 in.; the area of face of blankholder, 60 x 102 in., and area of face of plunger, 36 x 86 in. The weight of the press is 600,000 lb. (300 ton).

Wages of Sheet and Tin Plate Workers

YOUNGSTOWN, March 14.—Wage rate of sheet workers in mills operating under the sliding scale of the Amalgamated Association of Iron, Steel and Tin Workers will continue at 26 per cent above base for the March-April period, as result of the bi-monthly examination of sales sheets March 11 at Youngstown. The examination disclosed an average price of 2.80c. per lb. on Nos. 26, 27 and 28 gage black sheets shipped by mid-Western mills during the 60-day period ending Feb. 28. This same average was revealed at the settlement two months before and the wage rate is therefore unchanged. It compares with a peak of 5.80c., the average price developed on September-October, 1920, shipments of sheet steel.

Tinplate, however, declined from \$4.80, the average disclosed two months ago, to \$4.75 per base box, and affected workers will therefore sustain a reduction of one per cent of the base rate, or an actual working cut of two-thirds of one per cent from the rate paid in January and February. Under the new rate, workers in the tin plate division of the industry will be paid 18½ per cent above base.

Whereas sheets show a firmer tendency, the current tin plate market is \$4.60, and employees in tin mills are therefore due for another reduction at the settlement in June.

James H. Nutt, secretary of the Western Sheet and Tin Plate Manufacturers' Association, acted for the employers, as usual, while M. F. Tighe of Pittsburgh, president of the Amalgamated Association, represented the interests of employees.

Tool Builders' Standardization Committee

The National Machine Tool Builders' Association has appointed the following members to act as a general committee on standardization in co-operation with a similar committee of the American Society of Mechanical Engineers:

Automatic Screw Machines: E. C. Henn, National Acme Co., chairman; R. S. Brown, New Britain Machine Co.; E. E. Blundell, Cleveland Automatic Machine Co.

Shapers: R. T. Hazelton, Cincinnati Shaper Co., chairman; C. L. Cameron, Gould & Eberhardt; J. M. Mills, Smith & Mills. Grinders: A. C. Hoeflinghoff, Cincinnati Grinder Co., chairman; Wigalow Blanchard, Blanchard Machine Co.; James N. Heald, Heald Machine Co.

Planers: George Lahgen, Cincinnati Planer Co., chairman; C. C. Swift, Ohio Machine Tool Co.; E. M. Woodward, Sr., Woodward & Powell Planer Co.

Milling Machines: Charles S. Gingrich, Cincinnati Milling Machine Co., chairman; E. J. Kearney, Kearney & Trecker Co.; B. P. Graves, Brown & Sharpe Mfg. Co.

Drilling Machines (radial and upright): Arthur C. Pletz, Morris Machine Tool Co., chairman; E. A. Herrcke, Hoefer Mfg. Co.; Reed, Prentice Co., Worcester, Mass.

Turret Lathes: R. F. Flanders, Jones & Lamson, chairman; Oskar Kylin, Foster Machine Co.; Charles Meier, Acme Machine Tool Co.

Policy as to Open Price Associations

WASHINGTON, March 14.—Misunderstanding appearing to have arisen over the recent correspondence between Secretary of Commerce Hoover and Attorney General Daugherty regarding the particular character of trade associations with which the Department of Commerce could rightly continue to co-operate in statistical and other matters of commercial advancement, Mr. Hoover last week issued a statement saying that the department makes no interpretation of the Sherman law. It does have to decide in what sort of association work it can rightly co-operate, Mr. Hoover said, but the department does not find a basis of co-operation with the so-called open price association, and never has.

Labor and Its Legal and Moral Status*

Development of American Labor Policies in 35 Years-- Collective Responsibility Must Accompany Collective Activity

BY WALTER GORDON MERRITT

WE are the only nation which has what is known as labor litigation, because we are the only nation which recognizes that industrial rights are entitled to enforcement, as against the activities of combinations, in the civil courts of our land, on the application of a private party seeking protection.

To understand the full significance of this situation, I want to call your attention to the policy of government toward business and capital. The first great restrictive regulation was the passage of the Interstate Commerce act in 1887, to meet evils caused by unfair rebates as between different classes of shippers. We laid down the law then and there that railroads must serve everybody with impartiality, and upon the same terms and the same basis.

In 1890 we passed the Sherman anti-trust law, which, in effect, was designed for the protection of the public and to keep open the channels of interstate trade and commerce, so that the commodities of any producer could flow into the markets without obstruction, and the consumers could purchase them as they saw fit.

Then in 1914 we passed the Federal Trade Commission act, which declares that any unfair methods of competition are illegal. In other words, we have practically bridged the chasm between law and morals by declaring that, if any competitor attempted unfair competition toward another competitor in the course of interstate trade, his practices would be condemned by the Federal Trade Commission, and an injunction could be issued to restrain those practices. Then we passed the Federal Reserve act, designed to protect any interference with competitors through unfair methods in extending credit and financial aid to the respective concerns engaged in business.

So we have erected a great structure designed for the protection of the individual liberty of every business man and every corporation engaged in business, designed to keep open the doors of trade, the doors of opportunity, so that any person may go into business without being confronted with an artificial obstruction.

Some of us think that those laws have gone too far in the manner in which they have been interpreted by the courts, but we must protect the liberty of people to engage in business, and so far as these laws are designed to do that, they are laws which all should support. Sometimes the real test as to the value of a law is as to what that law has avoided, rather than what that law undid. In other words, what would big business do in the absence of any restrictive laws of this kind—not what these laws have done to change conditions as they found them existing.

How All This Affects Labor

Now, coming to the labor situation, which is the point of our particular discussion, I want to take up the application of those laws to labor organizations, to show the extent to which this country has at last become committed to the policy of industrial liberty, as against the policy of conscripting men to join organizations, or conscripting business men to operate solely on a closed shop basis.

In 1893 we had a strike in Chicago, carried on by the American Railway Union, against the hauling of Pullman cars by the railroads, because the Pullman cars were then so-called "scab" cars. In other words, we went through a strike tending to coerce the railroads to discriminate against a certain class of article, which discrimination, under the Interstate Commerce act, was

declared to be unlawful. That policy has been repeated frequently, in more or less different forms, since that time.

In the summer of 1920 there was considerable disturbance in New York, caused by the Transportation Trades Council, composed of all the truckmen, of all the men engaged in handling materials at steamship lines, the men who absolutely had control of the products as they came through and out of the port of New York. That organization declared that any merchandise which had been made in open shops should not be handled by them. In other words, open shop merchandise should not pass through the port of New York.

That organization laid down the rule, through its longshoremen branches, that no merchandise should be received or transported by any steamship company, which was delivered by non-union workmen; and so, through a citizens' committee, organized out of the big civic organizations in New York, we had to maintain a trucking system of our own, in order to do the work which the union truckmen in New York refused to do, and what was the result? As we carted the materials down to the steamship lines, the steamship employees said, "No, we won't allow the steamship companies to transport materials which have been handled by non-union workmen," and they threatened the steamship companies with a strike, if those materials were taken and served by these public carriers.

We had again a repetition of the Debs case there. We had again a violation of that same principle which was supposed to have been taken care of by the Interstate Commerce act. So it became necessary to go into our State and Federal courts for injunctions, which were secured against the employees and against the steamship companies themselves—in effect, ordering them to serve the public with impartiality, regardless of whether the goods they were called on to carry had touched the hands of a non-union man or not.

Any other principle is going to leave us all in the slough of despond. It would mean that a street railroad company, which attempted to haul a non-union man, might suffer a strike; it would mean that the telephone service might be cut off from a non-union worker, because it was threatened with a strike; it would mean that baggage transportation of all kinds, in the nature of public service, should be denied to people and to property disapproved by the employees of the particular companies who were under public duty to transport those materials. That question has been fairly well cleared up in this quarter of a century.

Labor and the Sherman Law

The Sherman anti-trust law came to the test, as to whether or not it was applicable to organizations of labor as well as to organizations of capital. The primary purpose of that law was to give the public an opportunity of being served by anybody who wanted to serve it, to give the public the right of commercial suffrage in purchasing any line of articles which anybody wanted to put on the market, as against obstructive combinations which might prevent those commodities from getting into the public market, where people could purchase them as they saw fit.

In 1920, at the time the American Federation of Labor was engaged in a policy of carrying on boycotts throughout the country, the members had evolved a scheme for the purpose of promoting their organization, whereby certain concerns, which they singled out for attention, would not be allowed to distribute their goods, because of boycotts being conducted against

*Abstract of paper read Feb. 13 before Pittsburgh convention of American Boiler Manufacturers' Association.

wholesale or retail merchants who dared to purchase those goods. The question arose, "Does that violate the Sherman anti-trust law?"

Litigation has finally settled, in the United States Supreme Court, that combinations of labor to obstruct the channels of interstate trade, and to deny consumers benefits to which they were entitled through free competition, were as much in violation of the Sherman anti-trust law as were capital obstructions; so we strengthened the foundations of our jurisprudence, designed for the protection of the freedom of trade and commerce, as against combinations of labor or capital, throughout the United States.

Labor's Anti-Injunction Movement

In 1914, the first State, I believe, to pass an anti-injunction law was Massachusetts, the good old conservative champion of individual rights. The purpose of this and similar laws was to declare that the workman's right to work was not a property right. The courts have always declared that the right to work, which is the means by which the workman acquires property, is as much a property right as the money with which he fills his purse. Now labor had run into this difficulty:

In attempting to promote their organizations, their men would go into the courts and get injunctions protecting the freedom of men to work, and protecting the freedom of men to carry on business as they saw fit, and the result was that this policy of conscripting men to join labor organizations had been much retarded. So the only theory to be advanced was to strip the courts of this power to protect these rights, to strip the unorganized workman and leave him naked and defenseless against this combined, economic power; to do as Herbert Crowley said in his book, "Abandon the non-union workman in the way in which he has been abandoned in Great Britain."

When this law was passed in Massachusetts, one of those strange things happened, which is the very irony of fate. At that time there was trouble between the I. W. W. and the hod-carriers' union of the American Federation of Labor. The I. W. W. men were being driven off buildings because of strikes threatened by the American Federation of Labor, which demanded that only its men be employed, and that members of the I. W. W. be not employed. So the I. W. W. went to court and said, "We want an injunction against the hod-carriers' union, to protect us in our right to work."

That case went on up, and the Supreme Court of Massachusetts had to pass upon the validity of that law. It said, "If before the law these people would be entitled to an injunction, does this law deny them the right to an injunction? Oftentimes it appears that the workman's right to work is his sole property right. Now, is it fair class legislation that he should be put upon a lower plane of protection, in reference to his sole property right, than are other people in connection with their property rights? As it is not fair, the law is unconstitutional and void, and the I. W. W. should receive their injunction against the hod-carriers' union of the American Federation of Labor."

This is history of tremendous importance.

How the British Situation Differs

Now, we are up against the fundamental proposition as to whether our present policy will be continued. In Great Britain the opposite policy prevails. Every labor organization there is beyond the reach of civil process. A labor leader can go out and libel your wife, can maim one of your employees, or can dynamite your factories, and you cannot hold the labor union responsible for what that man did in behalf of the labor union. You cannot bring the labor union into the civil courts and get private protection, and the result is that you can get no protection whatsoever. The labor organizations are privileged institutions; they are what I call outlaws, because they are beyond the reach of law.

In Great Britain the railroad employees may strike against hauling coal produced by non-union workmen, or imported from foreign countries. Society has no rights as against that sort of thing. There is no limi-

tation upon the use of the economic power of a labor union in Great Britain under the law, because they are entirely freed from any restriction of that kind. We probably could not pass such laws in this country, because we are a country of limited powers, by virtue of the restrictions of our constitution; but in Great Britain you can pass a law saying that red-haired men shall be employed and that bald-headed men shall not, and it would be a valid law, because it is unlimited in its powers.

Where collective action tends to deprive a man of the freedom of his own decision, of his right to carve out his own destiny, collective action has gone too far. Where collective action means that men voluntarily gather together to accomplish in a group what they cannot accomplish individually, then collective action is on the right track. Whatever virtues there are in collective self-help, it must be remembered that the pillar stones of this nation are individual initiative, individual character and individual enterprise. So, as I have often said, I don't believe any man should be obliged to sell his birthright to any class for a mess of pottage. I believe the right to remain unorganized is just as sacred as the right to organize, and I believe that any institution that grows by force rather than service, which is seeking to conscript people into the organization and hold them there by artificial authority, which lifts the institution above all ordinary laws of reward and punishment, is an institution which will become in the end a public bane and not a public benefit.

Ironton Fire Brick Co.'s New Plant

The Ironton Fire Brick Co., Ironton, Ohio, has just recently increased its capital to enable it to make extensive improvements at the plant at Ironton and also develop a large acreage of newly acquired fire clay land in Carter county, Ky., in the heart of the famous Olive Hill fire clay region. The building of two new 32-ft. inside diameter, round, down-draft, double-bottom kilns, a new steam heated concrete drying floor and the complete rebuilding of the ground clay storage bins, elevators, etc., together with the installation of a measuring device which enables the company to measure positively and accurately any desired mixture of clays, gives it a plant at Ironton modern in every particular.

A 1500-ft. double track railroad switch has been built at Bradmyer, Carter county, Ky., on the Lexington division of the Chesapeake & Ohio Railway, from which point the company is now shipping clay to the plant at Ironton. A 2800-ft. tramway connects the clay tippie at the switch with the mine, and one man, single handed, can deliver any number of cars loaded with clay from the mine to the tippie by gravity.

There are 712 acres of clay land, which has been estimated to furnish enough clay to last 100 years, manufacturing at the rate of 100,000 brick per day. The clay deposit is exceptionally fine—a recent analysis showing a fusion point of 3254 deg. Fahr., and analyzing:

Silica	51.97	Lime	0.60
Alumina	45.07	Magnesia	0.46
Ferric oxide	1.57	Alkalies	0.61

Plans are now being laid for the erection of a modern brick plant at the mines in Kentucky, where a plant site has already been provided. E. F. Myers is president and general manager.

New British Steel Announced

As the result of research work carried out by H. H. Ashdown and others at their Openshaw works at Manchester, Armstrong, Whitworth & Co. have produced a steel, known as Vibrac. What is claimed for the new steel is that in addition to responding satisfactorily to even higher mechanical requirements, particularly in respect to elastic limit, than those obtained from nickel-chrome steels, it may, subject to any normal treatment, after tempering, be either furnace cooled or cooled in air, thus cutting out risks of distortion, and yet will give higher impact values than nickel-chrome steel treated under the most favorable conditions.

Blind Efficiently Operate Machine Tools

Siemens-Schuckert Works in Berlin Conduct Series of Experiments to Determine Proper Training Methods

BY HUBERT HERMANN

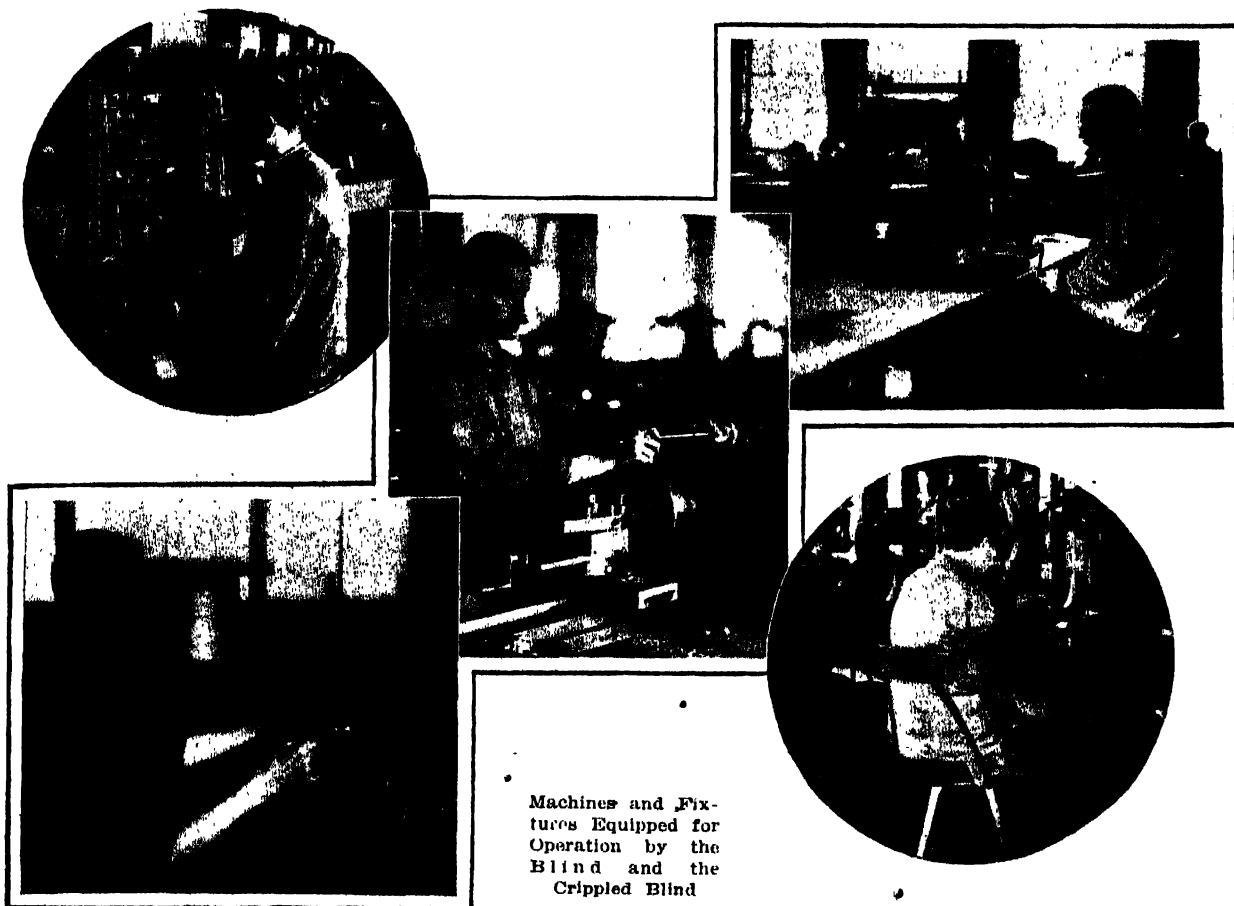
OVER 150 of Germany's 3122 war blind have been trained by the Siemens-Schuckert Works, Berlin, Germany, to be self-supporting machine tool operators.

Experiments were first started in 1916 with men who were almost totally blind. They were first placed among the able-bodied on work of either a manual nature or as helpers, but the results were unsatisfactory, as the production was inadequate even under strict supervision. Separating the blind from the other work-

may be operated only when both hands are upon the safety handles. Moving parts generally are inclosed.

The lower left view is that of a blind man using pillar shears. These are guarded between the knife and table to prevent injury to the hands.

The upper right picture covers the operation of drilling and sinking holes used for metal parts. In sinking, the work is held in a suitable chuck and the drill is depressed until it comes in contact with a stop. In drilling, the piece is introduced into a gage having



Machines and Fixtures Equipped for Operation by the Blind and the Crippled Blind

ers was then tried, but this also proved unsatisfactory. Successful results were finally obtained when they were put to work operating machine tools, as in this capacity they developed an efficiency greater than that of women workers with unimpaired vision. The results were sufficiently satisfactory to enable them to attain an earning capacity that permitted of self-support entirely by their own efforts in various manufacturing departments.

The married blind are housed as near as possible to the works to reduce the dangers and inconveniences of traveling, while the single workers are provided for in a home suitably appointed and equipped for their welfare.

The center picture of the accompanying group shows a blind man performing turning work on a guarded lathe fitted with various gages and safety chucks.

The upper left-hand cut shows how a punch press and similar types of machines are equipped so that they

an abutment and the drill is depressed until the stop is reached.

The lower right-hand picture shows the use of a bench drill. This may be operated by a treadle by means of wire rope, the operator being without the right arm.

The principal condition upon which the proposed location of the plant at Hammond, Ind., by the Jones & Laughlin Steel Co., was contingent, has been complied with as the result of the passage of a bill in Congress, providing for the improvement of the west branch of the Indiana Harbor ship canal. The bill now goes to the President for his signature.

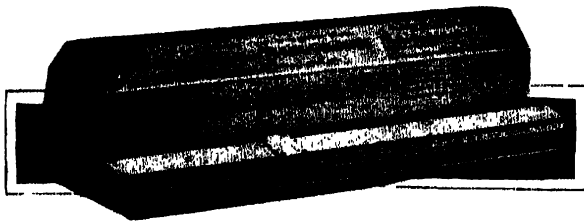
The Saucon plant of the Bethlehem Steel Co., Bethlehem, Pa., has resumed operations after an idleness of several weeks. Enough orders are on hand to maintain operations at least for one month.

Simplex Machine Time Calculator

This calculator, to be used in computing time required for machine tool operations, has been brought out by the Simplex Calculator Co., Box 184, York, Pa., and patents are pending. The device is designed to cover the general machine tool field, being applicable to rotating or reciprocating work or tools. It consists of a cylinder within an aluminum case, and a slide rule of special design attached to an extension of the base.

For use in connection with rotating work for tools, such as lathe, boring mill, drill press or milling operations, the cylinder carries tables indicating r.p.m. for diameters of $\frac{1}{4}$ in. to 10 ft. at all ordinary cutting speeds. The range of speeds shows above the slot at left.

The number of r.p.m. of a given piece of work is read in the slot opposite the diameter, directly under



Constants Shown on the Rotating Cylinder Are Used on the Slide Rule to Compute Rates

the cutting speed selected. This number is transferred to the rule, which bears four scales, indexed successively: feed, r.p.m., length and time. Locating this number on the r.p.m. scale of the slide, it is moved directly under the number representing the feeds per inch on the feed scale. The indicator is then moved along the length scale to the number representing the length of cut. Directly under this number, on the fourth scale, the result or time in minutes is read. Thus, all the operations necessary to complete a problem for rotating work or tools, requires but one setting of the cylinder, one movement of the slide, and one movement of the indicator on the rule.

In connection with planer, shaper, slotter or any other reciprocating tool, the procedure is similar. The area planed per minute at various forward and return speeds and feeds are read on the cylinder through the slot on right hand end of case. After determining the total area of surface to be planed, by multiplying length by width, either mentally or by the use of the rule, it remains only to divide this number by the area planed per minute. With one setting of the slide in the rule, the quotient or time required is read on the fourth scale under the end of slide.

This instrument was designed primarily for rate setters, estimators, and those whose duties require the daily or frequent predetermination of time for machine operations. It is a convenient desk size, being about 16 in. long and about 3 lb. in weight. With its use pencil calculations are entirely eliminated, computing time greatly reduced, and chance for errors minimized. The simplicity of its operation enables its use by anyone familiar with the practical side of machine tool operations.

Railroad Wage Reductions Sought

A hearing on general railroad wage reductions was opened before the United States Railroad Labor Board at Chicago on March 7. The wage controversies embraced in the hearing involve 205 railroads and 25 unions. The wages of the various crafts will be considered in the following order: shop crafts, maintenance of way employees, clerks, signalmen, dispatchers, firemen and oilers, and telegraphers. J. W. Higgins, executive secretary Association of Western Railroads, gave testimony on behalf of 101 Western railroads in support of wage reductions for shop men ranging from

4c. to 27c. per hour. For employees paid on a monthly basis, decreases ranging from \$10.02 to \$11.28 a month have been requested. For track and common laborers, laborers in the maintenance of way department, laborers around shops, station and platform employees and common laborers in station forces now receiving wages in cents an hour, authority has been asked to pay the prevailing rates for similar work in the territory employed. For inexperienced clerks, reductions ranging from \$7.50 to \$17.50 per month are asked. Mr. Higgins contended that the railroads should not be forced to pay higher rates of wages than are paid in outside industries for similar work. He asserted that the roads are not asking for the low level of pre-war wages. On the contrary, for most classes of employees the proposed scales are 50 to 100 per cent higher than those paid in 1915.

Parallel or Angle Plate Grinder

The Van Dorn Electric Tool Co., Cleveland, has brought out a 12-in. parallel or angle plate grinder for mounting on large lathes in grinding shafts and large rolls. It may be attached also to the vise of a milling machine, the head of a planer, shaper or boring machine for cylindrical or surface grinding. Grinding tools of this type are being made with a vertical supporting plate, but it is claimed that with the use of a 30 deg. angle plate the tool is more rigid, there is less overhang and the adjustments are more accessible, adding to the convenience in operation.

The tool has a 12 by $1\frac{1}{4}$ in. grinding wheel mounted on a shaft 1 in. in diameter at the grinding wheel end. The minimum distance from the angle-plate bolt, extending through a slot in the plate, to the center of



Used on Large Lathes in Grinding Shafts and Rolls. Can be used also on milling machine, planer, shaper and boring machine

the spindle is 8 in., and the shortest distance from the face of the wheel to this bolt is therefore 14 in. To determine whether the tool can be used on a given lathe and the maximum diameter of work in that lathe, the cross feed and compound rest are moved to their extreme outward positions and the distance from the center of the tool post to the center of the spindle is measured. This distance should exceed 14 in. and the excess over the distance represents the maximum radius of the work.

The machine is 19 in. overall, the overhang of the wheel from the center of the angle plate is $10\frac{1}{4}$ in., the diameter of the motor housing $8\frac{1}{4}$ in. and the maximum height of the wheel spindle above the rest is $9\frac{1}{2}$ in. The driving motor has a normal capacity of $1\frac{1}{3}$ hp. with a maximum momentary overload of $2\frac{1}{2}$ hp. The alternating-current stator and direct-current field assembly are interchangeable in the same frame and easily removed. The speed is 1800 r.p.m. Ball bearings are used throughout, these being mounted in dust proof housings. At the grinding-wheel end a double row of ball bearings take both the thrust and radial loads. Forced ventilation is provided by centrifugal fans. The weight is 175 lb. net.

Arguments on Railroad Rate Reductions

Attorneys for Carriers and Shippers Address Interstate Commerce
Commission at Conclusion of Hearings
—Doubt as to Decision

BY L. W. MOFFETT

WASHINGTON, March 14.—Pleas that no general rate reductions in railroads should be made at this time were strongly presented before the Interstate Commerce Commission by attorneys for the carriers in arguments in connection with the rate investigation case which finally came to a close yesterday after the time for closing the proceeding had again been extended. Counsel for shippers, who, for the most part, urged contrary pleas, insisted that industry cannot be revived until freight rates are reduced. There were some attorneys for shippers, however, who either did not ask for rate reductions or cautioned against any serious cuts that might endanger the revenues of the carriers, but took occasion to ask that if there were any cuts made the particular interests for which they appeared should be permitted to share in the reduced rates.

Among those urging cuts were representatives for the iron and steel, coal, and lumber industries, to mention some of the basic lines seeking lower railroad rates. It was evident throughout the hearings and arguments that the commission does not propose to precipitate any action in the way of general cuts in rates that it feels might injure the finances of the carriers. At the same time, it was plainly acquainted with the unfortunate plight of industries which are producing at a loss on account of high freight rates, but it is a question that can only be answered by the forthcoming decision, expected to be handed down soon, whether the commission is convinced that lower rates would stimulate traffic sufficiently to yield as great or greater net revenues to the carriers than now prevail. This is a matter it is compelled by duty to decide.

Necessity for Reduction

Whatever the outcome may be, it is the firm opinion of shippers, even those showing the most sympathy toward the railroads, that industry cannot be restored to a normal basis until rates are substantially lowered, and not merely reduced slightly. They recognize, however, that the carriers still face high labor costs, although they are in a position to go into the market and buy supplies on a comparatively low basis as the result of liquidation by the iron and steel and other industries. The position was taken by some that general rate reductions will have to be left to natural and gradual processes. But other shippers think immediate substantial cuts are necessary and would be beneficial to the carriers and shippers alike.

Arguments for the carriers were closed by Alfred P. Thom, general counsel for the Association of Railway Executives, who, while covering the general situation throughout the country as it applies to the carriers, took the same attitude that other attorneys for carriers had taken. The railroad attorneys were all in accord with the opinion of Henry Wolf Bikle, assistant general counsel of the Pennsylvania Railroad Co., that the economic situation has a wider basis than the rates and fares of railroads and is the result of the dislocation of industry and the destruction of values produced by the world war. Until this dislocation is corrected, it was pointed out, and new values created by productive effort, real prosperity cannot return; that this return will necessarily be gradual, and that any effort to accelerate it "artificially by striking at the transportation industry will produce reactions which would defeat the very purpose intended to be accomplished." Low earnings of carriers were repeatedly cited and it was declared that while expenses of operation have been to some extent diminished, they have not been diminished to such an extent as to permit further general reduc-

tions in rates, unless these reductions are preceded by reduction in wages. Mr. Bikle said that a 1 per cent reduction in freight rates would mean something over \$4,000,000 to the carriers of the country; that no one seemed to think that any stimulation of business would result short of at least a 10 per cent reduction, and that it was obvious "that such a reduction would be impossible." He further said that the testimony indicated that no stimulation of business would result from reductions of this character since the depression in business had resulted irrespective of the reductions in prices by producers, and that a small additional reduction which might be possible if the freight rates were reduced would "certainly have no more effect than the large reductions in prices already made." Shippers made a directly opposite argument.

Ore Mining Interests

Speaking for ore mining interests in New Jersey, and most of the steel industry of the country, except Buffalo district producers, Charles S. Belsterling appeared before the commission last Thursday afternoon and strongly urged cuts in railroad rates as being necessary to restore normal activity in the iron and steel markets. Asked by Commissioner Meyer what specific reductions he recommended, Mr. Belsterling said that the 40 per cent increase in rates effective on Aug. 26, 1920, should be wiped out as to iron ore and limestone; that rates on coal should be substantially lowered, and that rates on ore from New Jersey mines should be accorded equality with ex-lake and import ore rates. Iron and steel rates also should be reduced, he said, in line with any proposals that may be made to cut class rates.

Commissioner Potter asked Mr. Belsterling if the steel people should not give the commission cost figures and prices that are necessary to start the industry again. Mr. Belsterling pointed out that the evidence put into the record by iron and steel manufacturers showed plainly that they are producing in many lines at a loss and that rates being such a big item in steel production they must be reduced if the public is to be induced to begin buying again on a normal basis.

Mr. Belsterling insisted that the depression in iron and steel has been particularly prolonged unwarrantedly and uneconomically by high rates on finished material. He declared that the depression is not due to a lack of a desire or of power to buy but the refusal to buy at peak prices.

"The public will buy if prices are low enough," he said. "The steel industry has liquidated but the railroads have not, and the depression is the result. It is not possible to bring steel prices down to a normal level unless freight rates are brought down."

He pointed out that there was no commodity that is transported in interstate commerce in which the freight rate is of more importance than steel as it affects the consumer, because it requires from six to seven tons of raw material to produce a ton of finished material. It was insisted that steel manufacturers cannot forever continue to produce at a loss as they are doing to-day with railroad rates on a war basis. Replying to contentions of counsel for railroads during rebuttal proceedings that the public would not benefit if rates on iron and steel products were lowered, Mr. Belsterling said that the public would benefit.

Rates from New Jersey Mines

To show the high rates on iron ore from New Jersey mines, Mr. Belsterling says there is a charge of \$2 per ton for a haul of 75 miles as against the import

rate of \$1 per ton from Constable Hook, N. J., to Bethlehem, Pa. It was declared that a buyer was in the market recently for 100,000 tons of pig iron, but that the eastern Pennsylvania blast furnaces could not compete for the business on account of the low import and high domestic rates. But few blast furnaces are operating in eastern Pennsylvania, it was said, while not more than one mine in New Jersey is operating. In 1920, said Mr. Belsterling, ore shipments from lower lake ports to Eastern furnaces at a rate of \$1.50 per ton totaled 3,500,000 tons, from New Jersey mines they amounted to 500,000 tons and import shipments totaled 1,250,000 tons. With a rate of \$2.25 in 1921, respective shipments were declared to have been 20,000, 100,000 and 1,300,000 tons.

Combatting the views of Mr. Belsterling as to recommendations for rate reductions, Francis B. James, representing iron and steel interests in the Buffalo district, protested against cutting rates on iron ore from lower lake ports and urged reduction in rates on coal and coke. His argument was in line with testimony given by Buffalo producers and as made on several occasions with regard to plans to reduce ex-lake ore rates from lower ports to interior furnaces. He maintained that the rates on iron ore from and to the points mentioned are only 37.08 per cent of the rates on coal to lake front furnaces, although prior to the advance in rates on June 25, 1918, rates on ore were 50 per cent of the rates on coal.

"The carriers should first remove the monstrosity in the freight rates structure at the head of the lakes as to the ore rates and then reduce the coal and coke rates in line with the ore rates and after the coal and coke rates have been reduced relatively, so as to make them relatively just and reasonable as compared with the ore rates, then the ore rates and coal and coke rates should be simultaneously reduced," said Mr. James.

Proposed Reduction

He said that the trunk lines handling ex-lake ore had formulated a plan to file on March 16 tariffs, proposing to make effective on April 17, a 20 per cent reduction. It also has been reported that the reduction proposed is 14 per cent. The charge was made by Mr. James that the carriers are proposing to cut their rates on ex-lake ore so they would be able to say they had so depleted their revenues that they could not afford to make reductions on coal. By this means, he said, they would increase the disproportion between rates on ore and coal, which, he said, using the pre-war level as a base, was as 62 to 165.

He also charged that the tariffs of the carriers reducing by 28 per cent rates on ore other than ex-lake, filed to become effective April 1, were intended as an entering wedge to reducing ex-lake ore rates, the 28 per cent cut removing the 40 per cent advance of 1920. He quoted the resolution of the Trunk Line Association at its meeting on Feb. 24 when it also went on record in favor of restoring import iron ore rates, which have been reduced, to the basis in effect on Dec. 31, 1921. The resolution also called for restoration of rates on chrome and manganese ores to the basis in effect on the date named and where they were published as import rates they should be published effective April 1 as domestic rates.

Mr. James not only attacked the proposed cuts in ore rates and called for suspension of tariffs providing such action, but attacked the rebuttal evidence of the carriers as being an effort to prevent a reduction in the rates on coal. One effect of the heavy increases in rates on fuel, Mr. James said, is that steelmakers find it cheaper to allow their investment in by-product coke plants to lie idle and buy beehive coke. This, it was stated, reduced railroad tonnage because by-product ovens use 57,000,000 tons of coal to produce 40,000,000 tons of coke, and the carriers are given the latter tonnage in place of 57,000,000 tons of coal.

Cost of Pig Iron

F. L. Ballard, speaking for the Eastern Pig Iron Manufacturers, said the freight cost of assembling raw materials to make a ton of pig iron was \$18 and the selling price was only \$20.50, compared with a cost of

nearly \$24. The blast furnace interests, it was said, had deflated their costs except the cost of freight on their inbound material. He remarked that the pig iron industry is not of a mushroom growth, but had been established where it is in pre-revolutionary war days. High freight rates, Mr. Ballard said, had helped to cut the production to about one-fourth of normal.

Whatever the justification for the opinion may be, considerable significance was placed on the argument of Wilbur LaRoe, Jr., who appeared on behalf of his partner, former Chairman Edgar E. Clark of the Interstate Commerce Commission, who is ill as the result of an operation. Mr. Clark was to have spoken for the Chicago Association of Commerce. Mr. LaRoe said that a moderate reduction on all commodities, if any were possible, would be the only wise course for the commission to follow. He explained that he had not an opportunity to consult with Mr. Clark, but felt that he was presenting his general idea correctly. He said that the former chairman had taken the position of his client only after having considered it for himself.

"The association is not asking for a reduction in rates," said Mr. LaRoe, "although the business of its members has been restricted in such a way as to suggest that the percentage increases in rates caused the restriction. Its position is that if any reduction can be made, it should be given to all freight and that picking out this, that or the other commodity would lead to discrimination and dissatisfaction. The burden of freight rates falls on the whole nation."

Moderate Reduction

Chairman McChord asked Mr. LaRoe what he called a moderate reduction. The latter suggested 10 per cent, with nothing beyond 15 per cent. He argued against the more or less generally circulated suggestion that commodity rates might be cut with advantage to the country, but not class rates. He referred to such a procedure as being untenable and as tending to increase the advantage of the big shipper and the disadvantage of the smaller shipper. Doubt was expressed that statistics in the record warranted any reduction in any rates, but said that if the commission comes to a different conclusion, the Chicago Association of Commerce was firmly of the opinion that the benefit should be given to every article and not to selected ones. He admitted, however, that the record "seemed to show the country needed help in the form of reduced freight rates." He was strongly opposed to a reduction in passenger fares, thus taking a position diametrically opposite to that of attorneys for some State commissions.

"Wouldn't it be better for industry to stabilize itself on the present freight rates than to make a reduction of, say, 10 per cent now, and hold out a hope of another reduction in, say, six or eight months from now?" asked Commissioner Potter.

"Stabilization and certainty about freight rates certainly would be the best thing that could happen to the country," replied Mr. LaRoe, who conceded that certainty regarding freight rates was one thing the commission could not assure.

Attorney Rush C. Butler, representing the National Coal Association, strongly urged reductions in rates on bituminous coal, saying that rates on this product should be given special consideration because of its economic importance. He contended that lower rates on bituminous coal will reduce the unit operating expenses of the carriers; reduce the cost of materials and supplies used by them; reduce the market price of fuel coal to carriers and that such savings in coal costs alone will be sufficient to compensate for a substantial reduction in rates on fuel. He estimated that reduced rates on coal of 60c. per ton would release nearly \$1,000,000 a day in additional purchasing power which would be a strong stimulus to business revival and said the coal rates should not only be reduced but reduced to the bottom. Lower freight rates on industrial coal, he said, will also tend to re-establish normal production in industry. Over 50 per cent of the delivered cost of coal, it was declared, consists of freight rates. The average freight rate on soft coal was said to be \$2.27 per ton while the average price of soft coal f.o.b. mines is \$2.13 per ton.



Blast Furnaces of Hoskins Works at Lithgow, New South Wales, Australia

THE accompanying illustrations will serve to show the character of the blast furnace plant at Lithgow, New South Wales, Australia, of the Hoskins Iron & Steel Co., Ltd. Each of the two blast furnaces has four hot stoves. Alongside of each stack is one of the hot stoves and behind the stack and the one hot stove are the remaining three. The four hot stoves and the stack thus occupy a rectangle in plan.

The smaller photographic reproduction shows the open air sandcasting beds which are spanned by a 120-ft. crane. One of the crane runways may be seen and also the dust catchers. A vertical raw material elevat-

ing equipment serves both furnaces. Turbo-blowers are used for the blast, one of a capacity of 40,000 cu. ft. per min. at 18 lb. per sq. in. and two of 20,000 cu. ft. capacity.

At the Lithgow works, besides making pig iron and ferromanganese, the company produces steel blooms and billets, rails and fastenings, and structural, spring and agricultural steel. There is an iron mine at Cadia, 100 miles from Lithgow, and a limestone quarry 35 miles from Lithgow. There is a coke oven at Lithgow and also one at Dapto. The company makes cast iron pipe at Rhodes and at Sydney.

BRITISH FOREIGN TRADE

Further Increase in Steel Exports in January—
Sharp Decline in Imports

The January official returns of British foreign trade in steel and iron shows that the upward swing in exports, which has been a feature of recent months, was continued in January. The total exports were 261,119 gross tons, excluding iron ore and including scrap. This compares with 211,314 tons in December and with an average per month of 93,804 tons in the third quarter of last year. In January, 1921, the exports were 233,114 tons.

Iron and steel imports in January were 100,178 tons or much less than the influx late in 1921. In the last quarter these imports were 168,687 tons per month. In September they were 229,391 tons. The following table shows comparative data:

British Steel Exports and Imports, Gross Tons

	Exports	Imports
October, 1921.....	161,683	189,526
November, 1921.....	202,059	184,064
December, 1921.....	211,314	132,463
January, 1922.....	261,119	100,178
Average per month, 1919.....	188,519	50,801
Average per month, 1920.....	274,881	128,685
Average per month, 1921.....	144,885	152,734
Average per month, 1913.....	420,757	195,264

The trend of some of the principal exports is shown by the following data:

Principal British Exports, Gross Tons

	Average per Month		January	
	1913	1921	1921	1922
Pig iron	78,771	8,602	13,561	24,409
Steel rails	41,676	14,698	17,953	35,928
Steel plates	11,162	10,673	26,218	5,851
Galvanized sheets	63,506	17,635	19,774	55,560
Steel bars	20,921	8,927	17,362	13,225
Tin plates	41,208	18,873	33,822	34,275
Black plates	5,679	1,178	1,426	2,643
Steel sheets			5,625	6,803

Exports of steel rails, galvanized sheets and tin plate have shown the most marked recovery in the above products.

Pig iron imports in January were 31,346 tons as compared with a monthly average in 1921 of 55,564 tons.

Iron ore imports in January were 193,244 tons,

which compares with a monthly average in 1921 of 157,298 tons.

Manganese ore imports in January were only 3806 tons. In 1921 they were 14,405 tons per month and in 1913 they were over 50,000 tons per month.

Poor Outlook for Machinery in Far East

The outlook for selling very much American machinery in the Far East does not look promising according to B. A. Tozzer, Cleveland sales manager of the Niles Tool Works and the Pratt & Whitney Co., who recently returned from a 14-months trip during which he visited China, India, Japan, Java and other Far Eastern countries for the purpose of seeing what the prospects were in those countries for selling machine tools. Mr. Tozzer made a brief reference to the machine tool situation in the Far East in an address before the Cleveland section of the American Society of Mechanical Engineers, March 7, which for the most part was devoted to a story of his experiences during his trip and the description of scenes shown by lantern slides, a large number of which he exhibited.

"There is no manufacturing, as we understand it, in the Far East," said Mr. Tozzer. "There are no factories where they make things in quantities. Labor saving machinery does not appeal to the people over there because labor is so cheap. The arsenals, ship yards and railroad shops are the only shops where they use high grade machinery. Some machinery is required for repair work of various kinds, but outside of the three fields I named we cannot compete for business because of the low grade, cheap machinery made in Germany and Japan."

Freight Rates Reduced

As a result of efforts by the Traffic Bureau of the Youngstown, Ohio, Chamber of Commerce freight rates on iron and steel and other commodities from the Mahoning and Shenango Valleys to North and South Carolina have been placed on the Pittsburgh basis. This effects a saving up to 6c. per 100 lb. on shipments of iron and steel products. An effort is being made to effect a similar equalization on shipments from the Youngstown district to Kentucky and Tennessee.

COAL STRIKE OUTLOOK

Efforts to Prevent Work Stopping--Need of Continuous Production

WASHINGTON, March 14.—With the approach of April 1, the date set for the strike of union bituminous and anthracite coal miners, the Government, through Secretary of Labor Davis, still is attempting to bring about conferences between bituminous mine operators and miners. Anthracite operators and miners have agreed to meet and will have a conference in New York to-morrow. Refusal of coal operators of western Pennsylvania and southern Ohio bituminous fields to meet miners for the purpose of negotiating new wage agreements has complicated the situation, and unless they change their attitude it is believed by Government officials that a strike is inevitable.

Nothing has come from Government sources to verify reports that the President, acting on the precedent of former President Roosevelt in the anthracite situation of 1904, might use the powers of his office to force an agreement between the operators and miners. While it is evident that the country is showing less concern over the threatened strike than it would have if it were scheduled to take place during the cold months, it is claimed here that the situation requires the most serious attention.

Granting that the output of non-union mines is sufficient to keep industries going at their present rate of operation and that even transportation would be hurt but little for the present, the view is taken that production should be continued on a normal basis in order to prevent a fuel famine next winter. Meanwhile, production of soft coal continues to increase slowly. The total output for the week ending March 4, including lignite and coal coked, is estimated by the Geological Survey at 10,536,000 net tons, an increase of 162,000 tons, or 1.6 per cent over the week preceding. Production is still some 2,600,000 tons short of the maximum reached just before the mine strike of 1919, an even 500,000 tons less than in the third week of last October, when consumers were expecting the railroad strike.

Until the forthcoming report on stocks as of March 1, is ready the present level of stocks will not be known with certainty, but according to the Geological Survey it will probably require putting another 10,000,000 tons into storage to raise consumers' reserves to the level reached at the close of the war. Since Jan. 1, production has exceeded consumption and it is claimed that consumers have added materially to their stocks.

The Geological Survey estimates that the output of bituminous coal in 1921 totaled 407,000,000 net tons.

Opposed to Ore Rate Reduction

WASHINGTON, March 14.—In a formal statement filed yesterday with the Interstate Commerce Commission by Attorney Francis B. James, representing Buffalo district iron and steel producers, request is made that the commission suspend all tariffs reducing rates on iron ore. As is known, railroads have filed tariffs proposing a reduction of 28 per cent, on April 1, of rates on iron ore, except ex-lake ore, in official classification territory.

Mr. James says in a statement that the carriers also propose to make a reduction of 20 per cent in the ex-lake ore rates and that tariffs for this purpose will be filed about March 16, to become effective about April 16. The statement of Mr. James reaffirms the contention of Buffalo producers that rates on coal should be reduced first. It is charged that the carriers at the last moment "are resorting to many ingenious devices to shrink their revenues on other species of traffic so as to persuade the Interstate Commerce Commission not to reduce the rates on coal."

Mr. James also states that "the carriers admit that the proposed reduction in rates on iron ore is a part of a scheme to equalize assembling costs, a principle universally condemned by the commission." The tariff reducing rates on ore, it is said, should be suspended

so that the whole subject may be investigated. Mr. James contends that to allow these tariffs to go into effect, "entailing a tremendous reduction of revenue to the carriers, merely means that the carriers will urge that there can be no reduction in coal rates." It is added that coal rates to Buffalo and vicinity are relatively too high as compared with ore rates.

February Construction Far Ahead of Last Year

February construction activity was 73 per cent greater in volume than it was in the corresponding month of last year, according to the F. W. Dodge Co. The total amount of contracts awarded last month in the 27 Northeastern States of the country amounted to \$177,365,000, an increase of 7 per cent over January, and the second largest February total on the Dodge company's record.

A significant feature of the February construction record is the increase in business buildings over January. The increase in square feet of space contracted for was 30 per cent, and the increase in total cost was 65 per cent. February business buildings amounted to \$39,180,000, or 22 per cent of the month's total, an unusually high percentage for this class, which was exceeded only by residential building, amounting to \$75,703,000, or 43 per cent of the total. Public works and utilities took third place, amounting to \$21,193,000, or 12 per cent of the total.

The accumulated volume of construction since the first of the year has been 60 per cent greater than in the first two months of last year. Contemplated new work reported in the first two months has amounted to over \$800,000,000, or more than double the amount of work placed under contract in the same period.

Corporation's Unfilled Orders Decline in February

The unfilled business on the books of the United States Steel Corporation as of Feb. 28 last amounted to 4,141,069 tons, or 100,609 tons less than reported on the books Jan. 31. In January the unfilled tonnage decreased 26,736 tons; in December, increased 17,872 tons; in November and October, decreased 35,287 and 273,841 tons respectively; in September, increased 28,744; whereas previously decreases were reported each month from August, 1920. A year ago the unfilled business amounted to 6,933,867 tons, or 2,792,798 tons more than on the books Feb. 28, last. At the close of February the Steel Corporation had less unfilled business on its books than it had before since December, 1914. The monthly unfilled tonnage since January, 1920, compares as follows:

	1922	1921	1920	1919
Jan. 31.....	4,241,678	7,573,164	9,285,441	6,684,268
Feb. 28.....	4,141,069	6,933,867	9,502,081	6,010,787
Mar. 31.....		6,284,765	9,892,075	5,430,572
Apr. 30.....		5,845,224	10,359,747	4,800,685
May 31.....		5,482,487	10,940,465	4,282,310
June 30.....		5,117,868	10,978,817	4,592,855
July 31.....		4,830,324	11,118,468	5,578,661
Aug. 31.....		4,531,926	10,805,038	6,109,108
Sept. 30.....		4,560,670	10,374,804	6,234,638
Oct. 31.....		4,286,829	9,836,852	6,472,668
Nov. 30.....		4,250,542	9,021,481	7,128,330
Dec. 31.....		4,268,414	8,145,122	5,265,366

The largest total of unfilled orders was on April 30, 1917, when it was 12,183,083 tons. The lowest was on Dec. 31, 1910, at 2,605,747 tons.

Bonds for Schneider et Cie. Offered

J. P. Morgan & Co. are offering at a price approximating par an issue of \$10,000,000 7½ per cent bonds of Schneider et Cie., the well known French steel manufacturer with principal works at Creusot.

Machine Tool Builders to Meet in April

The National Machine Tool Builders' Association will hold its spring meeting at the Hotel Traymore, Atlantic City, N. J., April 25 and 26.

CONTENTS

March 16, 1922

Tensile Strength Increase by Cold Drawing	707
Development of a Law Covering the Tendency of Steel to Increase in Tensility—Variations and Breaking Points in Curves	
Design of a Modern Automobile Plant	713
Providing the Power, Heating, Water Supply and Other Services for a 10,000-Employee Development	
Design of Open-Hearth Furnaces	717
Regenerator Computations for the Volume and Weight of Checkerwork—Temperature Changes Based on Time of Reversals	
Observations on the Surface of Liquid Steel	719
Microscopic Examination of Particles Thrown Off—Optical Pyrometer Observations	
Chrome and Nickel-Molybdenum Steels	725
Comparison with Other Alloy Steels for Automobile Use—Forging and Machining Qualities—Nickel-Molybdenum for Case-Hardening	
Labor and Its Legal and Moral Status	731
Development of American Labor Policies in 35 Years—Collective Responsibility Must Accompany Collective Activity	
Blind Efficiently Operate Machine Tools	733
Siemens-Schuckert Works in Berlin Conducts Series of Experiments to Determine Proper Training Methods	
Arguments on Railroad Rate Reductions	735
Attorneys for Carriers and Shippers Address Interstate Commerce Commission at Conclusion of Hearings—Doubt as to Decision	

New Gasoline Locomotive.....	712	Foreign Trade Notes	737, 758, 759
Foreign Loans and American Industries.	712	Outlook for Machinery in Far East.....	737
New Cutting Torch	712	Coal Strike Outlook	738
Foreign Trade Convention Papers.....	720	Opposed to Ore Rate Reduction.....	738
Thermal-Limit Motor Starter	721	Steel Corporation's Unfilled Orders.....	738
Heavier Storage-Battery Tractor	721	February Construction	738
Silica and Fire Brick Production.....	722	Association Meetings	738, 743
Tandem Cold Strip Mills.....	722	Editorials	740
Pittsburgh Basing Point Hearings.....	723	Capital Charges and Labor Costs—Fortunate Deflation in Steel—Not "Economic Hallucinations"—Pig Iron Shrinkage in 1921—Pyrites Cinder and the Blast Furnace.	
Air-Gas Inspirator for Gas Furnaces....	724	Correspondence	742
Combination Portable Drill and Grinder.	724	Liquidation of 50 Per Cent Ferrosilicon—Cobalt Magnet Steel.	
Fluorspar in 1921	724	Revising Steel Tariff Schedule.....	743
Precision Angle and Measuring Irons....	724	Merger of Rolls Manufacturers.....	743, 749
Electrically Operated Japanning Oven....	728	British Iron and Steel Output.....	753
Hardwood Association Reorganizes.....	729	Refractories Market	757
Advocates of Metric System Organize....	729	Trade Changes	760
Large Press for Drawing Axle Housings.	730	Production of Pig Iron in 1921.....	762
Labor Notes	730, 734, 738, 764	Cutting Tests for High-Speed Tool Bits..	763
Tool Builders' Standardization Committee	730	Book Reviews	766
Policy as to Open Price Associations.....	730	Industrial Finances	767, 775
Iron Fire Brick Co.'s New Plant.....	732		
New British Steel Announced.....	732		
Simplex Machine Time Calculator.....	734		
Parallel or Angle Plate Grinder.....	734		
Blast Furnaces in New South Wales.....	737		

Iron and Steel Markets	744
Comparison of Prices	745
Prices Finished Iron and Steel f.o.b. Pittsburgh	761
Non-Ferrous Metal Market	763
Personal Notes	764
Obituary Notes	765
Machinery Markets and News of the Works	768
New York Jobbers' Prices	776

ESTABLISHED 1855

THE IRON AGE

EDITORS:

A. I. FINLEY

WILLIAM W. MACON

GEORGE SMART

CHARLES S. BAUR, *Advertising Manager*

Member of the Audit Bureau of Circulations and of
Associated Business Papers, Inc.

Published every Thursday by the IRON AGE PUBLISHING CO., 239 West 39th Street, New York

E. J. Frank, *President*

PRINTED IN U. S. A.

George H. Griffiths, *Secretary*

Owned by the United Publishers Corporation, 243 West 39th
Street, New York. H. M. Swadlow, *Pres.*, Charles G. Phillips,
Vice Pres., A. C. Pearson, *Treas.*, E. J. Frank, *Secy.*

BRANCH OFFICES: Chicago: Otis Building. Pittsburgh:
Park Building. Boston: 410 Unity Building. Philadelphia:
1429-1432 Widener Building. Cleveland: Guardian Building.

Detroit: 317 West Fort St. Cincinnati: Mercantile Library
Bldg. Buffalo: Elliott Square Building. Washington: 816
Fifteenth St., N. W. San Francisco: 320 Market St.
London, Eng.: 11 Haymarket, S.W.1.

Subscription Price: United States and Possessions, Mexico,
Cuba, Shanghai, \$6.00; Canada, \$8.50; Foreign, \$12.00 per
year. Single copy 50 cents.

Entered as second class matter June 18, 1879, at the Post Office at New York, New York, under the Act
of March 3, 1879.

Capital Charges and Labor Costs

It is profitable to note the change in the attitude of manufacturers toward capital charges in production costs. In appraisals recently of properties of a number of steel companies, for instance, iron ore rights providing a 30-year supply were not valued at much more than those providing a 20-year supply, the advantage of the longer period being rated much lower than would have been the case a few years ago.

Comparisons are also being made between blast furnaces, the most recently constructed, which involve all conceivable refinements for reducing the muscular effort necessary for operation and the slightly older furnaces whose designers were not so extremely particular.

Just after the armistice every one who contemplated improvements laid great stress upon what appeared to be the obvious necessity of reducing the employment of labor to the absolute minimum. Labor, to use a general though somewhat unfortunate term, appeared destined to be permanently scarce, at least in periods involving maximum production, and manufacturers were prepared to go to greater lengths than ever before in investing capital for reduction in the amount of labor required. The feeling in the past few months has been that the pendulum has swung too far.

A broader study of economic conditions might have prevented men from going so far in their appraisals of the future of labor supply. It is not necessary to produce goods for which there are no consumers, and the test frequently applied to mathematical formulas might have been used. Suppose we produced everything by entirely automatic means, what would be the condition? The channels of trade could be kept open only by men finding work in new occupations, and so radical a change could be effected only very gradually. Scarcity of labor ordinarily develops from savings being spent too rapidly, and therefore at a pace that cannot be maintained. That is equally true whether the savings are spent on things that do not last or in investment construction that does last.

This is not the first time that men have changed

their appraisals as to the amount of capital that may properly be tied up. The boom in Connellsville coking coal land of somewhat more than ten years ago will be recalled. Connellsville coal changed hands at prices up to \$2,000 and \$2,500 an acre, and when in 1909 an attempt was made to form a combination of the merchant properties in the Connellsville region the prices asked by many operators ranged from \$3,000 to \$4,000 an acre. Computation readily showed that to carry the coal at such values required coke as produced to yield a margin which the market had never afforded and therefore was not very likely to furnish. The dénouement was marked by the interesting event of the United States Steel Corporation, which had never held such exalted views of the value of coal in the ground, buying the Colonial Coke Co. properties from the Pittsburgh Coal Co. at a price involving about \$1,000 an acre for the 7000 acres.

To choose between a large capital outlay and a small current expense and a smaller capital outlay and a larger current expense requires particular farsightedness, for the capital charge once shouldered is permanent, whereas the current expense may be modified from time to time. Especial care is needed when the question is one of deciding upon a capital investment that involves spending the money upon labor, for if labor becomes more plentiful the replacement cost of the facilities constructed decreases while at the same time their economy—the dollars in labor that they save—is reduced.

Aside from the rapid increase in British steel exports in January to a figure far in excess of the American total, as shown elsewhere in this issue, the outstanding feature is the expansion in exports of British galvanized sheets. The January movement was 55,560 tons, a figure not approached since the pre-war days. In 1912 and 1913 the monthly averages were 54,900 and 63,500 tons respectively. The recent expansion dates from October, galvanized sheets now approximating one-fifth of the total exports, or not far below the pre-war movement. In decided contrast there is not only the low volume of total iron and steel exports from the United States, but also the more marked decline in

our shipments of galvanized sheets, approximating in recent months only about one-third of those before the war.

Fortunate Deflation in Steel

As consumers look back over the period of liquidation in steel they have reason for congratulation that strong hands were in control. Large though losses have been, they easily might have been far greater had there not been resistance to demands for drastic cuts. The recessions in late 1920 were sharp and prices fell rapidly to proximity with pre-war levels, which were everywhere made a measure of deflation. Nearer the pre-war basis for a long time (and still so) than any products save those of the farm and a few non-ferrous metals, conspicuously copper, the descent in prices was nevertheless not so precipitous as to prevent the disposal of accumulated consumer stocks. More than one steel user, as a result of this orderly readjustment, has been saved from going to the wall. Overwhelmed at the end of 1920 with shipments from a number of sellers, whereas he expected to be served by only one of those from whom he bought, the steel user has had all of 1921 for distributing his surplus in a market of gradually receding prices. At the outset, to be sure, he did find prices dropping at a rate of \$4 per ton per month, but for most of 1921 the rate was less than \$2 per ton and at the year end less than \$1. There is some satisfaction in realizing that conditions might have been worse. Losses admittedly great might have been widely disastrous if the leaders in the trade had not realized that price was a secondary factor in a market glutted with materials and that required as extended a deflation as possible.

Not "Economic Hallucinations"

In a recent address on "Some Economic Hallucinations," by Theodore H. Price, editor of *Commerce and Finance*, the so-called cycle theory of business depressions was sharply attacked. Mr. Price said that the theory assumes an alternation of business prosperity and prostration and insists that because we have been successful for a time we must then be unsuccessful for a while. He declared that most people have surrendered themselves to the theory so completely that they often bring on hard times by vociferously insisting that they are due. The "agonizing deflation" through which we have recently passed he considered to be largely attributable to the fact that some highly placed personages who had the power to make their prophecies come true were obsessed with a belief in the cycle theory.

Mr. Price uses extreme language in stating the theory, and he is to some extent right if we grant that it is adhered to rigidly and that at certain definite times there will be business depression. Such a conviction will unquestionably have a depressing influence and help to end prosperity. Some people certainly have made the theory of cycles mechanical and have followed it too far. In Ohio for many years Farmer Benner issued prophecies based on the cycle theory and won a fame that endured for a considerable time, but finally ended in a crash. Despite the fact that Benner often made a hit in his prophecies, he sometimes failed in part,

and in 1907 failed completely when he not only did not foresee the panic of that year but predicted great prosperity.

It is true that business history shows periods of prosperity and depression which have come with a measure of regularity, and it certainly cannot be maintained that all belief in the recurrence of depression in the industrial world is due to hallucinations. Human nature being what it is, every period of prosperity has brought transgression of economic laws, and the broken laws would not be denied their penalty. Great harm has been done, however, by gloomy forebodings. Much can be accomplished by not looking for depression at any time and to ameliorate conditions when prosperity wanes. Much has been accomplished by the Federal Reserve Bank, with its adjustment to credit requirements, and other ways of meeting financial stress and unemployment will be found.

Mr. Price also calls an hallucination the belief that the world is poorer as a result of the war. He claims that nearly all of the products of human energy are consumed or wear out in seven years, whether we are at peace or war, and hence that we are not poorer on account of the war. He overlooks the tremendous energy wasted by war, which if applied to the aims of peace would have accomplished results of great value. There was also tremendous loss in efficiency during the war and for several years after, that has not been recovered and probably will not be in a long time.

Mr. Price stands on better ground when he opposes the belief that we cannot prosper unless we continue for all time to sell more than we buy, collecting the difference between the accounts in cash. We must both buy and sell, and so long as the buying and selling are profitable, the balance of trade is not the all-important consideration.

Pig Iron Shrinkage in 1921

Production of pig iron in 1921 is officially reported at 16,688,126 tons, of which 16,593,396 tons was coke and anthracite iron. As the production figures month by month were compiled by THE IRON AGE, the year's total of coke and anthracite given in the issue of Jan. 5 being 16,543,686 tons, or only 50,000 tons different from the official figure given now, the chief interest in the statistics at this later date is in the details. The distribution by grades varied little from 1920 to 1921, even though there was a decrease of 55 per cent in the total. Malleable, forge and ferromanganese each decreased about 65 per cent, while Bessemer and basic decreased less than 54 per cent.

A remarkable divergence in the 1921 statistics is the small proportion of steel-making iron reported as being made for sale. In 1920 12.8 per cent of the basic iron production was given as made for sale, while in 1921 the proportion was only 7.3 per cent. In the case of Bessemer and low phosphorus iron the decrease was from 9.1 per cent to 7.3 per cent. It may be suggested that in 1921 some steel works sold pig iron which had originally been made for their own use and that all such iron may not have been reported as having been made for sale when as an actual fact it was not made for sale, the sale being a subsequent development. In that event the consumption of pur-

chased iron would not be altogether so small as suggested by the statistics, but the fact would remain that merchant furnaces did not make the iron.

Taking all grades of pig iron, the percentages of the total reported as being made for sale were as follows, beginning with the first year for which these particulars were reported:

1913	20.8	1916	28.5	1919	28.0
1914	21.6	1917	30.1	1920	29.0
1915	28.7	1918	27.6	1921	22.4

The year 1921 is seen to have been unique among the years covered. The divergence is different in character from the change which occurred before 1913 when steel works that had been buying iron built furnaces of their own, partly because they desired to have the advantage of using molten iron. In a few instances the end was attained by buying merchant furnaces.

Assuming that the merchant furnaces delivered no basic iron in molten condition, the proportion of steel works basic iron delivered molten changed only from 83.9 per cent in 1913 to 84.9 per cent in 1920, but in 1921 the proportion dropped to 78.2 per cent. This drop is no doubt attributable chiefly to the intermittent and irregular operation of basic open-hearth furnaces last year, particularly in the early months, cold pig iron being accumulated at works whose regular practice involved direct metal.

The badness of the year 1921 has already been sufficiently commented upon, but mention may be made of the appearance the 1921 pig iron production will present in the annals that will be consulted in the future. There have been other years of light production, but none that represented nearly so great a backward step. The production in 1865 was the lightest in three years, while 1876 showed the lightest in five years, 1894 the lightest in six years and 1908 the lightest in seven years, but the production in 1921 was the lightest in thirteen years. In that respect the year leaves a record that cannot well be beaten. The rate of production at the beginning of this month, as indicated by our blast furnace report last week, was 30 per cent above the average rate in 1921.

Pyrites Cinder and the Blast Furnace

Before the war the greater part of the sulphuric acid output of the country was made from iron pyrites. To-day probably 75 per cent of the pyrites formerly so used has been displaced, acid being made by the burning of brimstone which can be obtained at a lower cost. The change is reflected in the imports of pyrites. In 1912 and 1913 about 975,000 tons was imported in each year. In 1920 imports declined to 332,600 tons and in 1921 to only 216,200 tons.

These facts have a bearing also on the pig iron industry. For many years the cinder from the burned pyrites, commonly known as "blue billy," accumulated in large heaps in the yards of acid manufacturers. Later a campaign was undertaken which resulted in the selling of this cinder to blast furnace plants, and the use of a certain amount of pyrite cinder in blast furnace mixtures has continued to the present time. Recently the question of swollen blast furnace linings, due to

an absorption of zinc by the brick, was discussed in these columns. With the exception of the pyrites coming from Spain, that which was used by American acid makers contained a moderate amount of zinc which remained in the cinder. It is reasonable to infer that blast furnaces which used blue billy freely had marked trouble from the zinc-impregnated brick. Now that pyrites cinder is to figure in blast furnace mixtures to a much smaller extent than before, less zinc-carrying material will be charged and the troubles due to zinc impregnation should largely disappear.

CORRESPONDENCE

Liquidation of 50 Per Cent Ferrosilicon

To the Editor: We have noted with great interest your editorial on page 597 in THE IRON AGE, March 2, on the subject of the extreme post-war liquidation in regard to 50 per cent ferrosilicon.

Everything that you say is true, although you might have enlarged on the point that, because of lack of tariff protection, what little business there has been available has largely gone to foreign producers.

It is truly stated by you that war demand was such an incentive to the installation of new plants that they were developed in excess of to-day's needs. There is very much more electric furnace plant installation for making 50 per cent and higher grades of ferrosilicon than the country can possibly keep busy in the next several decades; and yet, essential as these plants were during the war, it appears that the industry is going to be destroyed and the country once more left dependent on outside or foreign supply, as a result of the dilatory action of Congress in respect to the tariff bill.

Prices at present obtainable for any grade of ferrosilicon are notoriously unprofitable, but there are many users of the commodity who cannot understand or believe this, assuming that because somebody is willing to sell them there must naturally be a profit in the transaction. The real truth is that electric furnace operators making ferroalloys were left at the end of the war with electric power contracts which in many if not in most cases require payment for the power whether it can be used or not. This situation brings to each producer the question of whether to lose some money on the finished product or perhaps more money in paying for power unconsumed; and is the chief explanation why ferrosilicon is selling below its cost of production to-day.

The writer feels quite sure that the other producers of ferrosilicon will, as he does, appreciate your remarks on this subject, and believes there is opportunity to enlarge upon them.

PAUL J. KRUESI,

President, Southern Ferro Alloys Co.

Chattanooga, Tenn., March 7.

Cobalt Magnet Steel

To the Editor: With reference to the interesting announcement on page 350 of your issue of Feb. 2, in which you quoted from the *London Ironmonger*, we beg to mention for the sake of interested parties that the cobalt magnet steel referred to is the invention of P. R. Kuehnrich, chairman Darwin & Milner, Ltd., Sheffield, one of the best known authorities on empirical research work on special alloy steels and the inventor of a number of them, well known to the trade, as for instance, the so-called cobaltchrom steel. Cobalt magnet steel is the product of the Cobalt Magnet Steel Co., Ltd., Sheffield, represented in the United States by Darwin & Milner, Inc., 403 Long Avenue, Cleveland.

DARWIN & MILNER, INC.

Cleveland, March 11.

REVISING STEEL SCHEDULE

Many Changes Said to Have Been Agreed Upon by Majority of Senate Committee

WASHINGTON, March 14.—Revision of the steel schedule of the permanent tariff by Republicans of the Senate Committee on Finance is said to have been tentatively completed except as to several items. Those chiefly under discussion are understood to relate to the ferroalloy section. The committee apparently has reduced House rates on those products but has not as yet fixed the duty on ferromanganese. It is said that manganese ore has been placed on the free list as compared with the duty of 1c. per pound of metallic manganese in the Fordney House bill, and that consideration is being given to the fixing of a ferromanganese duty of 1c. per pound of manganese while the House gave a duty of 2 1/5c. per pound when containing in excess of 1 per cent of carbon and 2 1/5c. per pound and 23 per cent ad valorem when containing less than 1 per cent of carbon. Tungsten ore is said to have been made dutiable at \$9 per 20 pounds of tungstic trioxide as compared with 45c. per pound of metallic tungsten in the House bill, which provides no unit basis. Ferrotungsten, made dutiable at 72c. per pound on tungsten content and 15 per cent ad valorem in the House bill, is said to have been given a duty of 9/10c. per pound for each per cent of tungsten content and high-speed tungsten steel and all alloy steels containing tungsten are said to have been made dutiable at 35 per cent ad valorem.

The pig iron duty of \$1.25 per ton in the House bill is reported to have been increased to the Payne-Aldrich rate of \$2.50 per ton. Rates on ferrosilicon are also reported to have been lowered as well as those on magnesite. While it is said there have been a number of changes in phraseology of the steel schedule, it is reported that as to the general line of rolled steel products no great changes have been made in the House bill, but that some suggestions of manufacturers to make the schedule more scientific have been adopted.

Tentative preparation of the steel schedule has followed conferences held here between members of the Finance Committee, steel makers, ferroalloy producers and others, including those interested in magnesite, etc.

The committee is unable to say when the tariff bill will be reported, but it is said that so much progress has been made that prints of the bill are about ready, and that introduction in the Senate will follow soon; it is claimed that the bill has been written in two forms, one on an American valuation and the other on the foreign valuation plan, the latter taking higher duties than the former, where ad valorem duties apply; many duties are said to have been transferred to a specific basis in order to avoid as much as possible the difficulties as to assigning import levies.

Merger of Rolls Manufacturers Progressing

PITTSBURGH, March 13.—Negotiations which have been in progress for several months, looking toward a merger of three of the leading manufacturers of rolls and rolling mill equipment of the country, are approaching the final stages and an official statement is expected in the next few weeks. The companies involved are the Mackintosh-Hemphill Co., the A. Garrison Foundry Co. and the Pittsburgh Iron & Steel Foundries Co. J. Ramsey Speer, chairman Pittsburgh Iron & Steel Foundries Co., has played an active part in this combination, the fundamental reasons for which are economies of operation and a concentration of products. Although not official, it may be said authoritatively

that the controlling factors in the A. Garrison Foundry Co. have sold out their interests and will not be active in the affairs of the new company.

Order for Freighter Placed

CLEVELAND, March 14.—An order for a 450-ft. lake boat for the coal and stone trade has been placed with the Manitowac Ship Building Corporation. This is the first order for a freighter that has been placed with an American Great Lakes shipyard this season.

Dennison K. Bullens, author of "Steel and Its Heat Treatment," was the speaker of a joint dinner and meeting of the Pittsburgh Chapter, American Society for Steel Treating and the Pittsburgh Chapter, American Institute of Mining and Metallurgical Engineers, held Tuesday, March 7, at the Bureau of Mines Building, Pittsburgh.

COMING MEETINGS

March

Refractories Manufacturers' Association. March 15, 16 and 17. Annual meeting, Chicago. Secretary, F. W. Donahoe.

Taylor Society. March 16 to 18. Midwinter meeting, City Club, Philadelphia. Managing director, Dr. H. S. Person, 29 West Thirty-ninth Street, New York.

April

National Federation of Construction Industries. April 3, 4 and 5. National conference, Drake Hotel, Chicago. Association headquarters, Drexel Building, Philadelphia.

National Metal Trades Association. April 19 and 20. Annual meeting, Hotel Astor, New York. Secretary, Louis W. Fischer, Peoples Gas Building, Chicago.

American Gear Manufacturers' Association. April 20, 21 and 22. Annual meeting, Hotel Lafayette, Buffalo. Secretary, E. D. Hamlin, 4401 Germantown Avenue, Philadelphia.

American Supply and Machinery Manufacturers' Association and Southern Supply & Machinery Dealers' Association. Joint Meeting, April 24 to 26, Birmingham. E. D. Mitchell, 233 Broadway, New York, is secretary of the American association and A. M. Smith, Smith-Courtney Co., Richmond, Va., is secretary of the Southern association.

National Machine Tool Builders' Association. April 25 and 26. Spring convention, Hotel Traymore, Atlantic City, N. J. General manager, E. F. DuBrul, 817 Provident Bank Building, Cincinnati.

Society of Industrial Engineers. April 26 to 28. Spring meeting, Hotel Statler, Detroit. George C. Dent, business manager, 327 S. La Salle Street, Chicago.

American Electrochemical Society. April 27 to 29. Spring meeting, Baltimore. Acting secretary, Dr. Colin G. Fink, 110 Park Avenue, New York.

May

Iron and Steel Institute. May 4 and 5. Annual Meeting, Quarters of Institution of Civil Engineers, London, England. Secretary, George C. Lloyd, 28 Victoria Street, S. W., London.

The National Supply and Machinery Dealers' Association. May 8, 9 and 10. Seventeenth annual convention, Marlborough-Blenheim Hotel, Atlantic City. Secretary, T. James Fernley, 506 Arch Street, Philadelphia.

American Society of Mechanical Engineers. May 8 to 10. Spring meeting, Atlanta, Ga. Secretary, Calvin W. Rice, 29 West Thirty-ninth Street, New York.

National Association of Manufacturers. May 8, 9 and 10. Annual Convention, Waldorf-Astoria Hotel, New York. General Offices, 50 Church Street, New York.

National Foreign Trade Council. May 10 to 12. Convention, Philadelphia. Secretary, O. K. Davis, 1 Hanover Square, New York.

National Sheet Metal Contractors' Association. May 15 to 19. Convention and exposition, Cadle Tabernacle, Indianapolis.

National Association of Purchasing Agents. May 15 to 20. Annual convention and exposition, Exposition Park, Rochester, N. Y. Secretary, H. H. Heydon, 19 Park Place, New York.

American Iron, Steel & Heavy Hardware Association. May 23 to 25. Annual meeting, Hotel Washington, Washington. Secretary, A. H. Chamberlain, Marbridge Building, New York.

American Society for Steel Treating. May 25 and 26. Sectional meeting, Pittsburgh. Secretary, W. H. Eisenman, 4600 Prospect Avenue, Cleveland.

Iron and Steel Markets

INCREASE IN DEMAND

Larger Scale of Operations Continued

Coal Strike, Spring Demand and the Effort to Raise Prices Are Leading Factors

An increased demand for steel products is more plainly indicated, but throughout the trade great care is taken lest its extent be overstated. Operations continue at the higher rate shown by February statistics. For the Steel Corporation they are slightly under 60 per cent this week and for the whole industry are probably between 55 and 60 per cent.

Buyers and sellers are watching closely for developments in three directions—the coal strike, spring demand, and the effort of the steel companies to advance prices on plates, shapes and bars.

A strike at union mines on April 1 is everywhere expected and there is more disposition this week to believe that some of the recent buying of steel was precautionary. Non-union mines can increase their output, but some independent steel companies have only union properties. As to spring demand for steel, it is not considered to have figured largely in the buying of recent weeks and its volume remains to be gaged.

Results from the effort to advance prices on plates, shapes and bars cannot be measured as yet, but several steel companies are now holding for 1.50c., while others have advanced \$1 to \$2 above their low quotations. The Steel Corporation, it appears, did not go below 1.35c. in the recent breaks and 1.40c. is now more commonly maintained on the three heavy products than in a number of weeks.

A factor not easily determined is the amount of protection given consumers at the low prices. The immediate effect of the higher quotations has been favorable in the heavy products, and there is less pressure for low prices on other forms of finished steel.

The gradual broadening of railroad demand is not to be underestimated as a hopeful feature. The last rail order is 18,000 tons for the Chesapeake & Ohio. For the New York Central 1000 box cars have been placed and indications are that the St. Paul, which has inquired for 1000 cars, will actually buy 4500. This road is inquiring for 50 locomotives and the Florida East Coast has bought 10.

Indications are that miscellaneous railroad buying will be a considerable factor in the near future. For track supplies there are numerous small orders apart from 5000 kegs for the Pennsylvania and 3000 kegs for the Southern Pacific. At Chicago 2c., Pittsburgh, is the price, but in Eastern Pennsylvania business has been done as low as 2.20c. at mill. The rail mill at Gary is turning out 35,000 tons per month and bookings are sufficient to maintain this rate through the year.

The Steelton mill of the Bethlehem Steel Co., which has been out of the girder rail market for several years, is now actively competing for trolley line business. Boston reports contracts for 4700 tons in the past week.

Including 11,850 tons for an ore dock at Superior, Wis., for the Great Northern, fresh structural steel work totaled over 83,000 tons. Awards were, roughly, 24,000 tons.

Improvement in the demand for sheets continues and the operation of the mills is better than in several months. Automobile buying is larger. Bookings of the American Sheet & Tin Plate Co. last week were the heaviest in two years.

Recent buying of steel bars at Chicago, while largely for replenishment, has been in part for seasonal needs. Bar mills are not likely to feel the effect of the advances in farm products for some months.

Jobbers have been buying wire and nails more freely and in some cases have acquired stock for the coming season.

Export trade has improved in spots and on a few products slight advances have been secured. New inquiries for rails for Japan amount to 18,000 tons and some rail business is pending in Brazil.

Many sales of foundry pig iron for prompt delivery are being made and there is evidence of increasing melt, particularly in the East, but transactions are not large and they have caused no advance from the low prices recently named in Buffalo, Birmingham and some other centers. At Pittsburgh basic pig iron is 25c. higher, going to \$18, Valley, on a sale of 1000 tons.

Recent buying of steel scrap and blast furnace turnings by several steel plants in the Pittsburgh district at advancing prices has caused a flurry in the scrap market as dealers have tried to cover on their orders. The highest prices since early in 1921 have been realized.

Pittsburgh

PITTSBURGH, March 14.

On the whole the effect of the recent lifting of quotations on plates, shapes and bars upon the general steel market has been favorable, although the new base as yet has little or no foundation in sales and the claim is made by the important buyers of these products that they still are able to place business at 1.35c. to 1.40c. There is no question that the general structure of prices has been strengthened by the action of the leading Pittsburgh independent, which has been followed by all other independent companies. The Carnegie Steel Co. has not made a public announcement as to prices for some time, contenting itself with going along with the general market.

A good many wavering orders have been driven in by the advance and if the market actually has not reached the new basis, at least there has been almost complete disappearance of quotations of less than 1.40c. Another favorable development of the withdrawal of the extremely low prices on the heavy tonnage products has been to lighten the pressure for lower prices on other lines of finished steel. When plates, shapes and bars could be bought as low as 1.30c., buyers of other products naturally felt that prices of these other products could not be maintained and were inclined to order sparingly.

For some time past it has not been a lack of needs so much as a lack of confidence in the maintenance of prices that has retarded business. The market reflects a more cheerful undertone, but the idea that a return

A Comparison of Prices

Advances Over the Previous Week in Heavy Type, Declines in Italics

At date, one week, one month, and one year previous

For Early Delivery

Pig Iron, Per Gross Ton:	Mar. 14, 1922	Mar. 7, 1922	Feb. 14, 1922	Mar. 15, 1921
No. 2X, Philadelphia	\$21.26	\$21.26	\$21.34	\$27.96
No. 2, Valley furnace	19.00	19.00	18.75	26.00
No. 2, Southern, Cl'tif.	19.50	19.50	20.00	29.50
No. 2, Birmingham, Ala.	15.00	15.00	15.50	25.00
No. 2 foundry, Chicago*	20.00	20.00	18.00	25.00
Basic, del'd, eastern Pa.	19.84	19.84	19.84	26.26
Basic, Valley furnace	18.00	17.75	17.75	25.00
Valley Bessemer, del. P'gh	21.46	21.46	21.46	28.96
Malleable, Chicago*	20.00	20.00	18.00	25.50
Malleable, Valley	19.00	19.00	19.00	26.00
Gray forge, Pittsburgh	20.71	20.71	20.71	26.96
L. S. charcoal, Chicago	26.00	26.00	30.50	38.50
Ferromanganese, seaboard	62.50	62.50	62.50	90.00

Rails, Billets, etc., Per Gross Ton:	Mar. 14, 1922	Mar. 7, 1922	Feb. 14, 1922	Mar. 15, 1921
O.-h. rails, heavy, at mill	\$40.00	\$40.00	\$40.00	\$47.00
Bess. billets, Pittsburgh	28.00	28.00	28.00	38.50
O.-h. billets, Pittsburgh	28.00	28.00	28.00	38.50
O.-h. sheet bars, P'gh	29.00	29.00	29.00	40.00
Forging billets, base, P'gh	32.00	32.00	32.00	43.50
O.-h. billets, Philadelphia	33.74	33.74	33.74	44.24
Wire rods, Pittsburgh	36.00	36.00	36.00	52.00
	Cents	Cents	Cents	Cents
Skelp, gr. steel, P'gh, lb.	1.40	1.40	1.50	2.35
Light rails at mill	1.40	1.40	1.50	2.35

Finished Iron and Steel,	Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Iron bars, Philadelphia	1.71	1.71	1.76	2.45	
Iron bars, Chicago	1.55	1.55	1.60	2.60	
Steel bars, Pittsburgh	1.40	1.35	1.40	2.00	
Steel bars, Chicago	1.50	1.50	1.55	2.38	
Steel bars, New York	1.78	1.73	1.78	2.38	
Tank plates, Pittsburgh	1.40	1.35	1.40	2.00	
Tank plates, Chicago	1.50	1.50	1.55	2.38	
Tank plates, New York	1.78	1.73	1.78	2.38	
Beams, Pittsburgh	1.40	1.35	1.40	2.10	
Beams, Chicago	1.50	1.50	1.55	2.48	
Beams, New York	1.78	1.73	1.78	2.48	
Steel hoops, Pittsburgh	1.80	1.80	1.90	2.80	

*The average switching charge for delivery to foundries in the Chicago district is 70c. per ton.

†Silicon, 1.75 to 2.25. ‡Silicon, 2.25 to 2.75.

The prices in the above table are for domestic delivery and do not necessarily apply to export business.

Sheets, Nails and Wire,	Mar. 14, 1922	Mar. 7, 1922	Feb. 14, 1922	Mar. 15, 1921
Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Sheets, black, No. 28, P'gh	3.00	3.00	3.00	3.85
Sheets, galv., No. 28, P'gh	4.00	4.00	4.00	5.00
Sheets, blue an'd, 9 & 10	2.25	2.25	2.25	3.00
Wire nails, Pittsburgh	2.40	2.40	2.40	3.00
Plain wire, Pittsburgh	2.25	2.25	2.15	3.00
Barbed wire, galv., P'gh	3.05	3.05	3.05	3.85
Tin plate, 100-lb. box, P'gh	\$4.60	\$4.60	\$4.75	\$7.00

Old Material, Per Gross Ton:

Curwheels, Chicago	\$16.50	\$15.50	\$15.00	\$15.00
Curwheels, Philadelphia	16.00	16.00	15.00	18.00
Heavy steel scrap, P'gh	15.00	15.00	13.50	14.00
Heavy steel scrap, Phila.	12.50	12.00	12.00	13.00
Heavy steel scrap, Ch'go	12.50	11.75	11.25	12.50
No. 1 cast, Pittsburgh	15.75	15.75	16.00	21.00
No. 1 cast, Philadelphia	17.25	17.00	16.50	19.00
No. 1 cast, Ch'go (net ton)	14.25	13.75	13.00	14.50
No. 1 R.R. wrot, Phila.	15.50	15.00	14.50	17.00
No. 1 R.R. wrot, Ch'go (net)	11.25	11.25	10.50	11.50

Coke, Connellsville, Per Net Ton at Oven:

Furnace coke, prompt	\$3.25	\$3.25	\$2.90	\$4.50
Foundry coke, prompt	4.25	4.25	4.00	5.50

Metals,

Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Lake copper, New York	13.00	13.00	13.25	12.12 1/2
Electrolytic copper, refinery	12.75	12.75	13.00	11.87 1/2
Zinc, St. Louis	4.65	4.62 1/2	4.50	4.75
Zinc, New York	5.00	4.97 1/2	4.85	5.25
Lead, St. Louis	4.40	4.40	4.40	4.00
Lead, New York	4.70	4.70	4.70	4.00
Tin (Strait), New York	29.00	29.00	30.75	28.00
Antimony (Asiatic), N. Y.	4.20	4.20	4.40	5.25

Composite Price, March 14, 1922, Finished Steel, 2.019c. Per Lb.

Based on prices of steel bars, beams, tank plates, plain wire, open-hearth rails, black pipe and black sheets	Mar. 7, 1922, 1.998c. Feb. 14, 1922, 2.005c. Mar. 15, 1921, 2.757c. 10-year pre-war average, 1.689c.
These products constitute 88 per cent of the United States output of finished steel.	

Composite Price, March 14, 1922, Pig Iron, \$18.38 Per Gross Ton

Based on average of basic and foundry irons, the basic being Valley quotation, the foundry an average of Chicago Philadelphia and Birmingham	Mar. 7, 1922, \$18.25 Feb. 14, 1922, 18.02 Mar. 15, 1921, 25.38 10-year pre-war average, 15.72
--	---

to normal conditions is immediately ahead finds few subscribers.

Increase in the orders for plates, shapes and bars has not been so great as to make it necessary for the mills to advance delivery dates against new business. Improvement in the demand for sheets continues, and there is now a better general operation of the mills than before in several months. Bookings of the American Sheet & Tin Plate Co. last week were the heaviest for any week in about two years. Business in wire products still is good and there has been no let down in the specification for tin plates. There is a livelier market in strips and makers of nuts, bolts and rivets in this district, for the first time in more than a year, are talking more cheerfully about business. Tubular goods prices show a firmer tendency, although some recent business in line pipe is understood to have been placed at very low prices.

The pig iron market is slightly firmer, although not much activity is apparent. The impending strike of union coal miners is attended by very little excitement

in the fuel market, but there is a pretty lively situation in scrap iron and steel, due to the efforts of sellers to cover against recent sales.

Of the 140 blast furnaces in this and nearby districts, 62 now are in blast and steel plant operations, taking in both steel works and finishing mills, average between 55 and 60 per cent of capacity.

Pig Iron.—Business does not show much life, but the market shows considerable firmness on all grades and actually has advanced 25c. per ton on basic, of which we note a sale of 1000 tons at \$18, Valley furnace. There also has been a sale of 600 tons of this grade at \$18 by the Republic Iron & Steel Co., and since both transactions were subject to competition, it is plain that there no longer is any basis for a price of less than \$18, Valley furnace. Only small lots of Bessemer iron are being moved by Valley furnaces, but these invariably have been at \$19.50, and as far as Valley furnaces are concerned the market is hardly quotable at less. There is a pretty steady demand for foundry iron, but few of the sales are individually large. The market on this

grade is well established at \$19 for No. 2. A sanitary ware manufacturer with plants in this district and the South has entered the market for the April requirements for the local plants, amounting to about 2000 tons each of plain No 2 and No. 2X. This interest is reported to have closed for the second quarter requirements of its Southern plant amounting to 9000 tons, at \$15, Birmingham, for the base grade.

We quote Valley furnace, the freight rate for delivery to the Cleveland or Pittsburgh district being \$1.96 per gross ton:

Basic	\$18.00
Bessemer	19.50
Gray, forge	18.75
No. 2 foundry	19.00
No. 3 foundry	18.75
Malleable	19.00

Ferrolloys.—Interest in ferromanganese on the part of steel makers is increasing and while most of the inquiries are for small lots, a few of fair size recently have come out. A Buffalo steel maker is in the market for 1200 tons of 80 per cent material. We note a sale of 500 tons to a Valley steel works and it is currently reported that the Carnegie Steel Co. recently took an order for 2000 tons from a Pittsburgh district independent. This lot is understood to have brought the full quotation of \$62.50, seaboard. Commercial producers, however, appear more eager for business and all are not adhering rigidly to that base, except on carload lots. On the basis of recent sales and quotations against large inquiries, the market now is quotable at \$60 to \$62.50, Atlantic seaboard. An Eastern maker of spiegeleisen has announced quotations of \$35, furnace, for 20 per cent material and \$30 for 16 to 19 per cent. There has been hardly enough demand lately to provide a real test of these prices. The impression prevails that less can be done on large lots. The market for 50 per cent ferrosilicon is inactive and nominal.

We quote 78 to 82 per cent ferromanganese, \$60 to \$62.50 c.i.f. Atlantic seaboard for domestic and English. Average 20 per cent spiegeleisen, \$35 furnace; 16 to 19 per cent, \$30 furnace; 50 per cent ferrosilicon, domestic, \$55 to \$60 furnace, freight allowed. Bessemer ferrosilicon is quoted C.O.B. Jackson and New Straitsville, Ohio, furnaces as follows: 10 per cent, \$36.50; 11 per cent, \$39.80; 12 per cent, \$43.10; 13 per cent, \$47.10; 14 per cent, \$52.10; silvery iron, 6 per cent, \$25; 7 per cent, \$26; 8 per cent, \$27.50; 9 per cent, \$29.50; 10 per cent, \$31.50; 11 per cent, \$34; 12 per cent, \$36.50. The present freight rate from Jackson and New Straitsville, Ohio, into the Pittsburgh district is \$4.06 per gross ton.

Billets, Sheet Bars and Slabs.—Sales of forging billets are fairly numerous, though usually in small lots, the going price being \$32, base. Semi-finished steel does not yet reflect the enlargement of finishing mill operations, there being little open market demand for soft billets, slabs or sheet bars. Non-integrated sheet and tin plate makers appear to be covered by contracts for sheet bars. Those equipped to roll billets into bars or slabs into plates or skelp can buy the finished products more cheaply than they can make them. There is no change in prices.

We quote 4 x 4-in. soft Bessemer and open-hearth billets at \$28; 2 x 2-in. billets, \$29; Bessemer and open-hearth sheet bars, \$29; slabs, \$28; forging billets, ordinary carbons, \$32, all C.O.B. Youngstown or Pittsburgh mills.

Wire Rods.—The market is firm but not especially active as far as domestic users are concerned. Makers generally are quoting \$36, Pittsburgh, or Youngstown, for the base size of soft rods and small lots are moving on that basis. Export sales are reported at \$35, but this represents an advance since it transpires that business was done as low as \$33 a few weeks ago. Prices are given on page 761.

Steel Skelp.—Prices remain indeterminate in the absence of important inquiries and sales. With higher prices quoted on plates, however, an effort is being made to boost the price of skelp and 1.50c. is quoted though 1.40c. is nearer the base of such sales as are made.

Wire Products.—Some uncertainty exists as to the real base of bright and annealed wire and there are rumors that less than \$2.40 base per keg is being done on nails. So far as manufacturers in this district are concerned, the market is \$2.25 base per 100 lb. for wire and \$2.40 base per keg for nails, and these figures are rigidly observed. The doubt about wire prices undoubtedly arises from the fact that when makers au-

thorized the acceptance of nail orders at \$2.40, it was assumed by district offices that a like reduction applied on wire, putting the price to \$2.15, and business was accepted on that understanding and could not well be repudiated. Reports of price cutting on nails are denied. Business is fairly active but still is below the average of other years at this particular season.

We quote wire nails at \$2.40 base per keg, Pittsburgh, and bright basic and Bessemer wire at \$2.25 base per 100 lb., Pittsburgh.

Iron and Steel Pipe.—Prices of merchant steel pipe are firmer, as those makers who recently were making special price inducements to secure orders have either withdrawn them or are showing less desire for business at the figures they recently named. Business in this line is steady, but few, if any, of the makers are sold up to a point where there is any question of early deliveries. Oil well goods are moving with a little more freedom and there has been a fair number of line pipe orders. Among the latter was one of 1200 to 1500 tons of 6-in. and 8-in. to a Pittsburgh oil company with wells in West Virginia and in the West; also 28 miles of 6-in. and 26 miles of 8-in. for the Wyoming field, all of this business going to a Valley manufacturer. The market for line pipe still is a buyers' affair. Makers of wrought iron pipe report a steady but not very active demand for merchant pipe. Card discounts are given on page 761.

Sheets.—Continued improvement is noted in the demand for sheets, the feature of which is its diversity. Metal furniture manufacturers lately have been ordering freely and there is an improved demand from the automotive industry, while material for building work is in strong demand. The American Sheet & Tin Plate Co. last week had the largest bookings and specifications of any week in about two years, its business even exceeding that of the week before. This company last week operated 78 per cent of its sheet mills. Independent companies also are getting larger orders and are running between 65 and 70 per cent of capacity. Sheets easily are the most active of the finished products and adherence to quoted prices is more rigid than it has been, not only on black and galvanized, but on blue annealed stock. Prices are given on page 761.

Tin Plate.—Container manufacturers are specifying freely on contracts and there is still a high rate of operation of the mills, this being particularly true of the independent units, which are averaging about 80 per cent. There are few of the independents without a backlog, some not being in a position to take on additional business for shipment before May. This condition finds reflection in a firmer tone to prices. An Eastern maker is understood to have withdrawn some very low prices recently named on Pacific Coast business. The leading interest is running about 65 per cent of capacity and this with 80 per cent by the independents means an average for the entire industry of approximately 75 per cent.

We quote standard production coke tin plate, \$4.60 per base box C.O.B. Pittsburgh for carload lots.

Steel Rails.—There has been no special change in light rails, either as to prices or demand. The Carnegie Steel Co. still is quoting 1.45c. base, and is getting a fair run of orders and specifications at that figure. Independents are trying to get the same price, but are not letting orders get away at 1.40c. base. Demand is not very brisk.

We quote 25 to 45-lb. sections, rolled from new steel, 1.40c. base; rolled from old rails, 1.35c. base; standard rails, \$40 per gross ton mill for Bessemer and open-hearth sections.

Cold-Finished Steel Bars and Shafting.—The firmer tendency in hot-rolled bars has not yet been reflected in the price of cold-finished bars, which remains at 1.90c. base, and still is being shaded occasionally on orders that are attractive from a rolling standpoint. Business is better than it was earlier in the year and is well diversified. One maker in this district in checking up this month's business in comparison with that of last month and with March of last year, finds that this month shows a gain over February of close to 50 per cent and over that of March last year of more than 300 per cent. In general, however, the trade admits

that there is still room for considerable improvement. Ground shafting holds at 2.25c. base, mill, for carload lots.

Hoops and Bands.—A pretty strong effort is being made to stabilize hoops at 1.90c. base, Pittsburgh, and some business is being booked at that figure, although buyers with desirable orders still are able to place them at \$1 to \$2 per ton less. The market in bands is not very well defined and while the official quotation is 1.90c. base, Pittsburgh, it is admitted that no business is possible at that figure. Bands appear to be quotable generally at 1.75c. to 1.85c.

Hot-Rolled and Cold-Rolled Strips.—Recent betterment in business is well maintained, the feature of the buying being its diversity rather than the size of the individual orders. Cold-rolled strips are holding well at 3.50c. base, Pittsburgh, and now that the mills have a fair accumulation of orders in hot-rolled strips, there is more disposition to seek prices that will reduce the loss which sales of less than 1.90c. base involve.

Nuts and Bolts.—Orders with makers in this district are more numerous than they have been, but individually they run pretty small and consequently lack volume. Evidently there is not yet enough business to give all a share because concessions from quotations still are reported. Discounts are given on page 761.

Rivets.—Business is better, but the improvement is in the number rather than in the size of the orders. A feature is that demand now is coming from widely scattered sources and no longer is largely confined to tank builders as was the case recently. Leading makers deny having abandoned quotations of \$2.25 and \$2.35 base, per 100-lb. on heavy rivets, and claim to be getting specifications against contracts for small rivets taken at 70, 10 and 10 per cent off list. On the other hand, it is well established that a few sizable orders for small rivets have attracted an additional 5 per cent on top of the quoted discount of 75 and 10 per cent off list. Some bolt and nut makers have taken orders for certain sizes of rivets as low as \$1.90 base, per 100 lb. Prices and discounts are given on page 761.

Spikes and Track Bolts.—Railroads seem to have covered against their early spring requirements and standard spikes now are rather inactive. The Pennsylvania Railroad recently closed for about 500 kegs for the Central Region and for a larger quantity for the Eastern Region. A report that the Chicago, Burlington & Quincy Railroad recently bought a large quantity of spikes is denied. The market on standard spikes in small lots is quoted at \$2.10 base, per 100 lb., but on large lots the railroads have been able to negotiate tonnages down to \$2 base, per 100 lb. Track bolts still are quoted at \$3 base, per 100 lb. in carloads, but the market is rather weak at that price and on less than carloads, business has been done at much less than the usual 1c. per lb. extra over carload lots. Prices are given on page 761.

Iron and Steel Bars.—The effect of the recent advance to 1.50c. base, by most companies has been to crystallize the market, as far as sales are concerned, at around 1.40c. There is no question that the mills allowed regular customers to get under cover prior to the advance, and if there have been any sales at the new quotations, they have involved unimportant tonnages. Makers of iron bars in this district still are holding to 2c. to 2.10c. for refined iron, but note no material improvement in demand.

We quote steel bars rolled from billets at 1.40c. to 1.50c.; reinforcing bars, rolled from billets, 1.40c. to 1.50c. base; reinforcing bars, rolled from old rails, 1.30c. to 1.40c.; refined iron bars, 2c. to 2.10c. in carloads, f.o.b. mill, Pittsburgh.

Structural Material.—Recent advance in price of plain material to 1.50c., base, by most companies is regarded by important fabricating interests as nothing more than an effort to stave off demands for tonnages at 1.30c., base, or less. The claim is made that orders can be placed yet at 1.35c. to 1.40c., and of course there is much tonnage on which the mills have given the fabricating shops protection, at around these prices. There has been a complete dearth of structural awards among the shops here, but inquiries are numerous and hopes still run strong of a good spring business. Prices are given on page 761.

Plates.—The new price of 1.50c. as yet has found little, if any, basis in sales, and as a selling price the present market appears to be quotable at 1.40c. Much business which was pending, however, has been driven in by the advance in asking prices.

We quote sheared plates, $\frac{1}{4}$ in. and heavier, tank quality, at 1.40c. to 1.50c., f.o.b. Pittsburgh.

Boiler Tubes.—Business in steel tubes steadily is increasing, but there is not yet enough to give all a share and prices remain favorable to buyers. An effort is being made to put prices on a more profitable level, but not much headway yet can be reported. Card discounts are given on page 761.

Coke and Coal.—The market gives little sign of the impending strike of union coal miners. Activity is not of a pronounced sort in either coke or coal and if prices show any definite tendency, it is toward lower rather than higher levels. Spot furnace coke still is quotable at from \$3.25 to \$3.50 per net ton oven, while spot tonnages of foundry grade are moving at \$1 per ton premium over furnace fuel. There have been a few sales of both grades at 25c. per ton above the maximum figure, but lately demand has been a little less insistent for tonnages for stocking and \$3.50 for furnace coke and \$4.50 for foundry grade have become common maximum. The Lackawanna Steel Co., which recently inquired for 15,000 tons of beehive oven coke a month for second quarter delivery, is reported to have closed at \$3.50 per net ton oven. Coal prices are easier within about the recent quotations of \$1.50 to \$1.75 for mine run steam for prompt shipment; \$1.75 to \$2 for mine run by-product, and from \$2.15 to \$2.40 for mine run gas coal.

Old Material.—The market maintains a very firm undertone, although there has been a considerable contraction in buying by melters in the last two weeks. The market gains its strength from the fact that those who took orders a short time ago from the steel mills in this and nearby districts still are endeavoring to cover them and are obliged to offer pretty attractive prices to secure supplies. Offerings of industrial scrap are pretty limited and the railroads at present appear to be providing the bulk of the available supply. Bids of \$15 for heavy melting steel have found no response and it is doubtful whether much of this grade to-day could be had at \$15.50. The market is stronger on blast furnace material, notably on good clean borings, while machine shop turnings lately have sold as high as \$11. The market remains rather dull on the foundry grades.

We quote for delivery to consumers' mills in the Pittsburgh and other districts taking the Pittsburgh freight rate, as follows:

Heavy melting steel, Steubenville, Follansbee, Brackenridge, Monessen, Midland and Pittsburgh.....	\$15.00 to \$15.50
No. 1 cast, cupola size.....	15.75 to 16.25
Re-rolling rails, Newark and Cambridge, Ohio; Cumberland, Md.; Huntington, W. Va., and Franklin, Pa.....	15.00 to 15.50
Compressed sheet steel.....	13.00 to 13.50
Bundled sheets, sides and ends.....	12.00 to 12.50
Railroad knuckles and couplers.....	15.50 to 16.00
Railroad coil and leaf springs.....	15.50 to 16.00
Low phosphorus standard bloom and billet ends.....	17.50 to 18.00
Low phosphorus plates and other grades.....	17.00 to 17.50
Railroad malleable.....	13.50 to 14.00
Iron car axles.....	23.00 to 24.00
Locomotive axles, steel.....	21.00 to 22.00
Steel car axles.....	15.50 to 16.00
Cast iron wheels.....	15.50 to 16.00
Rolled steel wheels.....	15.50 to 16.00
Machine shop turnings.....	10.50 to 11.00
Sheet bar crop ends.....	15.00 to 16.00
Heavy steel axle turnings.....	12.50 to 13.00
Short shoveling turnings.....	12.00 to 12.50
Heavy breakable cast.....	15.00 to 15.50
Stove plate.....	12.50 to 13.00
Cast iron borings.....	11.75 to 12.25
No. 1 railroad wrought.....	12.50 to 13.00

Collecting Fuel Reserves

YOUNGSTOWN, OHIO, March 14.—Steel companies are building up substantial fuel reserves against possible disruption at union coal mines April 1. Interests operating by-product coke ovens are fortifying themselves in particular. Stocks are sufficient for four to six weeks' furnace operation at curtailed rate. Railroads report coal shipments to Valley plants have shown big gains past two weeks.

Chicago

CHICAGO, March 14.

Betterment in mill operation continues to keep pace with the gradual but steady expansion in demands. The Illinois Steel Co. has fired its fifteenth furnace, giving it seven active stacks at Gary, six at South Works and two at Joliet, and it has increased its ingot output to 65 per cent of capacity. Its Gary works is exceptionally busy, being on an 80 per cent operation basis. All of the bar mills at that plant are running double turn for the first time in over a year. The rail mill is producing at the rate of 35,000 tons a month with sufficient bookings to sustain that rate of operation for the rest of the year. The new rail mill of the Inland Steel Co. is also operating, having started last week. This company is also on a satisfactory production basis, with all of its No. 1 plants running double turn and its No. 2 plant single turn. Its steel output is about 60 per cent of ingot capacity.

In keeping with improved bookings, market sentiment is better and prices are steadily growing firmer. Independent mills throughout the country, sick of taking business at a loss, are advancing their prices. While the advance in plates, shapes and bars announced by the Inland Steel Co. last week, has not yet been followed by the local Steel Corporation mill, it would not be surprising if such action would be taken soon, provided market conditions seem to justify it. There is no question that the market on these products has been too low, but it is not yet clear whether the buying movement now in its incipency has acquired sufficient momentum to sustain an advance.

Much recent buying is directly attributable to the low level of prices. Railroad cars, for example, have been purchased on practically a pre-war basis. On the other hand, it would appear that the railroads themselves anticipate an advance in prices, because they are now trying to close contracts for several months' requirements of such commodities as plates, shapes, bars, tie plates, bolts and spikes. The mills, however, are unwilling to accept such contracts at current prices.

The Republic Iron & Steel Co. to-day announced an advance in bar iron to a minimum of 1.60c., Chicago.

Pig Iron.—Local iron is firm at \$20, base, local furnace, and a fair amount of business is being closed at that figure. While most current orders are rather small, a number of contracts for second quarter have been closed, ranging from 100 tons to 2000 tons each. Fairbanks, Morse & Co., which was in the market for 3500 tons of foundry and malleable iron, has closed for 1000 tons at the market. A north Chicago melter has bought 300 tons of Southern foundry at \$15 base, Birmingham. Current inquiries include 1000 tons of Northern foundry for Chicago delivery, 1000 tons of Southern foundry for a Michigan melter, and 200 tons of foundry for Indiana shipment. A local melter is in the market for 100 tons of low phosphorous iron and an outside foundry wants 300 tons of the same grade of iron. It is intimated that Jackson County producers will soon announce an advance in silvery iron.

Quotations on Northern foundry, high phosphorous malleable and basic irons are f.o.b. local furnace and do not include a switching charge averaging 70c. per ton. Other prices are for iron delivered at consumers' yards, or when so indicated, f.o.b. furnace other than local.

Lake Superior charcoal, averaging	
sl. 1.50, delivered at Chicago.....	\$28.00
Northern coke, No. 1, sl. 2.25 to 2.75	20.50
Northern coke, foundry, No. 2, sl.	
1.75 to 2.25.....	20.00
Northern high phos.....	20.00
Southern foundry, sl. 1.75 to 2.25.....	\$20.77 to 21.67
Malleable, not over 2.25 sl.....	20.00
Basic.....	20.00
Low phos., Valley furnace, sl. 1 to 2	
per cent copper free.....	30.00
Silvery, sl., 8 per cent.....	32.32

Ferrolloys.—A Chicago consumer is in the market for 250 to 500 tons of ferromanganese. This commodity is strong, at least one producer having announced an advance to \$65, seaboard. A recent sale of 50 tons of spiegeleisen to a local buyer was closed

at approximately the market. Fifty per cent ferro-silicon is inactive and prices are nominal.

We quote 78 to 82 per cent ferromanganese, \$70.30, delivered; 50 per cent ferrosilicon \$56 to \$57.50, delivered; spiegeleisen, 16 to 18 per cent, \$40.10, delivered.

Railroad Equipment.—The New York Central has divided an order for 1000 steel hopper cars equally among the American Car & Foundry Co., the Pressed Steel Car Co., the Standard Steel Car Co. and the Pullman Co. It is intimated that the St. Paul, which is in the market for 1000 box cars, will actually buy 4500 cars. The same road is inquiring for 50 Mikado type locomotives. The Florida East Coast has placed an order for seven Pacific type engines and three switchers with the American Locomotive Co.

Cast Iron Pipe.—Current bookings are satisfactory and prices are firm. Fort Dodge, Iowa, takes bids on 260 tons March 26. The American Cast Iron Pipe Co. is reported to have been awarded 200 tons for Wausau and 150 tons for Madison, Wis.

We quote per net ton, f.o.b. Chicago, as follows: Water pipe, 4-in., \$46.10 to \$47.10; 6-in. and above, \$42.10 to \$43.10; class A and gas pipe, \$3 extra.

Bars.—Demand for soft steel bars continues to broaden and it is becoming apparent that buying is not solely for replenishment purposes but is also in preparation for seasonal needs. Consumers' stocks, with some notable exceptions, are low and they must be built up to take care of business which will develop in the spring months. Ruling prices remain unchanged, although recent advances by independents here and in the East have given the market a firmer tone. The betterment in demand for steel has not been accompanied by any material increase in bar iron or hard steel bar business. Bar iron mills continue to operate intermittently and no rail-carbon steel bar mill is running better than single turn.

Mill prices are: Mild steel bars, 1.50c. to 1.60c., Chicago; common bar iron, 1.55c. to 1.60c., Chicago; rail carbon, 1.50c., mill or Chicago.

Jobbers quote 2.28c. for steel bars out of warehouse. The warehouse quotation on cold-rolled steel bars and shafting is 3.40c. for rounds and 3.90c. for flats, squares and hexagons. Jobbers quote hard and medium deformed steel bars at 1.90c. base. Hoops, 3.13c. Bands, 2.88c.

Sheets.—There are still evidences of resistance on the part of buyers, but prices remain firm and bookings are gradually increasing. Better tonnages are coming from the automobile industry as well as from other lines. The mills of the Inland Steel Co. are operating at capacity, with 30 days' work ahead.

Mill quotations are 3c. for No. 28 black, 2.25c. for No. 10 blue annealed and 4c. for No. 28 galvanized, all being Pittsburgh prices, subject to a freight rate to Chicago of 38c. per 100 lb.

Jobbers quote: Chicago delivery out of stock, No. 10 blue annealed, 3.38c.; No. 28 black, 4.15c.; No. 28 galvanized, 5.15c.

Wire Products.—Jobbers are buying wire and nails more freely and in some cases are building up stocks for the coming season. There is less contracting ahead than is usually the case at this time of the year, but orders are more numerous and the aggregate bookings of mills larger than a few weeks ago. Demand from jobbers in Middle Western States shows considerable improvement, but business from the Northwest is still light owing to the severe weather conditions there. Prices are firm on finished products, but wire rods are moving at about \$33.50, Pittsburgh. For mill prices, see finished iron and steel, f.o.b., Pittsburgh, page 761.

We quote warehouse prices f.o.b. Chicago: No. 9 and heavier black annealed wire, \$2.85 per 100 lb.; No. 9 and heavier bright basic wire, \$3 per 100 lb.; common wire nails, \$3 per 100 lb.; cement coated nails \$2.50 per keg.

Warehouse Prices.—Local jobbers have reduced prices on bars, bands, plates, shapes, and rivets. The new quotations are published under appropriate paragraphs.

Rails and Track Supplies.—Demand for track materials remains active, numerous orders for spikes and bolts having been placed. Most of the orders were individually small, a notable exception being 3000 kegs of spikes placed with a local mill by the Southern Pacific. Prices are fairly firm, the lowest quotation reported being 2c., Pittsburgh, which was named on 500 kegs of spikes bought by a Chicago road. Rail specifications are increasingly liberal, but new orders are few. The Chesapeake & Ohio, which was in the mar-

has placed 18,000 tons of rails, has placed 7000 tons with the mill and is understood to have distributed the remainder among other producers.

Standard Bessemer and open-hearth rails, \$40; light rails rolled from new steel, 1.50c. to 1.60c., f.o.b. makers' mills.

Standard railroad spikes, 2.05c. to 2.10c., Pittsburgh; track bolts with square nuts, 3.05c. to 3.10c., Pittsburgh; tie plates, steel and iron, 1.65c. to 1.75c., f.o.b. mill; angle bars, 2.40c., f.o.b. mill.

Plates.—The Sinclair Oil Co. has placed an order for 10 additional storage tanks with the Chicago Bridge & Iron Works and also 10 with the Graver Corporation, making a total of 30 tanks, the steel for which, amounting to 9000 tons, will be furnished by the Illinois Steel Co. Specifications received from carbuilders coupled with a steadily increasing number of orders from miscellaneous sources are resulting in more satisfactory mill operations. The price situation remains unchanged, although one local producer is quoting a minimum of 1.60c., mill.

The ruling mill quotations range from 1.50c. to 1.60c., Chicago. Jobbers quote 2.38c. for plates out of stock.

Bolts and Nuts.—Demand is improving slowly and prices, while still weak, continue to grow steadier. Efforts of buyers to close contracts for second quarter at current discounts have proved unsuccessful. Makers who have been willing to take spot business at a loss in order to keep their plants in operation refuse to take on commitments for three months ahead on that basis.

Jobbers quote structural rivets, 3c.; boiler rivets, 3.10c.; machine bolts up to $\frac{3}{4}$ x 4 in., 60, 10 and 10 per cent off; larger sizes, 60 to 10 off; carriage bolts up to $\frac{3}{4}$ x 6 in., 60 and 10 off; larger sizes, 55 and 5 off; hot pressed nuts, square and hexagon tapped, \$3.75 off; blank nuts, \$4 off; coach or lag screws, gimlet points, square heads, 65 and 5 per cent off. Quantity extras are unchanged.

Structural Material.—As the building season approaches, the construction field is becoming more active. New fabricating projects are more numerous and lettings are heavier than for some weeks. Confidence in the successful stabilization of the local labor situation is indicated by the award of the general contract for the London Guarantee Life Assurance Building to the Thompson-Starrett Co. About 4500 tons of fabricated material is involved, which is expected to be let soon. The general contract for the Belden Hotel, another local project involving 4000 tons of steel, is about to be awarded. Plain material prices are unchanged, although they are firmer owing to the fact that one local mill is now quoting a minimum of 1.60c., f.o.b. works. Fabricating awards include:

Indianapolis Athletic Club, 1425 tons, to McClintic-Marshall Co.

Northern Pacific Railroad, bridges for various locations, 2700 tons, to American Bridge Co.

Hotel Rowe, Grand Rapids, Mich., 344 tons, to Rochester Bridge Co. and Vierling Steel Works.

New building for Vienna Model Bakery, Chicago, 166 tons, to Butler Street Foundry Co.

Buoyette Co., foundry, South Milwaukee, Wis., 250 tons, to Worden-Allen Co.

Bucyrus Co., machine and erecting shop, Evansville, Ind., 250 tons, to Worden-Allen Co.

Jones Island sewage disposal plant, power and boiler houses, Milwaukee, 530 tons, to Milwaukee Bridge Co.

State University of Montana, gymnasium, Missoula, 182 tons, to Minneapolis Steel & Machinery Co.

Pending business includes:

Medical Building, Detroit, 1270 tons, general contract to Bass Construction Co., Cleveland.

Loop Motor Hotel, Chicago, 2000 tons, Glaver & Dinkelberg, architects.

The mill quotation on plain material ranges from 1.50c. to 1.60c., Chicago. Jobbers quote 2.38c. for plain material out of warehouse.

Steel Castings.—No further orders for car castings have been let, but a number involving considerable tonnage are still pending. Outside of castings for railroad cars, there is little business in the market. Prices are holding fairly well, although some isolated instances of cutting are reported.

Old Material.—Some very substantial purchases of heavy melting steel have been made at from \$12.50 to \$12.75 per gross ton delivered. While this buying is conspicuous because of the tonnage involved, consumptive purchases of other grades are more numerous and have resulted in advances commensurate with the increased strength of the market. Foundry operations

are gradually expanding and it is notable that orders for cast grades are more plentiful, although most of them are individually small. Although there has been some recent buying of wrought iron grades, it has now subsided and it is to be noted in this connection that bar iron mill operations are not improving materially, their condition being in marked contrast with that of the steel mills, which have made important gains in output since the first of the year. The bidding of dealers on railroad lists indicates their confidence in a sustained upward swing in prices. Current offerings include the Louisville & Nashville, 10,000 tons, of which 4500 tons is rails, and the Pullman Co., 650 tons. Owing to a typographical error, shoveling steel was quoted last week at \$11.25 to \$12.75. The quotation should have been \$11.25 to \$11.75. This grade has since advanced.

We quote delivery in consumers' yards, Chicago and vicinity, all freight and transfer charges paid, as follows:

Per Gross Ton	
Iron rails	\$16.00 to \$16.50
Relaying rails	20.00 to 25.00
Cast iron car wheels	16.50 to 17.00
Roller or forged steel car wheels	14.00 to 14.50
Steel rails, rerolling	13.00 to 13.50
Steel rails, less than 3 ft.	13.50 to 13.75
Heavy melting steel	12.50 to 12.75
Frogs, switches and guards cut apart	12.50 to 12.75
Shoveling steel	11.75 to 12.25
Low phos., heavy melting steel	14.00 to 14.50
Drop forge flashings	8.50 to 9.00
Hydraulic compressed sheet	8.50 to 9.00
Axle turnings	8.50 to 9.00

Per Net Ton	
Iron angles and splice bars	14.25 to 14.75
Steel angle bars	11.50 to 12.00
Iron arch bars and transoms	16.00 to 16.50
Iron car axles	20.00 to 20.50
Steel car axles	13.50 to 14.00
No. 1 bushelling	9.25 to 9.75
No. 2 bushelling	6.25 to 6.75
Cut forge	11.00 to 11.50
Pipes and flues	7.50 to 8.00
No. 1 railroad wrought	11.25 to 11.75
No. 2 railroad wrought	11.00 to 11.50
Steel knuckles and couplers	12.50 to 13.00
Coil springs	13.00 to 13.50
No. 1 machinery cast	14.25 to 14.75
No. 1 railroad cast	13.50 to 14.00
Low phos. punchings	11.50 to 12.00
Locomotive tires, smooth	10.50 to 11.00
Machine shop turnings	5.75 to 6.25
Cast borings	7.00 to 7.50
Stove plate	12.50 to 13.00
Grate bars	11.00 to 11.50
Brake shoes	11.25 to 11.75
Railroad malleable	12.00 to 12.50
Agricultural malleable	12.00 to 12.50

Acquires Stock of the Pittsburgh Rolls Corporation

The Union Steel Casting Co., Pittsburgh, has purchased at private sale a large block of the capital stock of the Pittsburgh Rolls Corporation, Pittsburgh. The plants of both companies are located in the Lawrenceville district of Pittsburgh and it is the intention of the Union Steel Casting Co. in making this purchase that the two plants shall work in close harmony. No changes will be made in the organization or management of the Pittsburgh Rolls Corporation other than the retirement of some directors who have sold their stock and whose places will be filled by officers of the Union Steel Casting Co.

The Pittsburgh Rolls Corporation, (Phoenix Roll Works) has operated in the same locality for more than 50 years. It was first under the name of Bowman, Boyd & Bagley, then James B. Young & Co., and later Seaman, Sleeth & Co., this being the firm name for a number of years prior to 1917, when the Pittsburgh Rolls Corporation succeeded to the business. During these several changes of firm names, the plant has been known as the Phoenix Roll Works, the home of Phoenix rolls, which have had and still are finding wide use not only in rolling mills in this country, but in most parts of the world. Present officers of the company are D. L. Eynon, president, Q. S. Snyder, vice-president and treasurer and P. M. Fleming, secretary.

The Union Steel Casting Co., organized in 1899, has grown from small beginnings to one of the leading steel foundries of the country. Its officers are C. C. Smith, chairman, J. P. Allen, president, J. B. Henry, vice-president and general superintendent, S. H. Church, vice-president, G. W. Eisenbeis, treasurer and W. C. Eichenlaub, secretary.

Philadelphia

PHILADELPHIA, March 14.

Practically all of the independent steel companies have followed the lead of the Jones & Laughlin Steel Co. in announcing a price of 1.50c., Pittsburgh, on plates, shapes and bars. Some of these advances went into effect late last week and others dated from Monday of this week. Buyers were given a few days in which to send in their specifications at the former prices and the result was the booking of a very substantial tonnage in the past week. On specific projects, protection was given for longer periods and the market situation will doubtless be confused during the next week or two by reports that orders are still being taken at the old prices. The independent mills are said to be adhering firmly to 1.50c., Pittsburgh, on all new business, but no orders of any size have been placed at the higher level. It is still possible to buy the heavy tonnage products at 1.40c., Pittsburgh, but apparently all outstanding quotations below the latter figure will be acted upon shortly by buyers, or will be withdrawn by the mills if orders are not forthcoming within a reasonable time.

Pig Iron.—Aside from reported buying by two cast iron pipe companies of about 5000 tons each, there has been no very important pig iron business in the past week. Orders aggregating a few thousand tons additional have been booked, but as a rule do not exceed a few hundred tons each, and specify delivery over the remainder of second quarter. The American Engineering Co. and the Sanitary Co. of America each bought about 1000 tons. No selling for third quarter has been done, so far as reported, but one pipe company has indicated its desire to cover for that period. The uncertainty of the coke situation deters Eastern furnaces from selling so far ahead. The price situation on foundry iron is unchanged. Furnaces are quoting from \$19.50 to \$20, furnace, on No. 2 plain and 50c. per ton higher on No. 2 X. The furnaces, however, continue to equalize freight rates in competition with sellers having a freight rate advantage. A small tonnage of gray forge has been sold at \$19.50, furnace, with \$1.26 freight. In other grades of pig iron there is practically no interest, this being particularly true of steel-making iron. The Alan Wood Iron & Steel Co. will put out its No. 3 furnace this week, leaving only one stack, No. 2, in blast. The Robeson furnace went out last Saturday on account of lining trouble. The Thomas Iron Co. plans to let Alburdis go out at the end of the month unless the coke situation looks better.

The following quotations are, with the exception of those on low phosphorus iron, for delivery at Philadelphia, and include freight rates varying from 81 cents to \$1.54 per gross ton:

East. Pa. No. 2 plain, 1.75 to 2.25 sil.	\$20.76 to \$20.84
East. Pa. No. 2X, 2.25 to 2.75 sil.	21.26 to 21.34
Virginia No. 2 plain, 1.75 to 2.25 sil.	26.24 to 26.74
Virginia No. 2X, 2.25 to 2.75 sil.	27.24 to 27.74
Basic delivery eastern Pa.	19.84
Gray forge	20.50 to 21.00
Malleable	22.50 to 24.00
Standard low phos. (f.o.b. furnace)	30.00
Copper bearing low phos. (f.o.b. furnace)	28.00

Plates.—The immediate effect of the advance in the plate price to 1.50c., Pittsburgh, by all independent makers has been to create a scramble among buyers to cover to the former prices. A good deal of business was placed in the past week, mostly at 1.35c., Pittsburgh, the mills giving their customers a few days in which to get in their specifications. In the case of specific projects on which fabricators are submitting bids, protection was given for a longer period, but on all new inquiries every maker of plates in the Eastern district is now quoting 1.50c., Pittsburgh. The leading interest, however, has not announced that its price has gone above 1.40c. It may require a week or so to clarify the present price situation, but at the moment the market may be quoted at 1.40c. to 1.50c., Pittsburgh. A number of large plate inquiries are still pending, among which is one coming from several car builders and shipyards which are figuring on the 2000 to 4000 70-ton steel freight cars inquired for by the Norfolk & Western. These cars will require from 22,000 to

44,000 tons of steel. Eastern fabricators are figuring on a steel pipe job for Seattle, Wash., which will require 12,500 tons of plates and a New York State pipe project calls for 2500 tons of plates, but the contract has not yet been awarded. A Philadelphia shipyard, which is bidding on a Great Lakes boat, is asking prices on 1500 tons of plates. The steel for the 47 locomotives to be built by the Baldwin Locomotive Works for the Chicago, Burlington & Quincy Railroad, amounting to 2000 tons, has been placed with the Lukens Steel Co. New locomotive inquiries include one for 50 engines from the Chicago, Milwaukee & St. Paul and one from the Monon for 20. It is reported that other roads will soon be in the market for new power equipment. A disturbing feature in the market is the quantities of salvage plates that are being offered for sale, with prices in some instances as low as 1.20c., Philadelphia.

Structural Material.—Bids are being taken this week on the new Ledger Building, which will require 2000 tons of steel, and on a hotel to be built at Locust and Juniper streets, requiring 1000 tons. Bids close March 24 on a city pier, requiring 4000 tons. Though price protection has been given by the mills on most of the projects on which bids are now going in, 1.50c., Pittsburgh, is being quoted on all new inquiries by the independent mills. The market may be quoted at 1.40c. to 1.50c., Pittsburgh.

Bars.—Many buyers covered their requirements in steel bars at the former prices before the advance by independents to 1.50c., Pittsburgh. Considerable tonnage was booked last week. Bar mills are operating at a fairly good rate on immediate specifications. Bar iron is offered at 1.35c. to 1.40c., Pittsburgh, but there is very little business.

Sheets.—The mills are adhering firmly to 2.25c. on blue annealed, 3c. on black and 4c. on galvanized, f.o.b. Pittsburgh, but concessions, it appears, have been offered by jobbers who apparently have specified heavily against old contracts entered into at prices lower than the mills now quote. These concessions have amounted in some instances to \$2 or \$3 a ton.

Track Supplies.—The Pennsylvania Railroad has placed about 100,000 tie plates and 5000 kegs of spikes. The Norfolk & Western is expected to release numerous requisitions shortly for bolts, nuts, staybolt iron and other repair material.

Warehouse Business.—Local jobbers have reduced the price on cold rolled steel 25c. per 100 lb.

Old Material.—Eastern scrap dealers have had one of the busiest weeks since 1920, but their orders have come chiefly from the Pittsburgh district, where a good demand exists, particularly for heavy melting steel and blast furnace turnings. On moderate-sized sales to eastern Pennsylvania mills and in line with advances at Pittsburgh, the local market shows many higher quotations this week, averaging about 50c. per ton.

We quote for delivery at consuming points in this district as follows:

No. 1 heavy melting steel	\$12.50 to \$13.50
Scrap rail	12.50 to 13.50
Steel rails, rerolling	15.00 to 15.50
No. 1 low phos., heavy 0.04 and under	18.00 to 19.00
Cast iron car wheels	16.00 to 16.50
No. 1 railroad wrought	15.50 to 16.00
No. 1 yard wrought	13.00 to 13.50
No. 1 forge fire	10.00 to 10.50
Bundled sheets (for steel works)	10.00 to 10.50
No. 1 busheling	11.50 to 12.50
No. 2 busheling	9.00 to 10.00
Turnings (short shoveling grade for blast furnace use)	10.75 to 11.25
Mixed borings and turnings (for blast furnace use)	10.75 to 11.25
Machine-shop turnings (for rolling mill and steel works use)	11.00 to 11.50
Heavy axle turnings (or equivalent)	11.50 to 12.00
Cast borings (for steel works and rolling mills)	12.00 to 12.50
Cast borings (for chemical plants)	15.00 to 15.50
No. 1 cast	17.50 to 17.75
Railroad grate bars	14.00 to 14.50
Stove plate (for steel plant use)	14.00 to 14.50
Railroad malleable	13.00 to 13.50
Wrought iron and soft steel pipes and tubes (new specifications)	13.00 to 13.50
Shafting	15.00 to 15.00
Iron car axles	No market
Steel car axles	17.00 to 18.50

New York

NEW YORK, March 14.

Pig Iron.—A period of quiet has followed the recent buying, but there is positive evidence that the melt is being slowly increased and numerous sales of small tonnages have been recorded. There has been some selling of charcoal iron on the basis of \$22.50 Michigan furnace, or \$32.60 New York, a reduction of \$7 from the price which prevailed until about two weeks ago. The strike in Brooklyn and Long Island City foundries on account of a reduction of wages of molders from \$6.50 for an eight-hour day to \$6.00 has been compromised on the basis of \$6.25, and the men have resumed work. Letting of the contracts for the segments of the vehicular tunnel is still delayed, but it is regarded as virtually settled that the contracts will be awarded as stated in THE IRON AGE of March 2, page 622.

We quote delivered in the New York district as follows, having added to furnace prices \$2.52 freight from eastern Pennsylvania, \$5.46 from Buffalo and \$6.16 from Virginia:

East. Pa. No. 1 fdy., sil.	2.75 to 3.25	\$22.52 to \$23.02
East. Pa. No. 2X fdy., sil.	2.25 to 2.75	22.02 to 22.52
East. Pa. No. 2 fdy., sil.	1.75 to 2.25	21.52 to 22.02
Buffalo, sil.	1.75 to 2.25	23.46 to 23.71
No. 2 Virginia, sil.	1.75 to 2.25	28.16

Iron Ore.—Leading eastern furnacemen are not in sympathy with Buffalo furnaces in opposing the proposed reduction by the railroads in the carrying rate on iron ore, but believe that it would be well to allow this reduction to go into effect, so that a similar reduction on coal and coke could be made later. The controversy among various interests connected with the manufacture of iron is considered unfortunate at the present time, adding, as it does, another element of uncertainty to the situation.

Ferroalloys.—The demand for ferromanganese does not increase and inquiries embrace 1000 to 1500 tons, with very few sales reported in the last week. A sale of 100 tons of British alloy is noted. Prices continue firm and unchanged at recent levels. Demand for spiegeleisen is moderately active and fair sales of the lower grades are reported at prevailing quotations. A large producer in New Jersey recently started up a furnace, the output of which is largely booked for some little time. There is no interest in manganese ore and quotations continue nominal. Business in 50 per cent ferrosilicon continues moderate with sales confined to the needs of consumers for fairly early delivery. A middle western consumer is understood to have booked 500 tons at \$55, delivered. Quotations follow:

Ferroalloys

Ferromanganese, domestic, seaboard, per ton	\$62.50
Ferromanganese, British, seaboard, per ton	\$62.50
Spiegeleisen, 16 to 19 per cent, furnace, per ton	\$39.00
Spiegeleisen, 20 per cent, furnace, per ton	\$39.00
Ferrosilicon, 50 per cent, delivered, per ton	\$55.00 to \$60.00
Ferrotungsten, per lb. of contained metal	40c. to 50c.
Ferrochromium, 6 to 8 per cent carbon, 60 to 70 per cent Cr., per lb. Cr., delivered	12c. to 14c.
Ferrovanadium, per lb. of contained vanadium	\$4.00

Ores

Manganese ore, foreign, per unit, seaboard	25c. to 26c.
Tungsten ore, per unit, in 60 per cent concentrates	\$2.00 up
Chrome ore, 40 to 45 per cent Cr ₂ O ₃ , crude, per net ton, Atlantic seaboard	\$20.00 to \$25.00
Chrome ore, 45 to 50 per cent Cr ₂ O ₃ , crude, per net ton, Atlantic seaboard	\$25.00 to \$27.00
Molybdenum ore, 85 per cent concentrates, per lb. of MoS ₃ , New York	50c. to 60c.

Finished Iron and Steel.—Although the Midvale and the Bethlehem companies have joined the Jones & Laughlin Steel Co. in advancing the price of plates, shapes and bars to 1.50c., Pittsburgh, the market is not firmly established at that level. Some companies apparently are still willing to take business at figures lower than 1.50c., though it is predicted in the trade that a more general adoption of the 1.50c. quotation by the mills will become effective this week. Under the present condition it is difficult to tell what the market price is on plates, shapes and bars for the reason that undoubtedly a good part of the business closed within the past week had been quoted upon prior to the advance. The general opinion is that the heavy tonnage products will be stabilized at about 1.40c., Pittsburgh, with a little more firmness in shapes than in plates and bars. It probably will take a week or so, however, to determine just how firmly the mills will stand for

higher prices, particularly those mills which have not publicly made known their attitude. The New York, New Haven & Hartford Railroad a few days ago placed 1100 tons of plates, shapes and bars at a price reported to be 1.35c., Pittsburgh, while 1500 tons of deformed bars for a Cuban pier job was bought by a New York contractor at 1.30c., Pittsburgh. The latter transaction is of course regarded as one for export. Plates have been sold within the past few days, even in comparatively small lots, at 1.35c., Pittsburgh, though it is stated that to-day a buyer might find it difficult to place an order at lower than 1.40c. Export prices have stiffened somewhat except in Canada, where plates, shapes and bars have been sold in the past week on the basis of 1.30c., Pittsburgh. Wire products and sheets are firm for domestic trade and have stiffened slightly for export. An effort is being made to hold tin plate at \$4.60 per 100 lb. base box, Pittsburgh. Railroad business shows a degree of promise and it is the expectation of car builders that several new inquiries for cars will be sent out within the next few weeks. The New York Central Railroad will receive bids up to March 22 on 3000 tons of plates, shapes, bars, axles, track supplies, etc. The Pennsylvania Railroad has inquired for 250 all-steel passenger cars and the Louisville & Nashville is inquiring for 25 passenger cars. The American Locomotive Co. has received an order from the Florida East Coast Railroad for 10 locomotives. Structural steel work is in fair volume, with new projects showing a slight increase in number. New work includes:

City of Philadelphia pier, 4000 tons, bids closing March 24.
Y. M. C. A. building at Middletown, Ohio, 250 tons.
Hospital at Poughkeepsie, N. Y., 250 tons.
Library at Columbia University, New York, 1600 tons.
Apartment house at West End Avenue and Eighty-eighth Street, New York, 400 tons.

Jobs awarded include the following:

Public Library, Philadelphia, 4000 tons, to American Bridge Co.
Boiler plant in Los Angeles, Cal., 750 tons, to a local fabricator.
Residence for Mrs. Alexander Hamilton Rice, Fifth Avenue, New York, 400 tons, to American Bridge Co.
Building for Hudson Trust Co., Hoboken, N. J., 300 tons, to Olmster Iron Works.
Office building in Boston for Ira G. Hersey & Sons, 1000 tons, to New England Structural Steel Co.
Power house extension at New Bedford, Mass., 400 tons, to McIntire-Marshall Co.
Ten oil tanks for Sinclair Consolidated Oil Corporation, 3000 tons, to Chicago Bridge & Iron Works.
Building for American Car & Foundry Co. at Huntington, W. Va., 600 tons, to American Bridge Co.
Two steel stacks, Brooklyn Edison Co., 400 tons, to Chicago Bridge & Iron Works.

No decision has been announced by the New York Central Railroad on the bridge across the Hudson River at Castleton, N. Y., requiring 23,000 tons of steel. It is reported that the work may be divided between the lowest two bidders. B. Goldberg & Son, 166 Jackson Avenue, Long Island City, N. Y., is in the market for 300 tons of steel sheet piling.

We quote for mill shipments, New York, as follows: Soft steel bars, 1.78c.; plates, 1.78c.; structural shapes, 1.78c.; bar iron, 1.73c. to 1.88c. On export shipments the freight rate is 28.5c. per 100 lb. and the domestic rate is 38c.

Cast-Iron Pipe.—The market continues active, particularly in purchases by private interests. There is also a moderate amount of municipal buying, chiefly on awards to contractors. One of those recently placed, but for which the pipe involved has not yet been purchased, calls for 590 tons of cast-iron pipe. Another tender, which will be opened March 22, by the Department of Water Supply, Gas and Electricity, New York, involves about 800 tons for installation in the Borough of Bronx. On the whole the market is extremely optimistic and prices continue stiff. We quote per net ton, f.o.b. New York, as follows: 6-in. and larger, \$47.30; 4-in. and 5-in., \$52.30; 3-in., \$52.80, with \$4 additional for Class A and gas pipe.

High Speed Steel.—The market continues quiet and prices weak. The majority of sales are now being made at about 75c. per lb. for 18 per cent tungsten, high speed steel.

Warehouse Business.—The market is quiet and prices weak. It is generally believed that a downward

revision of prices will be made within the next week or ten days. Activity continues in the brass and copper market, where prices are holding up fairly well except on copper sheets, which are off about $\frac{1}{4}$ c. per lb. Wrought iron and steel pipe is unchanged. We quote prices on page 776.

Coke.—The market is not as active as it was during the recent flurry, but prices are strong, and \$4.50 is the prevailing price on foundry grades with some companies asking \$4.75 and even more. By-product coke is still quoted at \$8.59 delivered to points on the Pennsylvania, Erie and Lackawanna railroads, and \$9.15 on the Central of New Jersey.

Old Material.—The slight improvement evident during the past few weeks has suddenly developed into a distinct upward trend. Prices on No. 1 heavy melting steel have advanced to as high as \$15.50 per ton in the Pittsburgh district and buying prices in the New York market are from \$9 to \$9.50 per ton, with some actual transactions reported to figure back to a basis of \$9.75 New York. This advance has resulted in some instances in re-rolling rails, which are now at about the same price, being sold for heavy melting steel. Despite the evidently favorable outlook, dealers feel that it may be only temporary. The present buying is largely confined to western Pennsylvania mills, those in the East still adhering to a policy of low prices and not seeming to be particularly anxious to buy.

Buying prices per gross ton, New York, follow:

Heavy melting steel, yard.....	\$9.00 to \$9.50
Steel rails, short lengths, or equivalent.....	9.00 to 9.50
Re-rolling rails.....	9.25 to 9.75
Relaying rails, nominal.....	27.00 to 28.00
Steel car axles.....	10.00 to 10.50
Iron car axles.....	17.50 to 18.50
No. 1 railroad wrought.....	9.50 to 10.00
Wrought iron truck.....	8.50 to 9.00
Forge fire.....	4.75 to 5.25
No. 1 yard wrought, long.....	9.00 to 9.50
Cast borings (clean).....	7.00 to 7.50
Machine-shop turnings.....	5.25 to 5.75
Mixed borings and turnings.....	5.50 to 6.00
Iron and steel pipe (1 in. diam., not under 2 ft. long).....	7.75 to 8.25
Stove plate.....	10.50 to 11.00
Locomotive grate bars.....	10.00 to 10.50
Malleable cast (railroad).....	8.00 to 8.50
Cast-iron car wheels.....	10.50 to 11.00

Prices which dealers in New York and Brooklyn are quoting to local foundries, per gross ton, follow:

No. 1 machinery cast.....	\$16.50 to \$17.00
No. 1 heavy cast (columns, building materials, etc.), cupola size.....	15.50 to 16.00
No. 1 heavy cast, not cupola size.....	15.00 to 15.50
No. 2 cast (radiators, cast boilers, etc.).....	10.50 to 11.00

Cleveland

CLEVELAND, March 14

Iron Ore.—Railroads in the central territory have filed with the Interstate Commerce Commission new tariffs making a 20 per cent reduction on ore rates from Lake Erie ports to interior furnaces, the new rates to become effective April 17. The new rates are considerably above the rates that prevailed before the present rates were placed in effect. The Buffalo and other lake front blast furnace interests that have opposed efforts to secure lower rail rates on ore unless a reduction is granted on coal and coke rates, have asked a suspension of the proposed rates. It is believed that a decision will be handed down without delay by the Interstate Commerce Commission which has already spent considerable time in investigating the rate situation in respect to these commodities. With the reduction in rail rates, the railroads also plan to place in effect on the same date a 20 per cent reduction in ore handling charges. The present rail rates, being a flat 40 per cent advance over previous rates, were placed in effect Aug. 26, 1920, a corresponding increase in dock handling charges being made a month later. On Oct. 20 last, a temporary reduction of 28 per cent was made in rail rates on ore to remain in effect until Jan. 1, this bringing rates virtually back to where they were before the 40 per cent advance. In December the railroads agreed to extend the reduced rates until March 31, but the Interstate Commerce Commission refused to grant this extension, evidently as the result of the opposition of the lake front blast furnace interests which claimed that a reduction on ore rates without a reduction on coal and coke rates was a discrim-

ination against them. There is some belief in the ore trade that the railroads will shortly place in effect a temporary reduction in ore rates from the mines to upper lake ports, to remain effective during the season or possibly until the Interstate Commerce Commission hands down its decision in the pending ore rate case. The rates as they existed from 1917 to 1920, the present rates and the new rates, are as follows, the figures showing the line haul rate and not including the dock handling charge:

	New Rate	Present Rate	Rate Previous to 1920
Valley.....	\$0.73	\$0.91	\$0.65
Dover, Leontia and New Castle.....	0.785	0.98	0.70
Midland, Pa.....	0.885	1.105	0.79
Pittsburgh.....	1.02	1.275	0.91
Johnstown.....	1.15	1.44	1.03
Jackson and Hamilton from Toledo.....	0.80	1.00	0.715
Jackson from Cleveland.....	0.995	1.245	0.89
Ironton.....	1.11	1.385	0.99
Lehigh and Schuylkill Valleys.....	1.725	2.155	1.54
Sparrows Point.....	1.78	2.225	1.59

The dock charge for handling direct shipment ore from the rail of the vessel to the car was 6 cents from 1917 to 1920. It is now 8 $\frac{1}{4}$ c. and will be reduced to 7c. The handling charges on dock ore are to be reduced as follows: Handling from vessel to stock pile, from 22 $\frac{1}{2}$ c. to 18c., and from stock pile to car, from 14c. to 11c. The 14c. dock charge for handling from hold to rail of vessel, which is borne by the shipper, is reduced from 14c. to 11c.

The freight reduction on direct shipment ore, including the reductions in the charges for the handling from the vessel, amounts to 21.5c. per ton for the Valley and 30c. for Pittsburgh, or equivalent to 55c. and 60c. reductions, respectively, on the cost of making a ton of pig iron.

We quote delivered lower lake ports: Old range Bessemer, 55 per cent iron, \$6.45; Old range non-Bessemer, 51 $\frac{1}{4}$ per cent iron, \$5.70; Mesabi Bessemer, 55 per cent iron, \$6.20; Mesabi non-Bessemer, 51 $\frac{1}{4}$ per cent iron, \$5.55.

Pig Iron.—Furnaces are still making a fairly large number of sales of foundry iron, but the volume of business fell off during the week owing to the absence of any large lot orders. The business booked was mostly in lots of 200 tons and under. One lake furnace interest reports sales aggregating over 4,000 tons during the week in small lot orders. An order for 500 tons was placed by a Cleveland manufacturer of printing machinery. The market is fairly firm, the price situation showing virtually no change. Most of the business was booked at \$19 for No. 2 foundry iron. No inquiries developed from points regarded as highly competitive, but sellers who have been quoting \$18.50 for iron for shipment to points where competition is keen, have shown no disposition to hold out for higher prices for this competitive business. The only inquiry of any size is from a Quincy, Ill., consumer for 1,000 tons of foundry iron for the second quarter. Shipments on contracts continue good and if they hold up at the present rate, March shipments will be larger than during any previous month for a year.

Quotations below are f.o.b. local furnace for Northern foundry iron, not including a 56c. switching charge. Other quotations are delivered Cleveland, being based on a \$1.96 freight rate from Valley points, a \$3.36 rate from Jackson and a \$4.67 rate from Birmingham:

Basic.....	\$19.71
Northern No. 2 fdy., sil. 1.75 to 2.25.....	\$19.00 to 19.50
Southern fdy., sil. 1.75 to 2.25.....	22.17
Ohio silvery, sil. 8 per cent.....	30.86
Standard low phos., Valley furnace.....	32.00

Semi-finished Steel.—A northern Ohio mill has purchased 3000 tons of sheet bars at \$29, Youngstown. The market is apparently well established at that price.

Finished Material.—The price advance to 1.50c. in steel bars, plates and structural material by the leading Pittsburgh independent producer has been followed by similar advances by several of the other larger independent mills, but the Carnegie Steel Co. is still quoting the 1.40c. price. Unless the Steel Corporation also advances prices, some of the independent mills are not expected to hold to the 1.50c. base for lots of any size, for independent mills cannot hope to book much business at premium prices of \$2 a ton. The Cambria Steel Co. has advanced its price on steel bars, plates and structural material to 1.50c. for car lots and over and to 1.60c. for less than car lots. The stiffening of the market has brought out considerable business at the 1.40c. price from consumers who will stock up to

avoid the possibility of paying higher prices. Quite a number of others have placed contracts for three months' requirements. Some orders have been taken at the 1.50c. price, but these have been for very small lots. The Great Northern Railroad will build a new dock at Superior, Wis., which will require 11,850 tons of steel, including structural material, plates and 800 tons of hard steel bars, and in addition it has an inquiry out for 750 tons of structural material for bridge work. This is the only inquiry that developed for round tonnage during the week. The fabricating contract for the Kresge Building, Cleveland, has been awarded to the Massillon Bridge & Structural Co. Hard steel reinforcing bars are quiet and weak. While the usual quotation is 1.40c., a desirable inquiry will doubtless bring out a lower price.

Sheets.—While the market is generally very firm, offerings are appearing in sheets classed as shop worn at some concession from regular prices. New demand is not active, few sales of over car lots being reported.

Jobbers quote steel bars, 2.36c.; plates and structural shapes, 2.46c.; No. 9 galvanized wire, 3c.; No. 9 annealed wire, 2.50c.; No. 28 black sheets, 3.75c.; No. 28 galvanized sheets, 4.75c.; No. 10 blue annealed sheets, 3.10c.; hoops and bands, 2.96c.; cold-rolled rounds, 3.25c.; flats, squares and hexagons, 3.75c.

Coke.—The demand for coke has quieted down. Most foundries have put in good sized stock to avoid danger of a shortage, should a coal strike interfere with production. Prices are firm, little, if any, Connellsville coke being available under \$4.50 per net ton.

Bolts, Nuts and Rivets.—The demand for bolts and nuts continues to gain, although orders are generally for small lots. A local maker has booked three carloads for shipment to England this month. Although there is still some shading of regular quotations, prices are stiffening up somewhat. The demand for rivets has improved, but the largest orders are for car lots. A leading local maker is adhering to 2.10c. to 2.20c. for structural and boiler rivets respectively, but concessions from \$1 to \$2 a ton are being made.

Old Material.—The demand for heavy melting steel became fairly active during the week. Youngstown, Canton and Warren mills are credited with round lot purchases. As the result, the price on this grade has stiffened. It is understood that mills paid as high as \$16 for No. 1 railroad steel. A Pittsburgh dealer is reported to have sold heavy melting steel at \$16 for delivery at Denora, is offering that price for this grade delivered at that point, \$15.50 for delivery to Monessen and \$12 for borings and turnings and \$11.50 for busheling for Pittsburgh delivery. There is some activity in compressed steel, which is slightly firmer. There has been no buying by Cleveland mills. Dealers doubt whether the present stiffening of prices will hold.

We quote per gross ton, f.o.b. Cleveland, as follows:

Heavy melting steel.....	\$13.00 to \$13.25
Steel rails, under 3 ft.....	12.75 to 13.25
Steel rails, rerolling.....	14.50 to 15.00
Iron rails.....	12.00 to 12.50
Iron car axles.....	18.00 to 19.00
Low phosphorus melting.....	13.50 to 14.00
Cast borings.....	9.00 to 9.25
Machine shop turnings.....	8.75 to 9.00
Mixed borings and short turnings.....	8.75 to 9.00
Compressed steel.....	10.00 to 10.25
Railroad wrought.....	12.00 to 12.50
Railroad malleable.....	12.50 to 13.00
Light bundled sheet stampings.....	7.00 to 8.00
Steel axle turnings.....	9.50 to 10.00
No. 1 cast.....	15.00 to 16.00
No. 1 busheling.....	9.00 to 9.25
Drop forge flashings, over 10 in.....	9.00 to 9.25
Drop forge flashings, under 10 in.....	9.25 to 9.75
Railroad grate bars.....	12.75 to 13.00
Stove plate.....	13.00 to 13.25
Pipes and flues.....	8.50 to 9.00

British Pig Iron and Steel Output for February

LONDON, ENGLAND, March 14 (By Cable).

The production of pig iron in Great Britain in February was 300,100 gross tons and that of steel ingots and castings 415,000 tons. These compare with an output of 288,000 tons of pig iron and of 327,500 tons of steel in January. The February pig iron is the largest since last March. The steel output compares with a monthly average of 403,350 tons for the six months preceding February and following the coal strike.

Cincinnati

CINCINNATI, March 18.

Pig Iron.—Increased activity was noted in the market during the past week. A number of sales of from 100 to 200 tons were negotiated, and from points scattered throughout the territory. Sellers see in these sales the best evidences of returning prosperity, as most of them were booked for immediate shipment, indicating that stocks of foundry yards are at a very low point. A local jobbing foundry bought 100 tons, another 200 tons, and several others single carloads. A central Ohio implement manufacturer was a buyer of 150 tons and a gas engine manufacturer is reported to have taken 300 tons of malleable. A central Ohio manufacturer also placed an order for 400 tons. Stove shops are reported fairly busy, an Indiana melter placing an order for 400 tons, and two stove shops in Michigan inquiring for 500 to 1000 tons each. There is also an inquiry current for 2000 tons from Illinois, 1000 tons of malleable from Chattanooga, and 500 tons of foundry iron from Cleveland. The Standard Sanitary Mfg. Co. is in the market for 1000 tons for Louisville, and there are several inquiries from outside the territory for 100 to 300 tons. Prices show little change as compared with last week, and \$15, Birmingham, is now regarded as the Southern market, though several furnaces are holding for \$15.50 and \$16. Southern Ohio prices remain unchanged at \$18.50 to \$19, though in places where the furnace has a distinct freight advantage, \$19.50 has been done. Chicago iron at \$20 has practically been eliminated as a factor in this market.

Based on freight rates of \$4.50 from Birmingham and \$2.52 from Ironton, we quote f.o.b. Cincinnati:

Southern coke, sil. 1.75 to 2.25 (base).....	\$19.50 to \$20.00
Southern coke, sil. 2.25 to 2.75 (No. 2 soft).....	20.00 to 20.50 "
Ohio silvery, 8 per cent sil.....	30.02
Southern Ohio coke, sil. 1.75 to 2.25 (No. 2).....	21.02 to 21.52
Basic, Northern.....	21.02
Malleable.....	21.52 to 22.02

Finished Material.—While it is a little early to note the effects of the price increases made by independent mills on the heavier products, the hope is expressed that there will be a stabilized price condition which will be of great advantage to the steel industry. Some small orders have already been booked at the new prices and considerable business is reported placed before the new prices went into effect. As indicating the trend of events, a number of buyers attempted to place orders for second quarter at the prices recently in effect, but in all cases mills refused to book the business. Price advances by independent mills have had the effect of strengthening the market somewhat on other products and as a result fairly good buying of sheets for second quarter delivery was in evidence during the week. The wire market also is stiffening somewhat and less is heard of shading of prices on nails, which are apparently firm on the basis of \$2.40 per keg Pittsburgh. Wire products moved in fair volume and some business was also placed for cold-rolled strips. In the structural field, the announcement of increased prices by independent mills has created somewhat of a stir and one large construction company is understood to have withdrawn all its outstanding bids. Several lettings of importance were noted during the week. The Indianapolis Athletic Club, involving 1450 tons, has been awarded to the McClintic-Marshall Co. and the steel for the Wilde Bank Building, Indianapolis, involving 500 tons, will be fabricated by Hetherington & Berner, Indianapolis. Revised plans will be submitted on the Moose Temple at Hamilton, on which all bids were rejected. Several new projects of importance will shortly come up. The United States Government has plans prepared for a parcel post building to be erected in Cincinnati. This building will be 280 x 300 ft., three stories. Harry Hake of Cincinnati is the architect. The Union Labor Temple Association, Louisville, Ky., has let the contract for the excavation work on the new Labor Temple building to be erected in that city at a cost of \$300,000. This building will be a five-story brick and steel structure and will contain, besides offices, an auditorium seating 2000 people. Schenck & Williams,

Dayton, Ohio, will shortly take figures on a 14-story bank building at Ashland, Ky., and plans have been completed for a school building at Cincinnati to cost \$250,000. Plant operations are improving. The Newport Rolling Mill Co. will put on two additional sheet mills this week, giving them eight mills in operation. Fires will be lighted in the open-hearth furnaces at the Andrews Steel plant and steel making will commence about March 20. The American Rolling Mill Co. plants at Middletown will continue to operate full time and the Zanesville mills of the same company will be on a 50 per cent basis. At the Ashland plant, operations will continue the same as last week, but it is expected that the sheet mills at this plant will be put on before the end of the month. At Portsmouth, the Whitaker-Glessner Co. will maintain its present rate.

Warehouse Business.—Structural steel and reinforcing bars are moving in fair volume from local warehouses. Jobbers of wire products also report improvement during the week. The nail market shows signs of stiffening. Prices are being fairly well maintained, although it is reported that some shading on cold-rolled products is being done, and it would not be surprising if lower quotations were in effect within the next week.

Tool Steel.—A slight improvement is noticed in the tool steel market and while orders are still small, they are more numerous. Prices show no change, the usual quotations on 18 per cent tungsten high speed steel being 85c. per lb.

Iron and steel bars, 2.75c. base; hoops and bands, 3.35c. base; shop and plates, 2.85c. base; reinforcing bars, 2.82½c. base; cold rolled rounds, 1½ in. and larger, 3.50c. base; under 1½ in. and flats, squares and hexagons, 4c.; No. 10 blue annealed sheets, 3.60c.; No. 28 black sheets, 4.25c.; No. 28 galvanized sheets, 5.25c.; wire nails, \$2.75 per keg base; No. 9 annealed wire, \$2.60 per 100 lb.

Coke.—The coke market is slowing up somewhat, but prices are holding fairly well. Connellsville coke is firm at \$3.50 for furnace and \$4.50 for foundry. Wise County is quoted at \$5.25 for foundry and New River at \$7.50.

Old Material.—The scrap market is showing signs of returning activity, and prices are higher on some grades. A steel plant in this district bought a small tonnage of heavy steel and turnings during the week, and some blast furnace borings and turnings were sold to a furnace in the South. Foundry scrap is in light demand.

We quote dealers' buying prices, f.o.b. cars:

	Per Gross Ton	
Bundled sheets	\$4.50 to \$5.00	
Iron rails	11.50 to 12.00	
Relaying rails, 50 lb. and up.	24.50 to 25.00	
Revolving steel rails	10.00 to 10.50	
Heavy melting steel	9.50 to 10.00	
Steel rails for melting	9.50 to 10.00	
Car wheels	12.00 to 12.50	
	Per Net Ton	
No. 1 railroad wrought	9.00 to 9.50	
Cast borings	4.00 to 4.50	
Steel turnings	3.00 to 3.50	
Railroad cast	12.00 to 12.50	
No. 1 machinery	11.00 to 14.50	
Burnt scrap	7.50 to 8.00	
Iron axes	16.00 to 16.50	
Locomotive tires (smooth inside)	9.00 to 9.50	
Pipes and flues	3.50 to 4.00	

Boston

BOSTON, March 14.

Pig Iron.—Fresh weakness has developed in this market as a result of competition between Buffalo and eastern Pennsylvania furnaces. Buffalo iron, which a week ago was believed to be established on a \$18.50 furnace base, this week was offered at \$18, or \$23.46 delivered New England points. At least one eastern Pennsylvania interest met this delivered quotation, which brings the furnace price down to \$19.40. Interests which purchased eastern Pennsylvania iron this week claim to have done better than the equivalent of \$18 furnace, Buffalo. The actual tonnage available and turned over in this territory was considerably less than during the previous week, which in a large measure explains the keen competition. All eastern Pennsylvania iron sold, however, was not at reduced prices. A Massachusetts foundry bought 100 tons No. 2X at \$20.50 furnace or \$24.56 delivered, and numerous car lots of No. 2X and No. 1X were taken at \$20.50

and \$21 furnace, respectively. Other sales for the week include 500 tons No. 2X to a Vermont foundry, 200 tons No. 2X to a Maine stove maker, 200 tons silicon 2.75 to 3.25 to a Connecticut interest, and 100 tons No. 2X to a Providence, R. I., melter, mostly eastern Pennsylvania iron. Deliveries in all but the last instance, which is for immediate, are for second quarter shipment. The situation, insofar as Virginia and Alabama irons are concerned, is unchanged. Sales are limited to an occasional car lot of special analysis for mixture purposes at prices heretofore established in this market.

We quote delivered at common New England points as follows, having added to furnace prices \$4.06 freight from eastern Pennsylvania, \$5.46 from Buffalo, \$6.58 from Virginia and \$10.66 from Alabama:

East. Penn., sil. 2.25 to 2.75	\$23.06 to \$24.81
East. Penn., sil. 1.75 to 2.25	23.06 to 24.56
Buffalo, sil. 2.25 to 2.75	23.46 to 23.96
Buffalo, sil. 1.75 to 2.25	23.46 to 23.96
Virginia, sil. 2.25 to 2.75	29.58
Virginia, sil. 1.75 to 2.25	29.08
Alabama, sil. 2.25 to 2.75	26.66
Alabama, sil. 1.75 to 2.25	26.16

Finished Material.—Street railway companies have placed orders for girder and T-rails. Sales of the former include 2200 tons to the Boston Elevated Street Railway Co., 1600 tons to the United Electric Railways, 640 tons to Stone & Webster, and 300 tons to the Springfield Street Railway Co. and the Worcester Consolidated Railway. The Boston Elevated Railway also bought approximately 1300 tons T-rails. The Boston & Maine Railroad has closed on 2200 kegs of track bolts, but has not made known its rail requirements. The Turner Construction Co.'s purchase of 700 tons of reinforcing bars is the outstanding feature of a more active market for that product. The McClintic-Marshall Co. is awarded 3500 tons structural steel for a Park Square, Boston, building, 650 tons for a Boston Elevated Railway inspection shop, 500 tons by Stone & Webster for a New Bedford, Mass., power house extension, and 350 tons for a Cranston, R. I., coal pocket. The New England Structural Co. is awarded 500 tons for an office building at the corner of High and Congress streets, Boston, 300 tons for another office building on Kilby Street and 150 tons for a building on Winter Street. Bids have been asked on approximately 700 tons for a Boston restaurant, on 275 tons for a Christian Science Church, Cambridge, Mass., and numerous smaller tonnages. There is a large prospective tonnage overhanging the market, which probably will be closed shortly in view of the advance in mill prices. New York interests have been awarded 450 tons for a local lighting and power plant addition. The Turner Construction Co., Boston, has awarded 350 tons of column cores to the Berlin Construction Co. New England plants of steel companies are increasing operations. Recent shipments from the Wickwire-Spencer Steel Corporation, Worcester, have been larger than at any period since August, 1920.

Warehouse Business.—Local warehouse interests have reduced prices on cold-rolled steel 25c. per 100 lb., on open-hearth spring steel 50c. and have made a slight cut on 3/16 in. plate stock. Otherwise prices remain as heretofore. They report individual orders as continuing small, but more of them, and an increase in daily shipments from stock as contrasted with last month. The market on stove bolts is now 80 per cent discount whereas heretofore it was 70 and 10 per cent. Business in bolts and nuts shows steady but slow expansion. Sheet zinc is down ¼c. per lb. to 9¼c. base.

Coke.—Both the New England Coal & Coke Co., Boston, and the Providence Gas Co., Providence, R. I., continue to report good sized bookings of by-product foundry coke shipping instructions and some new business. In one instance, the producer previously accumulated a reserve stock, consequently with the increased shipments it has not been necessary to increase plant production. The market for both plants' product is \$10.15 delivered where the local freight rate does not exceed \$3.40 a ton. Practically no Connellsville district by-product foundry coke is coming into New England.

Old Material.—The undertone of the old material market unquestionably is firmer, not so much because of any actual increase in bookings as to an increase

in actual and tentative inquiries from both inside and outside this territory. Certain dealers are quoting No. 1 machinery cast as high as \$17.50 to \$18 delivered, but a majority are doing perhaps 50c. less. The market on heavy melting steel is 50c. to 75c. higher, with sellers holding off on bids for anything lower. There continues a very good demand for turnings and borings of all kinds, but more especially cast iron chemical borings.

The following prices are for gross ton lots delivered consuming points:

No. 1 machinery.....	\$17.00 to \$17.50
No. 2 machinery.....	15.00 to 15.50
Stove plate.....	14.50 to 15.00
Railroad malleable.....	13.00 to 13.50

The following prices are offered per gross ton lots f.o.b. Boston rate shipping points:

No. 1 heavy melting steel.....	\$9.00 to \$9.25
No. 1 railroad wrought.....	10.50 to 11.00
No. 1 yard wrought.....	9.50 to 10.00
Wrought pipe (1 in. in diam., over 2 ft. long).....	7.00 to 7.25
Machine shop turnings.....	5.00 to 5.25
Cast iron borings, rolling mill.....	8.50 to 9.00
Cast iron borings, chemical.....	9.00 to 9.50
Blast furnace borings and turnings.....	5.00 to 5.25
Forged scrap and bundled skeleton.....	4.00 to 4.50
Street car axles.....	11.50 to 12.00
Shafting.....	12.00 to 13.00
Car wheels.....	11.00 to 11.50
Rerolling rails.....	9.50 to 10.00

Birmingham

BIRMINGHAM, ALA., March 14.

Pig Iron.—Every feature of the Birmingham iron market gathered strength last week with the exception of price. That remained at \$15.50, with \$15 admitted as base on large tonnages by at least one operator. Business came in large volume as it had done for two weeks and average tonnages were larger. A Southern stove foundry took 750 tons at \$15.50 and numerous lots of 200 to 500 tons were booked in St. Louis territory. One maker, who went out of the market for March on account of oversold condition, re-entered during the week for second quarter on the base of \$15.50 and immediately made bookings. A Louisville concern took 1000 tons and a St. Louis concern added 500 tons to an order for 1200 tons already placed, the new iron to be principally for April and May delivery. Central Ohio took 100 tons for April delivery and Atlanta ordered several cars for April delivery. One maker said: "We have had the three best weeks in a year consecutively. We have sold more iron week by week than in any like period in the past year. Tonnages of the individual consumer are larger than heretofore." One maker said: "We entered January and February with little or no iron for those months on our books. We came into March with March capacity nearly booked. By the end of the first week in March, we had booked March make and 6000 tons over. That means large stock reduction." One maker has less than 500 tons on yards. Frank H. Crockard, president Woodward Iron Co., said: "The market has broadened remarkably. If the pace maintains, there will be increase in furnace production." Very little iron has been taken by pipe concerns, the bookings being by the general foundry trade.

We quote per gross ton f.o.b. Birmingham district furnaces as follows:

Foundry, sillon 1.75 to 2.25.....	\$15.00 to \$15.50
Basic.....	14.00 to 14.50
Charcoal, warm blast.....	30.00

Finishing Mills.—The third consecutive week of capacity operations in the open hearth department of the Tennessee company was recorded. The Connors Steel Co. continued the operation of its hoop and band mill. The American Steel & Wire Co. is at about 60 per cent and new wire drawing business is coming in handily. The Gulf States Steel Co. is making about the same schedule as American Steel & Wire Co.

Coal and Coke.—Both coal and coke are in greater demand with production increasing. Each coke maker seems to be waiting for the other to raise base above \$5, but none has taken the lead. Furnace resumption and larger takings by railroads feature the increased demand for coal. Bunker business at Pensacola and New Orleans is understood to be picking up.

Old Material.—Cast scrap remains scarce and tends

to advance in price, but has not yet done so. Steel has become firmer, but the market price is shaded on large transactions.

We quote per gross ton f.o.b. Birmingham district yards as follows:

Steel rails.....	\$11.00 to \$12.00
No. 1 steel.....	10.00 to 11.00
No. 1 cast.....	14.00 to 15.00
Car wheels.....	13.00 to 14.00
Tramcar wheels.....	12.00 to 13.00
No. 1 wrought.....	12.00 to 13.00
Stove plate.....	11.00 to 12.00
Cast iron borings.....	6.00 to 7.00
Machine shop turnings.....	4.00 to 7.00

Buffalo

BUFFALO, March 14.

Pig Iron.—While the volume of inquiry is an encouraging sign of better business, the price situation is still unsatisfactory from the selling point of view. The \$18 market is still the rule, but some tonnage has been closed at \$18.50. Inquiry is scattered and in a total of 6500 tons on which prices were asked from one furnace, the whole was made up of 35 to 40 separate inquiries. About 10,000 tons has been sold and on two sales of 1000 tons each the consideration was \$18. An inquiry from a Massachusetts buyer for 1000 tons has not found Buffalo furnaces responsive because of the effort to have this tonnage spread over third and fourth quarter delivery. Nothing has been booked beyond July delivery. The greater portion of inquiry coming to Buffalo furnaces is from Eastern users.

We quote f.o.b. per gross ton Buffalo as follows:

No. 1 foundry, 2.75 to 3.25 sh.....	\$19.00 to \$19.50
No. 2X foundry, 2.25 to 2.75 sh.....	18.50 to 19.00
No. 2 plain, 1.75 to 2.25 sh.....	18.00 to 18.50
Basic.....	18.00 to 18.25
Malleable.....	18.50 to 19.00
Lake Superior charcoal.....	26 14

Finished Iron and Steel.—Bars, shapes and plates have been more in demand and with wire products and tin plate business materially increased, the situation is more encouraging than in many months. Pipe and sheet business has not improved in the same ratio as other products, but the price of sheets has held without change in the face of stiff competition. Wire nails and barbed wire demand has been especially brisk. The leading bar mill is quoting 1.40c., Pittsburgh, and while no large tonnages have been taken, the run of orders is more satisfactory. The City of Toronto is inquiring for 1000 tons of plates for use in waterworks extension.

Warehouse Business.—Adjustment of warehouse prices in the Chicago district has not had any effect in Buffalo to date.

We quote warehouse prices f.o.b. Buffalo as follows: Structural shapes, 2.65c.; plates, 2.65c.; plates, No. 8 gage, 3.35c.; soft steel bars and shapes, 2.55c.; hoops and bands, 3.15c.; blue annealed sheets, No. 10, 3.40c.; galvanized steel sheets, No. 28, 5.25c.; black sheets, No. 28, 4.25c.; cold-rolled strip steel, 5.90c.; cold-rolled round shafting, 3.40c.

Old Material.—Settlement of a controversy over the purchase of heavy melting steel on a contract made two years ago when the ruling quotation was \$28 has brought about an unusual situation in this market. The buyer—a leading bar and billet maker—has settled by splitting the difference between the original consideration and the present market. The contract originally called for 25,000 tons at \$28, but when the market dropped below that figure, the buyer declined to accept further delivery. The settlement just reached—\$21—will affect the trend of business, as dealers will be more interested in filling this old contract than seeking new business at \$13.50. Generally the situation is brighter and before the settlement referred to was agreed upon, some large movements of steel at \$13.50 were made.

Pipes and flues.....	\$7.25 to \$7.75
No. 1 railroad wrought.....	11.25 to 11.75
No. 2 railroad wrought.....	10.75 to 11.25
Steel knuckles and couplers.....	12.00 to 12.50
Coil springs.....	12.75 to 13.25
No. 1 machinery cast.....	13.75 to 14.25
No. 1 railroad cast.....	13.25 to 13.75
Low phosph. punchings.....	11.00 to 11.50
Locomotive tires, smooth.....	10.00 to 10.50
Machine shop turnings.....	5.50 to 6.00
Cast borings.....	7.00 to 7.50
Stove plate.....	12.50 to 13.00
Grate bars.....	10.50 to 11.00
Brake shoes.....	10.50 to 11.00
Railroad malleable.....	12.00 to 12.50
Agricultural malleable.....	12.00 to 12.50

St. Louis

St. Louis, March 14.

Pig Iron.—An increasing demand for pig iron is reported and there is a better feeling in the trade. The number of carload orders is greater, and there also is a disposition among buyers to take on greater quantities. The market for Northern iron is firm at \$20, Chicago, and there has been some complaint that even at this price it has been difficult to get prompt shipments of certain grades. The result has been that Southern iron is coming in for a greater call, especially as it commands a lower price delivered in this territory at present. The only producer in this district is now running on basic iron, and its stock of foundry iron is about exhausted; however, it expects to turn back to foundry iron by April 1. Inquiries are coming in now more generally for later delivery. A Western melter wants 1500 to 2000 tons of foundry iron for over the next 60 to 90 days. A Western melter is in the market for 3000 to 5000 tons of basic. An Indiana melter wants 2000 to 3000 tons. An inquiry for 500 to 800 tons of malleable for an Illinois melter, which has been pending for several weeks, is still open. Scattering inquiries of from a carload to 150 tons total about 1500 tons. A few sales were made during the week of Southern iron for water and rail shipment, on the basis of \$16, Sheffield, or \$19.44 St. Louis.

We quote delivered consumers' yards, St. Louis, as follows, having added to furnace prices \$2.80 freight from Chicago and \$5.74 from Birmingham:

Northern foundry, all, 1.75 to 2.25...	\$22.80
Northern malleable, sil. 1.75 to 2.25...	22.80
Basic	22.80
Southern foundry, all rail, sil 1.75 to 2.25	\$20.74 to 21.24
Southern foundry, water and rail, sil 1.75 to 2.25, f.o.b. St. Louis	19.44

Finished Iron and Steel.—A much improved condition is reported in the markets for finished iron and steel. Plates, shapes and bars are in greater demand, and sheets are beginning to move. The smaller fabricators, who have been buying right along, report a much better business in store fronts, repair work and other lines to which they cater. The larger fabricators are beginning to feel the effects of spring business, and they, too, are buying more freely, the market being at the point where they believe that prices are right. The price of 1.50c., Pittsburgh, established by the Jones & Laughlin and other independents, has not yet been met by the Steel Corporation. The outlook for a revival of building in St. Louis has been made decidedly brighter by the acceptance of a reduction of 15 per cent in the wage scale of the Bridge, Structural and Iron Workers' Union, from \$1.25 to \$1.06½ an hour, effective April 1, this being the third union to accept a reduction from the basic wage of \$1.25 an hour. The Majestic Theater, Dallas, Tex., will require 450 tons of structural steel, already placed, and 100 tons of reinforcing bars, not yet bought. The Decatur Bridge Co. got the contract for 90 tons of structural steel for two high school buildings at Springfield, Mo., and for 160 tons of steel for the parcel post building in St. Louis. Rolla Wells, receiver for the United Railways, will soon ask the Federal Court for authority to buy 50 new steel cars for the Grand Avenue line at a cost of \$10,000 each. Railroad inquiries during the week were few and inconsequential. Warehouse prices are lower, the reductions being made because of the belief that the spread between mill prices and warehouse prices was too great. Demand at warehouses is light.

For stock out of warehouse we quote: Soft steel bars, 2.37½c. per lb.; iron bars, 2.37½c.; structural shapes, 2.47½c.; tank plates, 2.47½c.; No. 10 blue annealed sheets, 3.47½c.; No. 28 black sheets, cold rolled, one pass, 4.15c.; cold drawn rounds, shafting and screw stock, 3.60c.; structural rivets, \$3.09½ per 100 lb.; boiler rivets, \$3.19½; tank rivets, 7/16-in. and smaller, 65 and 5 per cent off list; machine bolts, large, 60-10 per cent; small, 60, 10 and 10 per cent; carriage bolts, large, 55-5 per cent; small, 60 and 10 per cent; lag screws, 65-5 per cent; hot pressed nuts, square or hexagon blank, \$4; and tapped, \$3.75 off list.

Coke.—Foundry coke is in increasing demand. The majority of foundries are carrying small stocks, barely more than 30 days' supply. Purchasers of all grades are insisting on immediate shipment. There

has been some heavier buying in anticipation of a coal strike. Connellsville coke is selling at from \$4.50 to \$5.

Old Material.—The market for old material continues to improve, and is much stronger, nearly all items being marked up from 50c. to \$1 per ton. However, only one large consumer has come into the market, the others contending that the present advance is only a "dealers' boom" and the prices will seek lower levels within the next few weeks. On the other hand, the dealers believe that an upward swing has started, and they feel that the consumers will eventually begin buying at the higher levels. Railroad offerings before the market this week follow: Mobile & Ohio Railroad, 750 tons; United Railways Co., St. Louis, 1500 tons; Wabash Railway, 500 tons; Kansas City Southern Railway, 750 tons; Terminal Railway Association, 1800 tons; St. Louis & San Francisco Railway, 750 tons, and Santa Fe, 1800 tons.

We quote dealers' prices f.o.b. consumers' works, St. Louis industrial district and dealers' yards, as follows:

Per Gross Ton	
Old iron rails	\$14.00 to \$14.50
Steel rails, rerolling	12.50 to 13.00
Steel rails, less than 3 ft.	12.50 to 13.00
Relaying rails, standard section	23.00 to 28.00
Cast iron car wheels	15.00 to 15.50
No. 1 heavy railroad melting steel	10.50 to 11.00
No. 1 heavy shoveling steel	10.00 to 10.50
Ordinary shoveling steel	10.00 to 10.50
Frogs, switches and guards, cut apart	10.50 to 11.00
Ordinary bundle sheet	4.50 to 5.00
Cast steel bolsters	11.00 to 11.50

Per Net Ton	
Heavy axle and tire turnings	6.50 to 7.00
Iron angle bars	13.00 to 13.50
Steel angle bars	11.00 to 11.50
Iron car axles	18.00 to 18.50
Steel car axles	13.00 to 13.50
Wrought iron arch bars and transoms	15.50 to 16.00
No. 1 railroad wrought	9.50 to 10.00
No. 2 railroad wrought	9.00 to 9.50
Railroad springs	11.00 to 11.50
Steel couplers and knuckles	11.00 to 11.50
Locomotive tires, 42 in. and over, smooth inside	8.50 to 9.00
No. 1 dealers' forge	8.50 to 9.00
Cast iron borings	5.50 to 6.00
No. 1 bushing	8.50 to 9.00
No. 1 boilers cut in sheets and rings	6.00 to 6.50
No. 1 railroad cast	13.50 to 14.00
Stove plate and light cast	12.50 to 13.00
Railroad malleable	10.50 to 11.00
Agricultural malleable	10.50 to 11.00
Pipe and flues	7.50 to 8.00
Heavy railroad sheet and tank	6.00 to 6.50
Light railroad sheet	3.50 to 4.00
Railroad grate bars	10.50 to 11.00
Machine shop turnings	3.00 to 3.50
Country mixed iron	6.50 to 7.00
Uncut railroad mixed	9.50 to 10.00
Horseshoes	9.50 to 10.00
Railroad brake shoes	10.50 to 11.00

San Francisco

SAN FRANCISCO, March 8.

Pig Iron.—While a rather quiet condition prevails on the Coast, there is a little better demand developing, though gradually. Strengthening exchange rates and a firm tendency in ocean freights has played an important part in decreasing the business here in Continental pig iron in favor of domestic material. During the past two weeks or so, it is reported by a large dealer that around 1000 tons has been sold for Gulf shipment, the market being about \$28, ex-ship, San Francisco, for 1.75 to 2.25 silicon analysis. As far as can be ascertained, foreign iron is being held for from \$30 to approximately \$33. One prospect in sight is an inquiry in this market from Oregon for 1000 tons of foundry pig iron. Another from Los Angeles is for 100 tons of basic pig. Otherwise, demand is mainly for small lots.

Coke.—A good business has been done during the fortnight just passed. The regular steady demand has been felt, together with some special inquiry, as from the Southern Pacific Co., which after having placed 600 tons, is again in the market for an additional 600 tons on March 11. Recently there has been some trading for shipment from New Orleans, it being estimated that around 1200 tons has been sold, prices ranging from \$18 to about \$21, according to grades, ex-ship. Likewise, English coke has been in

demand, Tacoma and Los Angeles each having taken 500 tons, the price approximating \$20, ex-ship.

Finished Iron and Steel.—The Coast markets continue to show improvement, although the betterment is coming very gradually. There seems to be a more buoyant sentiment among the trade, which after the lessons of the past, however, is not disposed to expect too much. The opening of spring favors an enlargement of operations, both from private and State sources. Freight rates are still a problem, which undoubtedly is a deterrent influence, but it is hoped a readjustment will soon be reached. Perhaps the best single deal of recent date is the placing of 1000 tons of structural steel to be used on a new structure being erected by the State at Sacramento. The Steel Corporation was lowest bidder. For the erection of a cannery at Sacramento for the California Packing Corporation about 350 tons of steel will be required. The contract has not yet been let. A bank building to be constructed at Sacramento will require a fair tonnage, but this is not determined to date. Much interest is centering in Seattle at present, where a pipe line and paving work is contemplated. It is reported the paving of First Avenue will require \$120,000 for steel work. Prices seem to be reasonably steady and generally are unchanged. The Pacific Gas & Electric is in the market for a second hand locomotive.

Cast Iron Pipe.—There is little change in the situation along the Coast, which except for the pipe line job in Seattle is only moderately active. Prices appear steady to firm at around \$33, base.

Old Material.—After the heavy buying of the past month, scrap consumers are virtually out of the market, having liberal supplies on hand. There is little indication of greater foundry expansion at this time, which accordingly means a rather limited consumption. Heavy melting steel has developed a certain weakness, prices now ranging around \$9, gross ton delivered at mill, or slightly better. Cast iron scrap is quiet at from about \$21 to \$23.

Improved Demand for Refractories

PITTSBURGH, March 13.—Although the present month began as if it would be a dull one in refractories, the rise in iron and steel plant activities appears to have stimulated the demand and the past few days have been marked by a considerable swelling both in inquiries and sales. Manufacturers still note no tendency on the part of consumers to abandon a policy of covering only actual needs, but the very fact that stocks of refractories at the iron and steel plants have been allowed to get dangerously low and also to become much broken up, means that needs are greater and more urgent. The supply situation appears to be getting slightly stronger, because during the past few months shipments of most kinds of brick have been running somewhat ahead of production and this has resulted in a reduction in the stocks in first hands.

There is not enough business yet to give all makers a share and competition for orders is keen enough to keep prices in buyers' favor. It is established that a price of \$28 per 1000 for Pennsylvania silica brick has not entirely disappeared, but most makers are holding to \$30 and intimations are heard of a possible advance of \$2 per 1000 about April 1. On Pennsylvania high duty fire clay brick \$32 per 1000 is more of a minimum quotation than a selling price. Concessions from quotations also are reported on magnesite and chrome brick.

We quote per 1000, f.o.b. works:

Fire Clay	High Duty	Moderate Duty
Pennsylvania	\$32.00 to \$35.00	\$30.00 to \$32.00
Ohio	30.00 to 35.00	28.00 to 30.00
Kentucky	32.00 to 35.00	30.00 to 32.00
Illinois	32.00 to 35.00	30.00 to 32.00
Missouri	32.00 to 35.00	28.00 to 32.00
Silica Brick		
Pennsylvania		30.00
Chicago		35.00 to 37.00
Birmingham		10.00
Magnesite Brick		
Standard size per net ton (f.o.b. Baltimore)		53.00
Chrome Brick		
Standard size, per net ton		40.00 to 42.00

PRICES MORE STEADY

Moderate Improvement in the Youngstown District —Production Increasing

YOUNGSTOWN, March 14.—Less price unsettlement marks the iron and steel situation, following the advance by a number of companies on bars, shapes and plates to a 1.50c. minimum. Buyers, including both jobbers and manufacturing consumers, are placing tonnages with more freedom. Price advances are being talked of in manufacturing circles affecting other lines, but are being held in abeyance until a heavier backlog is built up on makers' books.

Improved sentiment in the steel market has appreciably affected the scrap market. In this district the old materials market is firmly at \$15.75 to \$16 for heavy melting, while hydraulically compressed sheets command from \$13.25 to \$13.50. Lighter grades of scrap continue scarce. While there has been a drop in buying by Valley plants, purchases by the National Tube Co. for its Lorain plant and by independents in close competitive territory have maintained scrap prices at these levels.

Furnace interests in the Valleys figure that the 20 per cent freight rate reduction on iron ore from lower lake ports will produce a saving in iron-making costs of between 35c. and 40c. per ton. The reduced rate, granted by the carriers to become effective April 15, will affect both the line haul and dock charges.

Plant schedules in the Mahoning Valley are on a slightly broader basis this week, as compared with last week. The rate of active steel-making capacity remains the same, with 38 of 51 independent furnaces charged. The Carnegie Steel Co. is pouring from 14 open hearths, giving the Valley a total of 52 active units, out of 66. Two additional pipe furnaces have been fired, 10 of 17 being active, four of the Republic Iron & Steel Co. and six of the Youngstown Sheet & Tube Co. Makers report there is somewhat better demand both for line pipe and casing and for merchant stock from jobbing interests.

COAL WAGE CONTROVERSY

Differences as to How Conferences of Employers and Employees Shall Be Held

PITTSBURGH, March 13.—The chief bone of contention in the impending strike of the bituminous coal miners, on April 1, is whether the operators and officials of the United Mine Workers of America shall confer by districts in reaching a wage scale, or, as has been the practice for several years past, for the operators of the so-called central competitive fields to collectively confer with the union officials. Operators in most districts have expressed a willingness to treat with their men in their respective districts on the question of a new scale to replace the present one, which expires by limitation on March 31. The union leaders in some districts have shown a willingness to go along with this idea, but John L. Lewis, president of the United Mine Workers of America, has specifically forbidden such conferences. The operators in Pennsylvania, Ohio, Illinois and Indiana, those States comprising the central competitive fields, favor dealing with their own men and are opposed to a collective bargain, the result of which forms a basis of wages for all union miners in the United States and Canada.

The Pittsburgh Coal Producers' Association, at a meeting last week, again went on record in opposition to a collective conference, but repeated a former offer to confer with the men employed in the mines embraced by the association.

"We will deal with our own men in western Pennsylvania," says a statement issued by the association, "union or non-union, on a working agreement, with the exception of a check-off, but we will not be a party to a scale for Ohio, Indiana and Illinois. The operators of the Pittsburgh district believe that the practice whereby a common scale was set up for Pennsylvania, Ohio, Indiana and Illinois to be economically unsound."

British Iron and Steel Market

Prices Stiffening on Galvanized Sheets, Tin Plate and Coke—Black Sheets Easier—Labor Deadlock Continues

(By Cable)

LONDON, ENGLAND, March 14.

No settlement has yet been reached in the engineering and shipbuilding labor disputes.

Home consumers of pig iron, realizing that lower prices are improbable at present, are showing more interest and forward contracts are being arranged. There is a fair amount of export buying. Hematite is less active and buyers are disinclined to pay the enhanced prices.

Sellers of Bilbao Rubio ore are asking 27s. (\$5.80) ex-ship Tees.

Home demand for steel is affected by the industrial upheaval and steel makers will be unable to continue for long unless there is an expansion in the export trade. Prices are firm, with concessions less easily obtainable.

Continental business is quiet. French foundry pig iron is held at £5 5s. to £5 10s. (\$22.57 to \$23.65) f.o.b. Luxemburg, and Belgian foundry iron may be had at £5 to £5 5s. (\$21.50 to \$22.57) f.o.b.

French, Belgian and Luxemburg merchant bars are all quoted at £8 to £8 10s. (1.54 to 1.63c. per lb.) f.o.b., for May and June delivery. German merchant bars are held at £8 5s. (1.58c. per lb.) f.o.b., for April and May shipment. French structural beams are obtainable at £7 12½s. to £8 (1.46 to 1.54c. per lb.) f.o.b., for April and May business. Belgian beams are quoted at £7 12½s. to £7 15s. (1.46 to 1.49c. per lb.) f.o.b., for April and May delivery.

German 3/16-in. plates are held at £8 (1.54c. per lb.) f.o.b., for April and May shipment. Belgian

3/16-in. plates are quoted at £8 12½s. to £8 15s. (1.65 to 1.68c. per lb.) f.o.b., for April and May delivery. Belgian sheet bars are obtainable at £6 12½s. to £6 15s. (\$28.49 to \$29.02) f.o.b., for March shipment. Luxemburg billets are held at £7 (\$30.10) f.o.b., for March and April business. Belgian billets are quoted at £6 10s. (\$27.95) f.o.b., for March delivery.

Tin plate quotations for forward shipments are slightly harder on increased business. There have been moderate-sized sales to France, Holland, Scandinavia, Germany and the Near East. Wasters are easier; 20 x 14-in. are held at 16½ to 17s. (\$3.60 to \$3.65) f.o.b., ex-stock.

There is increased business in galvanized sheets, but no important parcels have been involved. Prices are stiffer. Japan is buying to usual specifications. Black sheets, 6 x 3 ft., 107 lb., are being sold at £15 10s. (2.97c. per lb.) net, f.o.b.

We quote per gross ton, except where otherwise stated, f.o.b. maker's works, with American equivalent *figured at \$4.30 per £1 as follows:

Durham coke, delivered.	£1 10s.	\$6.45
Cleveland No. 1 foundry	4 15	20.42
Cleveland No. 3 foundry	4 10	19.35
Cleveland No. 4 foundry	4 7½	18.31
Cleveland No. 4 forge...	4 10	19.35
Cleveland basic	4 10	19.35
Hematite	7 0*	30.10*
East Coast mixed	5 0 to 5 2½	21.50 to \$22.04
Forromanguese	15 0 & 14 10*	64.50 & 62.35*
Rails, 60 lb. and up...	8 0 to 9 10	34.40 to 40.85
Billets	7 0 to 7 10	30.10 to 32.25
Sheet and tin plate bars,		
Welsh	7 0 to 7 7½	30.10 to 31.71
Tin plates, base box...	0 18% to 0 19	4.03 to 4.09
		C. per Lb.
Ship plates	9 5 to 10 10	1.78 to 2.01
Boiler plates	12 10 to 14 0	2.40 to 2.69
Toes	9 10 to 11 0	1.82 to 2.11
Channels	8 15 to 10 5	1.68 to 1.97
Beams	8 10 to 10 0	1.63 to 1.92
Round bars, ½ to 3 in.	10 10	2.02
Galvanized sheets, 24 g.	16 0 to 16 5	3.07 to 3.12
Black sheets	12 5 to 12 10	2.85 to 2.40
Steel hoops	12 0 & 12 5*	2.30 & 2.35*
Cold rolled steel strip,		
20 g. ...	23 10	4.51

*Export price.

General Conditions Unsatisfactory—Tin Plate Market Slow—The Basset Process

LONDON, ENGLAND, Feb. 22.—The recent marked improvement in gilt-edged securities has given certain quarters "furiously to think," and a good deal is being said about the wonderful improvement in trade which will shortly be seen. On the other side of the picture we have Sir Alfred Mond, the minister of health, openly stating that he has official information from the Master Cutler in Sheffield that his men were giving up their employment in order to draw the dole.

These two illustrations are in direct opposition to each other, but so far as the iron and steel trades are concerned, this country has a long way to go before conditions can approach anything like normal. From information recently received we learn that the shipbuilders have refused their employers' proposal to withdraw the cost of living bonus. High cost of production the slump in merchant shipbuilding and the finish of naval shipbuilding has caused Sir W. G. Armstrong, Whitworth & Co., to close their steel works at Elswick. There has been a considerable demand of late from the continent for coal and coke with the result that prices of these commodities have been advanced, thereby increasing the cost of the manufacture of iron and steel, and it is on account of this that Sir W. G. Armstrong, Whitworth & Co., have had to take this drastic step.

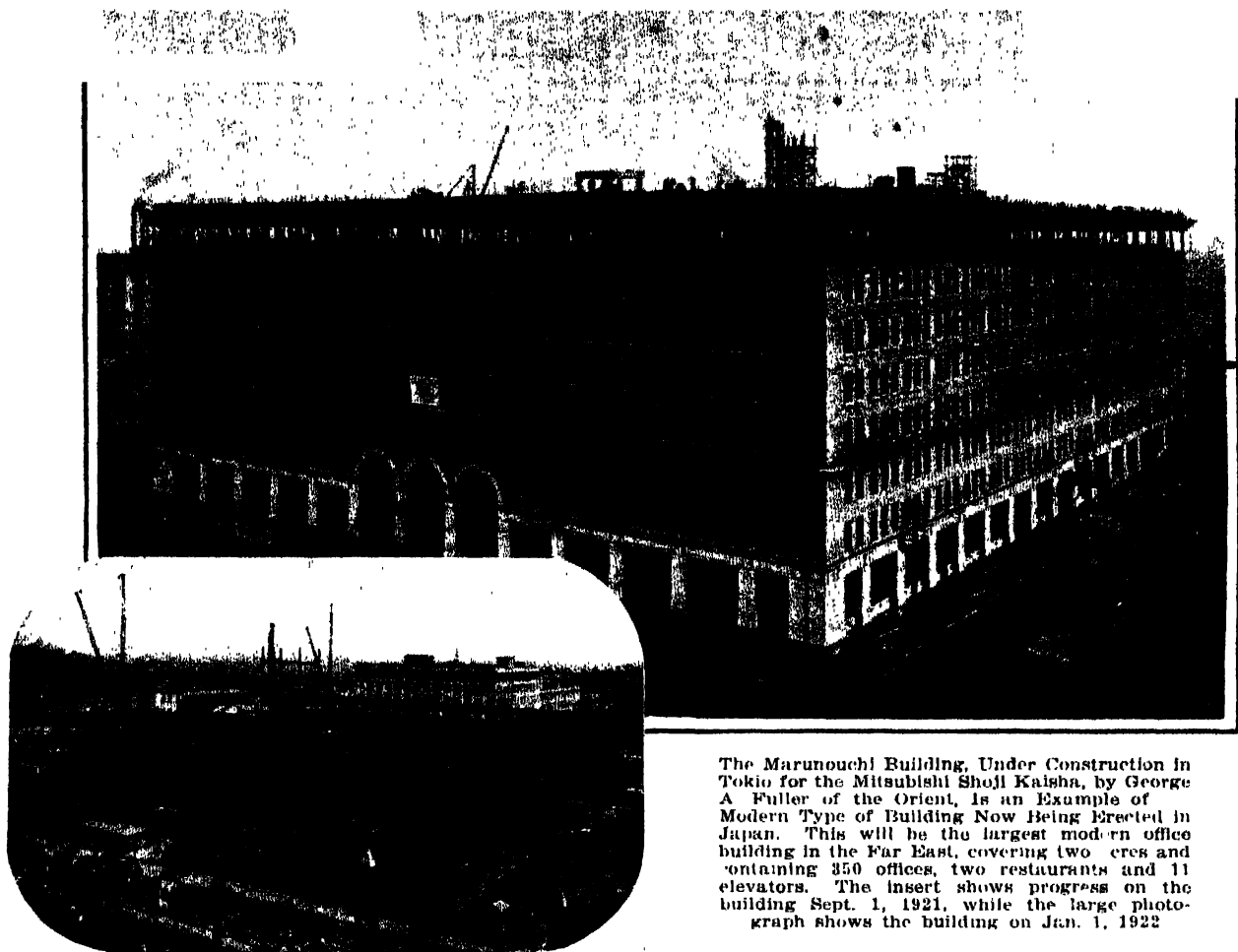
The demand for pig iron is only moderate and, with the position further complicated by increased costs of fuel, makers are naturally undecided as to relighting additional furnaces. There has been a little spurt in buying for export, Italy and Germany taking a few parcels, the latter being shipped to Hamburg but destined, it is stated, ultimately for Czecho-Slovakia. The price of No. 3 Cleveland pig iron is maintained at 90s. for home and export. In the hematite market, dear fuel has already made itself felt, consumers finding that they must now pay more money than they had to do a

week ago, it being very hard to obtain supplies of East Coast hematite for less than 97s. 6d. The demand on both home and export account is by no means large, but sufficient to absorb the present rate of output, and the question of putting in additional furnaces is in abeyance while the uncertainty of costs remains.

In the finished iron and steel departments, works are not so keen in taking orders at prices so very much below cost as they have been, while the big makers are rigidly adhering to the prices they have quoted for so many weeks. Works are badly in need of specifications and plants are only working part time. Tin plates are in a bad way, selling prices being far below cost and works are gradually closing down, with the result that output at the present time is certainly no more than 45 per cent. Consumers are only purchasing on a hand-to-mouth scale. A good deal has been heard of American competition in the Far East in tin plates, black sheets, wire and wire nails and latterly galvanized sheets, and there is no doubt that our makers will have to give their very closest attention to this in the future.

Several schemes are being put forward in this country which will directly benefit the iron and steel trades, among them being one involving a sum of £17,000,000 for the electrification of railroads in the south of England. Employment will be found for several thousands of men for a period of four to five years.

Sheffield makers of steel works plant and equipment have been busy on orders for M. Basset, the French metallurgist, who is stated to have discovered a process for making steel direct from iron ore. Part of the plant has been already shipped, consisting of 200-ft. cylinders each 12 ft. in diameter. Each cylinder when lined with firebrick and fully charged weighs about 400 tons. The Sheffield steel makers do not seem to be perturbed to any large extent, pinning their faith on the efficacy of the Siemens open-hearth, electric and crucible furnaces.



The Marunouchi Building, Under Construction in Tokio for the Mitsubishi Shoji Kaisha, by George A. Fuller of the Orient, is an Example of Modern Type of Building Now Being Erected in Japan. This will be the largest modern office building in the Far East, covering two acres and containing 350 offices, two restaurants and 11 elevators. The insert shows progress on the building Sept. 1, 1921, while the large photograph shows the building on Jan. 1, 1922.

JAPANESE TRADE ACTIVE

Numerous Bar Inquiries—Black Sheet Buying Increases—Rails Active—Large Tin Plate Inquiry

NEW YORK, March 14.—Exports to Far Eastern markets continue to show distinct improvement, and in addition exporters dealing with South America report a considerable increase in inquiries and a few orders from this source. Although inquiries for bars have taken the lead during the past few weeks, but little business is reported closed on this commodity, largely because of the price demands of Japanese buyers. During the past week a slight increase in black sheet inquiries has been registered. One of the large Japanese export houses has been obtaining bids on a tonnage of about 2000 tons of small-sized bars and other exporters are handling inquiries varying from a few hundred tons up to two and three thousand tons. The withdrawal of the foremost independent from a 1.30c. per lb. base on steel bars to higher quotations evidently has not appreciably affected export quotations, as it is reliably reported that sales are still being made to Canadian consumers on a 1.30c. per lb., Pittsburgh base, by other interests.

The Imperial Government Railway tender for about 6500 tons of 60-lb. rails for Japan, similar to the one recently placed in the United States, has been closed but cable information as to the low bidder has not yet been received. Bids have also been submitted on 20 miles of 100-lb. rails, c.i.f. Dairen, Manchuria, for the South Manchuria Railway Co. This tender is also similar to one recently placed in the United States by this company. Bids will be opened March 19. Government buying has also included about 2000 tons of structural steel for bridge construction, which was placed with one of the large Japanese export houses.

Among current inquiries of fairly large size is

one calling for about 22,000 base boxes of tin plate.

Recent buying has included light rails, wire, wire nails, black sheets, bars and structural material. One exporter in New York recently sold 200 tons of steel angles obtained from resale lots of the United States Government and is now quoting on an additional 100 tons to the same Japanese buyer. The purchaser requires unused angles but does not object if the material is slightly rusted. Another exporter has booked about 20 miles of 12-lb. rails to a Japanese importer.

Black sheet purchases, it is estimated by conservative Japanese interests, will total annually about 8000 tons for the districts of Tokio and Kobe alone. These estimates are based only on the probable annual consumption of black sheets for fireproofing purposes, necessary because of new municipal ordinances requiring fireproof roofs.

According to a Japanese exporter recently returned from Japan, there is some uneasiness on the part of the more conservative elements at the present increased buying contrasted with the export situation of the country. There has been speculation in iron and steel on a small scale, which has been consistently discouraged by the conservatives and the Government, who fear that unsoundness may again develop in the financial structure of the country.

A joint dinner of engineers, to celebrate the quarter centennial of the Rochester Engineering Society, is to be held in the Powers Hotel, Rochester, Saturday evening, March 19. Members of eight organizations will participate and John R. Freeman will address the meeting on "Engineering Observations In China and the Far East."

After being closed for more than a year, the Stroudsburg, Pa., car shops of the Erie Railroad have reopened on full time. The plant has been leased to the Meadville Machinery Co.

TRADE CHANGES

The South Bend Lath Works, New England office and warehouse, 65 Oliver Street, Boston, has been discontinued. H. B. Washington, manager, will represent the company in the Middle-West and western Canada. Present plans are to market the company's product through New England machine tool representatives of other lines. This allotting of representatives will be under the supervision of Vernon A. Campbell, heretofore associated with Mr. Washington in the Boston office not only in New England but in New York State east of Syracuse and in Canada east of Kingston, Ont., as well.

The Traders Steel & Pipe Co. announces that, effective March 1, it has changed its corporate name to the Sawhill-Moreland Co., and has removed its offices from the Conestoga Building to 2529 Oliver Building, Pittsburgh. D. V. Sawhill, formerly in the sales department of the Youngstown Sheet & Tube Co., is president and treasurer, and E. M. Moreland, for a number of years with the Carnegie Steel Co. in a sales capacity, is vice-president and secretary. The company does a general brokerage and merchant business in pig iron, ferro-alloys and semi-finished and finished steel products.

The Lakeside Forge Co., Erie, Pa., in addition to its district sales offices in New York at 30 Church Street, in Cleveland at 402 Bangor Building, in Philadelphia at 1218 Chestnut Street, has opened up offices in Detroit at 1354 Penobscot Building and in Indianapolis at 334 North Capitol Avenue. All of these offices are industrial sales offices not connected with the jobbing or dealer end of the business.

William M. Orr, for the past six years associated with the Thomas H. Hayward Co., Pittsburgh, as of March 1, severed that connection and has gone into business for himself under the name of the William M. Orr Co., with offices at 1635 Oliver building, Pittsburgh. The new company will be sales agent in western Pennsylvania, West Virginia and eastern Ohio for the Mueller Metals Co., Port Huron, Mich., and will do a general brokerage business in pig iron and ferroalloys.

The name of the Ball Engine Co., Erie, Pa., has been changed to Erie Steam Shovel Co. This change was made because the company is now making exclusively Erie steam shovels and cranes, the engine business having been sold. Although the manufacture of the steam engines was discontinued about two years ago, it has been necessary to more than triple the plant capacity in the past six years to take care of shovel and crane business. This enlarged plant is now running day and night, with full force on each shift. There has been no change in the assets, policies, management or personnel of the company—the change is in name, only.

The Detroit offices of the Whiting Corporation, formerly the Whiting Foundry Equipment Co. of Harvey, Ill., have been changed from 570 Penobscot Building to 3000 Grand River Avenue.

The Detroit offices of the American Brass Co. have been moved from 435 Book Building to 3-113 General Motors Building. Charles F. Craig is Detroit agent of the company.

The Utility Compressor Co., which has maintained offices in Detroit and plant at Adrian, Mich., has moved its general offices to Adrian.

The National Spring & Wire Co. has moved its general offices from Albion, Mich., to Detroit.

The S. L. Jackson Co., Detroit, has taken over the Auto Trimmers Supply and the Iron Products Co., both of Detroit, and both Michigan corporations. The company deals in upholstery and top materials, bolts, screws, nuts, etc.

Theodore Geissmann & Co., McCormick Building, Chicago, has been appointed district sales representative the Standard Seamless Tube Co., Ambridge, Pa.

The Betts Machine Co., Rochester, N. Y., has closed its New York sales office at 50 Church Street, but has not yet announced its plans for representation in the New York district.

The Dale Machinery Co., dealer in machine tools, has moved from 53 Lafayette Street, New York, to the National City Building, 17 East Forty-second Street, New York. A warehouse has been leased at 255 Pearl Street.

The address of the St. Louis office of Stewart Industrial Furnaces has been changed from the Railway Exchange Building to 420 Wainwright Building.

The York, Pa., plant of the American Foundry Equipment Co. is getting ready for bigger business by moving from the old location on North Street to larger and better adapted quarters on East Market Street, adjacent to the Maryland & Pennsylvania Railroad. The company's molding machines, flasks, jackets, and pattern mounting sundries are manufactured at this plant. Sand cutting machines, sand blast equipment, dust arresters, and core machines will continue to be manufactured at the main plant, 2935 West Forty-seventh Street, Chicago.

Ralph M. Sitterley, foreign sales manager, 149 Broadway (Singer Building), New York, announces the establishment of his offices at 149 Broadway, where he will act as foreign sales manager of American manufacturers of electrical specialties, marine supplies, automotive products and equipment. He expects to leave for Europe in April.

Plans of New Companies

The Conemaugh Iron Works, Latrobe, Pa., is a reorganization of the Blairsville Iron Works Co. The products are ingot molds and cast iron enamel ware.

The Brake Equipment & Supply Co., 80 East Jackson Boulevard, Chicago, has been incorporated for the purpose of manufacturing air brake repair parts such as valves, valve seats, copper gaskets, etc., for locomotive air compressors.

The T-A Brass Foundry Co., Charleston, W. Va., recently incorporated, was conducted formerly on a partnership basis. It is now putting on the market a patented trolley wheel equipped with roller bearing and an oil cellar that carries enough oil to run about ten days. The company will be in the market at various times for copper, tin and zinc.

The Arrow Mfg. Co., Harrisburg, Pa., will manufacture electrical and mechanical equipment for automotive service. The work will be done by contract. Contracts have not yet been awarded.

The Eclipse Auto Signal Co., Inc., Cedar Springs, Mich., is having electric automobile direction signals manufactured by contract, and will continue to do so until some time in the early fall.

The Ray P. Farrington Co., Philadelphia, acts as selling agent in the Philadelphia territory for Follansbee Brothers Co., Pittsburgh; the Falcon Steel Co., Niles, Ohio, and the Falcon Tin Plate Co., Canton, Ohio. R. P. Farrington, president, was formerly the district representative of the Trumbull Steel Co., later acted in that capacity for the Falcon Steel Co. and the Newton Steel Co. and, about the first of the year, was appointed representative for Follansbee Brothers Co. and the Falcon Tin Plate Co., having given up the agency of the Newton Steel Co. about a year ago. W. W. Keefer, 2nd, secretary and treasurer, was formerly connected with the Midvale Steel Co., later was with the Tacony Steel Co. in the capacity of special agent and was for two years the sales manager of the Mid-West territory with offices in Cleveland. The company handles a number of sheet and tin mill specialties which, with its tonnage lines, cover practically the whole range of sheet and tin plate manufacture.

The Bethlehem Steel Co.'s New York sales offices have been removed from 111 Broadway to the Cunard Building, 25 Broadway.

The Rochester Terminal & Canal Corporation, Rochester, N. Y., has been incorporated and has acquired dockage and storage facilities on the New York State barge canal. It will engage in the transportation of bulk commodities on the barge canal. A warehouse will be built at Rochester to be equipped with conveyors, coal chutes and other loading machinery. An order has been placed with the Kingston Dry Dock & Construction Co. for 10 barges of 500 tons capacity each. Additional barges will be built as the volume of business increases.

The Crescent Truck Co., recently organized, will locate at Lebanon, Pa., on property of the Hunsicker Engineering Co. The two concerns are independent and the Hunsicker Engineering Co. continues to do business as in the past as engineer, founder and machinist, manufacturing cars, forgings and special machinery.

The Graton & Knight Mfg. Co., Worcester, Mass., belting, is now operating full time and employing 900.

The Liddell Electric Mfg. Co., Bridgeport, Conn., has received orders for radio apparatus aggregating \$100,000.

The Lehigh Valley Coal Co., Hamilton, Pa., has plans in preparation for the construction of a new coal washery at its properties between Jeanville and Beaver Meadow.

Prices Finished Iron and Steel, f.o.b. Pittsburgh

Freight Rates

Freight rates from Pittsburgh on finished iron and steel products, in carload lots, to points named, per 100 lb., are as follows:

Philadelphia, domestic	\$0.36	Kansas City	\$0.815
Philadelphia, export	0.365	Kansas City (pipe)	0.77
Baltimore, domestic	0.35	St. Paul	0.665
Baltimore, export	0.255	Omaha	0.815
New York, domestic	0.38	Omaha (pipe)	0.77
New York, export	0.285	Denver	1.35
Boston, domestic	0.405	Denver (wire products)	1.415
Boston, export	0.285	Pacific Coast	1.665
Buffalo	0.295	Pacific Coast, ship plates	1.335
Cleveland	0.34	Birmingham	0.765
Detroit	0.325	Jacksonville, all rail	0.555
Cincinnati	0.325	Jacksonville, rail and water	0.46
Indianapolis	0.345	New Orleans	0.515
Chicago	0.38		
St. Louis	0.475		

The minimum carload to most of the foregoing points is 36,000 lb. To Denver the minimum loading is 40,000 lb., while to the Pacific Coast on all iron and steel products, except structural material, the minimum is 80,000 lb. On the latter item the rate applies to a minimum of 50,000 lb., and there is an extra charge of 9c. per 100 lb. on carloads of a minimum of 40,000 lb. On shipments of wrought iron and steel pipe to Kansas City, St. Paul, Omaha and Denver the minimum carload is 46,000 lb. On iron and steel items not noted above the rates vary somewhat and are given in detail in the regular railroad tariffs.

Rates from Atlantic Coast ports (i.e., New York, Philadelphia and Baltimore) to Pacific Coast ports of call on most steamship lines, via the Panama Canal, are as follows: Pig iron, 55c.; ship plates, 75c.; ingot and muck bars, structural steel, common wire products, including cut or wire nails, spikes and wire hoops, 75c.; sheets and tin plates, 60c. to 75c.; rods, wire rope, cable and strands, \$1; wire fencing, netting and stretcher, 75c.; pipe, not over 8 in. in diameter, 75c.; over 8 in. in diameter, 2 1/2c. per in. or fraction thereof additional. All prices per 100 lb. in carload lots, minimum 40,000 lb.

Structural Material

I-beams, 3 to 15 in.; channels, 3 to 15 in.; angles, 3 to 6 in., on one or both legs, 1/4 in. thick and over, and zees, structural sizes, 1.40c. to 1.50c.
Sheared plates, 1/4 in. and heavier, tank quality, 1.40c. to 1.50c.

Wire Products

Wire nails, \$2.40 base per keg; galvanized, 1 in. and longer, including large-head barbed roofing nails, taking an advance over this price of \$1.25 and shorter than 1 in., \$1.75; bright Bessemer and basic wire, \$2.25 per 100 lb.; annealed fence wire, Nos. 6 to 9, \$2.25; galvanized wire, \$2.75; galvanized barbed wire, \$3.05; galvanized fence staples, \$3.05; painted barbed wire, \$2.55; polished fence staples, \$2.55; cement-coated nails, per count keg, \$1.90; these prices being subject to the usual advances for the smaller trade, all f.o.b. Pittsburgh, freight added to point of delivery, terms 60 days, net, less 2 per cent off for cash in 10 days. Discounts on woven-wire fencing are 70 1/2 per cent off list for carload lots; 69 1/2 per cent for 1000-rod lots, and 68 1/2 per cent for small lots, f.o.b. Pittsburgh.

Bolts and Nuts

Machine bolts, small, rolled threads, 70, 10 and 10 per cent off list
Machine bolts, small, cut threads, 70 and 10 per cent off list
Machine bolts, larger and longer, 70 and 10 per cent off list
Carriage bolts, 1/2 in. x 6 in.; 70 and 10 per cent off list
Smaller and shorter rolled threads, 70 and 10 per cent off list
Cut threads, 70 and 10 per cent off list
Longer and larger sizes, 70 per cent off list
Lag bolts, 70, 10 and 5 per cent off list
Flow bolts, Nos. 1, 2 and 3 heads, 60 and 10 per cent off list
Other style heads, 20 per cent extra
Machine bolts, c.p.c. and t. nuts, 1/2 in. x 4 in.; 65, 10 and 5 per cent off list
Smaller and shorter, 65, 10 and 5 per cent off list
Larger and longer sizes, 65 and 10 per cent off list
Hot pressed sq. or hex. blank nuts, \$5.50 off list
Hot pressed nuts, tapped, \$5.25 off list
C.p.c. and t. sq. or hex. blank nuts, \$5.25 off list
C.p.c. and t. sq. or hex. blank nuts, tapped, \$5.00 off list
Semi-finished hex. nuts:
1/4 in. to 9/16 in. inclusive, 80, 10, 10 and 10 per cent off list
Small sizes S. A. E., 80 and 10 per cent off list
1/2 in. to 1 in. inclusive, U. S. S. and S. A. E., 70, 10, 10 and 10 per cent off list
Stove bolts in packages, 80 and 3 tens and 5 per cent off list
Stove bolts in bulk, 80, 3 tens and 2 1/2 per cent off list
Tire bolts, 70, 10 and 5 per cent off list
Track bolts, carloads, 3c. base
Track bolts, less than carloads, 3.75c. to 4c. base

Upset and Hex. Head Cap Screws

1/2 in. and under, 80 and 10 to 80, 10 and 10 per cent off list
9/16 in. to 1 in., 80 and 10 to 80, 10 and 10 per cent off list

Upset Set Screws

1/2 in. and under, 80, 10 and 5 to 85 per cent off list
9/16 in. to 1 in., 80, 10 and 5 to 85 per cent off list

Milled Squares and Hex. Cap Screws

All sizes, 75 and 10 to 80 per cent off list

Milled Set Screws

All sizes, 70, 10 and 10 per cent off list

Rivets

Large structural and ship rivets, \$2.00 to \$2.10
Large boiler rivets, 2.10 to 2.20
Small rivets, .75 and 10 off list

Wire Rods

No. 5 common basic or Bessemer rods to domestic consumers, \$36; chain rods, \$36; screw stock rods, \$41; rivet and bolt rods and other rods of that character, \$36; high carbon rods, \$43 to \$46, depending on carbons.

Railroad Spikes and Track Bolts

Railroad spikes, 9, 16-in. and larger, \$2 to \$2.10 base per 100 lb. in lots of 200 kegs of 200 lb. each or more; spikes, 1/2-in., 3/4-in. and 7/16-in., \$2.15 to \$2.25 base; 5/16-in., \$2.15 to \$2.25 base. Boat and barge spikes, \$2.15 to \$2.25 base per 100 lb. in carload lots of 200 kegs or more, f.o.b. Pittsburgh. Track bolts, 3c. base per 100 lb. Tie plates, \$1.75 per 100 lb. Angle bars, \$2.40 per 100 lb.

Terne Plates

Prices of terne plates are as follows: 8-lb. coating, 200 lb., \$9.30 per package; 8-lb. coating, 1 C., \$9.60; 15-lb. coating, 1 C., \$11.80; 20-lb. coating, 1 C., \$13; 25-lb. coating, 1 C., \$14.25; 30-lb. coating, 1 C., \$15.25; 35-lb. coating, 1 C., \$16.25; 40-lb. coating, 1 C., \$17.25 per package, all f.o.b. Pittsburgh, freight added to point of delivery.

Iron and Steel Bars

Steel bars, 1.40c. to 1.50c. from mill Refined bar iron, 2c. to 2.10c.

Welded Pipe

The following discounts are to jobbers for carload lots on the Pittsburgh basing card:

Steel			Iron		
Inches	Black	Galv.	Inches	Black	Galv.
1/4	54 1/2	28	1/4 to 3/8	3 1/2	22 1/2
1/2 to 3/4	60	33 1/2	1/2	36 1/2	18 1/2
1	65	50 1/2	3/4	42 1/2	27 1/2
1 1/4	69	56 1/2	1 to 1 1/2	44 1/2	29 1/2
1 to 3	71	58 1/2			

Lap Weld

2	64	51 1/2	2	39 1/2	25 1/2
2 1/2 to 6	68	55 1/2	2 1/2 to 6	42 1/2	29 1/2
7 to 8	65	51 1/2	7 to 12	40 1/2	27 1/2
9 to 12	64	50 1/2			

Butt Weld, extra strong, plain ends

1/4	50 1/2	33	1/4 to 3/8	4 1/2	37 1/2
1/2 to 3/4	56	38 1/2	1/2	35 1/2	23 1/2
1	62	50 1/2	3/4	42 1/2	28 1/2
1 1/4	67	55 1/2	1 to 1 1/2	44 1/2	30 1/2
1 to 3	69	57 1/2			
2 to 3	70	58 1/2			

Lap Weld, extra strong, plain ends

2	62	50 1/2	2	40 1/2	27 1/2
2 1/2 to 6	66	54 1/2	2 1/2 to 6	43 1/2	31 1/2
7 to 8	65	53 1/2	7 to 12	42 1/2	30 1/2
9 to 12	61	47 1/2	9 to 12	35 1/2	23 1/2
	55	41 1/2	9 to 12	30 1/2	18 1/2

To the large jobbing trade the above discounts are increased by one point, with supplementary discounts of 5 and 2 1/2 per cent.

Boiler Tubes

The following are the discounts for carload lots f.o.b. Pittsburgh:

Lap Welded Steel		Charcoal Iron	
1 1/2 in.	26 1/2	1 1/2 in.	5
2 to 2 1/2 in.	41	1 1/2 to 1 3/4 in.	15
2 1/2 to 3 in.	52	2 to 2 1/2 in.	25
3 1/2 to 13 in.	57	2 1/2 to 3 in.	30
		3 1/2 to 4 1/2 in.	32

To large buyers of steel tubes, a supplementary discount of 5 per cent is allowed.

Standard Commercial Seamless Boiler Tubes

New discounts have been adopted on standard commercial seamless boiler tubes, but manufacturers are not yet ready to announce them for publication, and for that reason we publish no discounts this week.

Sheets

Prices for mill shipments on sheets of standard gage in carloads, f.o.b. Pittsburgh, follow:

Blue Annealed

Cents per Lb.	Cents per Lb.
No. 8 and heavier, 2.20	Nos. 11 and 12, 2.30
No. 9 and 10 (base), 2.25	Nos. 13 and 14, 2.35
	Nos. 15 and 16, 2.45

Box Annealed, One Pass Cold Rolled

Cents per Lb.	Cents per Lb.
Nos. 17 to 21, 2.30	No. 28 (base), 3.00
Nos. 22 to 24, 2.35	No. 29, 3.10
Nos. 25 and 26, 2.90	No. 30, 3.20
No. 27, 2.95	

Galvanized

Cents per Lb.	Cents per Lb.
Nos. 10 and 11, 3.00	Nos. 25 and 26, 3.70
Nos. 12 to 14, 3.10	No. 27, 3.85
Nos. 15 and 16, 3.25	No. 28 (base), 4.00
Nos. 17 to 21, 3.40	No. 29, 4.25
Nos. 22 to 24, 3.55	No. 30, 4.50

Tin-Mill Black Plate

Cents per Lb.	Cents per Lb.
Nos. 15 and 16, 2.30	No. 28 (base), 3.00
Nos. 17 to 21, 2.35	No. 29, 3.05
Nos. 22 to 24, 2.90	No. 30, 3.05
Nos. 25 to 27, 2.95	Nos. 30 1/2 and 31, 3.10

Production of Pig Iron in the United States in 1921

THE special statistical bulletin of the American Iron and Steel Institute giving production of pig iron for the past year shows a decided decrease in all grades and the most striking change is in charcoal iron, the production having fallen from 323,396 tons in 1920 to 94,730 tons, a decrease of 70.7 per cent as compared with a decrease of 54.8 per cent of all pig iron. Looking at the production by States, the Indiana-Michigan territory makes the best showing, evidently due largely to the greater activity at Gary, the decrease in this district being 35.58 per cent. The great States of Pennsylvania, Ohio and Illinois did fairly well with decreases ranging from 50 to 55 per cent, and Alabama a trifle

below 50 per cent. But the other Southern States, including the border State of Maryland, made a very poor showing, ranging from a decrease of 93.12 per cent in Tennessee to 71.9 per cent in Maryland. The Eastern territory also made a poor showing. Of the leading grades of pig iron the largest decrease was in malleable, 65.11 per cent, while the steel making grades made a somewhat better showing.

Of the total production, 16,688,126 tons, 9,530,981 was produced in the first half and 7,157,145 in the second half year. The production of charcoal pig iron in the second half was only 24,795 tons, or 0.35 per cent of the total iron.

PRODUCTION OF PIG IRON BY GRADES, 1906-1921.

Years	Basic	Bessemer	Foundry	Malleable	Forge	All other	Total Gross tons.
1906	5,618,674	13,810,318	4,773,911	699,701	597,420	377,867	25,307,191
1907	5,375,210	13,231,020	5,151,299	683,167	620,290	419,850	25,781,361
1908	4,010,144	7,210,976	5,647,622	414,957	157,104	199,158	18,636,018
1909	8,260,225	10,575,370	5,324,141	685,048	725,624	281,789	25,795,471
1910	9,081,008	11,216,042	5,260,447	813,123	564,167	305,590	27,603,597
1911	8,720,020	9,409,303	4,968,940	612,531	408,811	220,910	25,199,514
1912	11,417,888	11,694,015	5,071,873	825,643	409,183	276,337	29,720,987
1913	12,536,693	11,590,113	5,220,343	903,730	324,307	300,860	30,966,132
1914	9,670,987	7,830,127	4,543,254	671,771	361,651	235,751	23,332,344
1915	13,093,214	10,521,406	4,843,899	829,921	316,214	309,659	29,916,213
1916	17,084,687	14,422,157	5,551,644	915,186	348,311	304,779	39,439,737
1917	17,671,683	13,714,712	5,328,311	1,015,579	345,707	345,378	38,621,210
1918	18,646,171	13,021,996	4,155,200	1,117,914	304,932	720,308	39,051,644
1919	14,494,131	9,975,911	4,916,758	1,090,019	271,280	318,296	31,015,364
1920	16,747,732	12,062,081	5,997,782	1,310,951	318,018	540,300	36,925,987
1921	7,753,071	5,595,215	2,968,136	457,740	112,748	201,616	16,688,126

PIG IRON MADE FOR SALE OR FOR USE OF MAKERS IN 1921.

Grade	For sale	For maker's use	Total Gross tons
Pig iron	568,843	7,184,228	7,753,071
Bessemer and low phosphorus	406,045	5,189,170	5,595,215
Foundry, including ferro-silicon	2,316,839	251,297	2,568,136
Malleable	350,682	100,658	457,340
Forge or mill	45,052	77,696	112,748
Ferro-manganese	24,255	79,502	103,755
Spiegel iron	5,745	50,678	56,423
All other grades	20,560	20,878	41,438
Total	Gross tons	3,728,019	12,960,107
			16,688,126

PRODUCTION OF PIG IRON BY STATES, 1917-1921.

States	1917	1918	1919	1920.	1921.
Maine, Mass., Conn.	10,527	12,485	13,678	10,281	2,142
New York, New Jersey	2,417,527	2,871,118	2,070,288	2,601,134	966,660
Pennsylvania	18,539,728	15,198,271	12,276,585	13,983,134	6,252,786
Maryland	422,312	373,817	244,002	628,733	147,189
Virginia	520,311	513,737	319,409	420,302	67,239
Alabama	2,953,705	2,547,852	2,130,092	2,392,002	1,307,408
W. Va., Ga., Ky., Texas	561,951	594,675	413,001	772,379	264,759
Tennessee	309,951	309,822	190,514	283,207	18,479
Ohio	8,518,003	8,704,132	7,102,627	8,535,470	3,799,613
Indiana	3,450,915	3,440,307	2,508,213	3,280,875	1,612,033
Illinois	2,057,503	3,073,509	2,715,659	2,939,521	1,893,611
Wisconsin, Michigan	738,541	750,366	605,610	711,405	422,663
Mo., Iowa, Cal., Mont.	453,742	504,463	375,587	464,584	226,364
Wash., Oregon, Cal.					
Total Gross tons	38,621,216	39,054,644	31,015,364	36,925,987	16,688,126

PRODUCTION OF PIG IRON BY STATES, 1920-1921.

States	1920	Per cent.	1921	Per cent.	Decrease.	Per cent. decrease.
Pennsylvania	6,252,786	37.47	13,983,134	37.87	7,730,368	55.26
Ohio	3,799,613	22.77	8,535,470	23.11	4,735,857	55.47
Ind., Mich.	1,998,611	11.35	2,939,521	7.90	1,040,910	35.58
Alabama	1,612,033	9.66	3,280,875	8.88	1,668,842	50.87
W. Va., Ky.	1,307,408	7.23	2,392,002	6.48	1,084,594	49.54
N. Y., N. J.	966,660	5.80	2,601,134	7.04	1,634,474	62.76
W. Va., Ky.	264,759	1.59	772,379	2.06	507,620	65.72
Wis., Minn.	226,364	1.36	711,405	1.93	484,042	68.11
Mo., Iowa, Colo., Mont.	226,364	1.36	464,584	1.26	238,220	51.28
Wash.	147,189	.88	523,733	1.42	376,544	71.90
Maryland	97,239	.40	429,302	1.16	332,063	84.34
Virginia	19,479	.12	283,207	.77	263,728	93.12
Tennessee						
Maine, Mass., Conn.	2,142	.01	10,281	.03	8,139	79.17
Total	Gross tons	100.00	36,925,987	100.00	30,237,861	54.81

PRODUCTION OF COLD AND HOT AND WARM BLAST CHARCOAL PIG IRON, 1917-1921.

PIG IRON, 1917-1921.						
Kind of iron	1917.	1918.	1919.	1920.	1921.	
Cold blast	5,219	4,200	2,113	1,734	350	
Hot and warm blast	371,306	344,689	234,984	321,692	94,380	
Total	Gross tons	376,525	348,877	327,067	323,366	94,730

* Includes small tonnage made with charcoal and coke mixed in 1917 and 1918.

PRODUCTION OF PIG IRON BY GRADES, 1920-1921, SHOWING DECREASE BY GRADES.

Grades	1921	Per cent.	1920	Per cent.	Decrease	Per cent.
Basic	7,753,071	46.46	16,737,722	45.33	8,984,651	53.68
Bessemer and low phosphorus	5,595,215	33.53	12,062,084	32.67	6,466,869	53.61
Foundry and ferro-silicon	2,568,136	15.39	5,957,782	16.13	3,389,646	56.89
Malleable	457,340	2.74	1,310,951	3.55	853,611	65.11
Forge	112,748	.67	318,048	.86	205,300	64.55
Spiegel iron	56,423	.34	111,449	.30	55,026	49.37
Ferro-manganese	103,755	.62	295,447	.80	191,692	64.88
All other	41,438	.25	132,504	.36	91,066	68.73
Total	Gross tons	100.00	36,925,987	100.00	20,237,861	54.81

PIG IRON MADE FOR SALE BY GRADES IN 1921.

States.	Basic.	Bessemer.	Foundry.	Malleable.	Forge.	All other.	Total Gross tons.
Maine, Mass.			2,142				2,142
N. Y., N. J., Md.	93,427	35,157	410,330	71,812	7,371	7,790	625,887
Pennsylvania	120,521	188,908	531,904	20,743	14,545	31,589	908,210
W. Va., Ala.	36,490	450	551,296		9,438	8,431	601,105
Ky., Tenn.	944	191	13,883			5,405	20,423
Ohio.	221,919	14,885	405,150	135,547	3,698	1,092	782,291
Ind., Ill.	86,149	166,369	203,061	113,292			568,871
Mich., Wis., Mo.	9,393	85	199,073	9,288		1,251	219,090
Iowa, Cal., Wash.							
Total.	549,843	408,045	2,316,830	350,682	35,032	50,559	7,795,010

METHODS BY WHICH ALL PIG IRON WAS CAST OR DELIVERED.

States.	Molten condition.	Sand cast.	Machine cast.	Chill cast.	Direct castings.	Total. Gross tons.
Maine, Mass		2,142				2,142
N. Y., N. J., Md.	256,302	171,084	611,007	78,874	522	1,115,849
Pennsylvania	4,071,736	118,302	1,989,571	70,744	2,411	6,252,766
W. Va., Ala., Ky., Tenn	764,551	442,572	311,120	35,610	5,020	1,558,885
Ohio	2,073,911	177,145	1,544,802		3,755	3,799,613
Ind., Ill. Mich., Wis., Minn., Mo., Iowa, Col., W. Va.	2,577,973	87,653	1,279,781	12,011	1,453	3,958,871
Total.	9,744,475	908,898	5,730,347	195,239	13,167	16,688,126

METHODS BY WHICH BASIC PIG IRON WAS CAST OR DELIVERED IN 1921.

IN 1921.

States.	Sand cast, machine cast, chill cast, etc.	Molten condition.	Total. Gross tons.
New York, New Jersey	208,799	183,111	398,910
Pennsylvania	873,108	2,156,198	3,029,301
West Virginia, Alabama, Kentucky	107,791	712,576	820,367
Ohio	521,593	704,304	1,225,897
Indiana, Illinois, Minnesota, Missouri, Colorado	422,068	1,866,828	2,288,896
Total	2,122,359	5,694,712	7,753,071

METHODS BY WHICH BESSEMER AND LOW-PHOSPHORUS PIG IRON WAS CAST OR DELIVERED IN 1921.

States.	Sand cast, machines cast, chill cast, etc.	Molten condition.	Total Gross tons.
New York; Maryland.	134,734	70,191	204,925
Pennsylvania.	543,523	1,914,090	2,457,613
West Virginia, Tennessee, Alabama.	45,625	81,975	127,600
Ohio.	329,011	1,345,284	1,674,295
Indiana, Illinois, Iowa.	261,994	686,480	948,474

NON-FERROUS METALS

The Week's Prices

	Cents Per Pound for Early Delivery					
	Copper, New York	Straits Tin	Lead	Zinc		
	Lake	Electro-lytic*	New York	New York	St. Louis	New York
March 8.....	13.00	12.75	29.00	4.70	4.40	4.97½
9.....	13.00	12.75	28.87½	4.70	4.40	4.97½
10.....	13.00	12.75	29.37½	4.70	4.40	5.00
11.....	13.00	12.75	28.75	4.70	4.40	5.00
12.....	13.00	12.75	28.75	4.70	4.40	5.00
13.....	13.00	12.75	28.75	4.70	4.40	5.00
14.....	13.00	12.75	29.00	4.70	4.40	5.00

*Refinery quotation.

New York

NEW YORK, March 14.

All the markets are moderately active and prices in most cases are steady to firm. The copper market is fairly active and prices are stronger. Only moderate activity has characterized the tin market and prices are easier. Buying and consumption of lead continue steady. Sales of zinc have been in fair volume and prices have stiffened.

Copper.—The last few days have been some of the most active this year. Inquiries and sales have not embraced large quantities individually, but in the aggregate the total has been fairly large. They have included both domestic and foreign consumption with the latter predominating and prices obtained for foreign shipment have netted a larger profit than those for domestic delivery. The tone of the entire market is fairly optimistic, but buying is confined for the most part to early deliveries, consumers not being certain yet as to far future commitments. Electrolytic copper for early or 30-day delivery is generally regarded as a minimum at 13c., delivered, or 12.75c., refinery, with some sellers asking a minimum of 13.12½c., delivered, or 12.87½c., refinery. There are also some sellers who will quote these prices as far ahead as May and some will even quote June delivery if combined with May or earlier.

Tin.—The market for Straits tin has not been featured by heavy sales, but the buying which has been reported has been spread over the week, with some business transacted almost every day, both spot and future delivery being involved. Taking the week as a whole there were two days which were the most active. On one day about 300 to 400 tons, mostly future shipment, was sold with dealers and consumers participating, and on another day, while the total was not as large as this, a fair business was done, mostly for future shipment. Most market observers have generally expected a decline and this was realized yesterday when sterling exchange fell to the lowest point in the last month and with it prices for tin also declined. As usual these influences originated in London where unfavorable political conditions predominated and as a result spot Straits tin to-day was quoted in New York at 29c. In London quotations stood at £142 15s. for spot standard, £144 10s. for future standard and £145 5s. for spot Straits. While these prices are not lower than a week ago, they had been higher since then and therefore represent a decline. Arrivals thus far this month have been 4950 tons with 4670 tons reported afloat.

Lead.—Business in this market continues in a steady stream and the healthy condition which has prevailed for so many weeks continues with no change in prices. The leading interest still quotes 4.50c., St. Louis, or 4.70c., New York, for wholesale lots for early delivery, while independents are selling on a basis of 4.40c., St. Louis, or 4.70c. to 4.75c., New York and eastern points.

Zinc.—The market for prime western has strengthened in the last week and quotations are slightly higher at 4.65c. to 4.70c., St. Louis, or 5c. to 5.05c., New York, for early or 30-day delivery. Sales are confined to moderate amounts for early consumption and

while this phase of the market is a little more active than a week ago, the attitude of producers continues of such a nature that offerings are not freely made in the belief that a higher level will prevail in the future. Very little business for delivery beyond 80 days is being taken.

Antimony.—Wholesale lots for early delivery are unchanged at 4.20c., New York, duty paid, with the market quiet.

Aluminum.—Wholesale lots of virgin metal, 98 to 99 per cent pure, for early delivery continue to be quoted by the leading interest at 19c. to 49.10c., f.o.b. plant, depending on the quantity, while the same grade from foreign sources is quoted by importers at 17c. to 18c., New York, duty paid.

Old Metals.—The tendency of the market seems upward and business is more active. Dealers' selling prices are as follows:

	Cents Per Lb.
Copper, heavy and crucible.....	12.50
Copper, heavy and wire.....	11.50
Copper, light and bottoms.....	9.50
Heavy machine composition.....	9.50
Brass, heavy.....	7.25
Brass, light.....	6.75
No. 1 red brass or composition turnings.....	8.00
No. 1 yellow red brass turnings.....	6.25
Lead, heavy.....	4.25
Lead, tea.....	3.25
Zinc.....	3.00

Chicago

MARCH 14.—Copper and zinc have advanced slightly in a dull market, principally because of firmness on the part of producers. Tin has declined in sympathy with another reaction in the London market and antimony has receded with the delivery of several cargoes at New York docks. Old metal prices remain unchanged. We quote in carload lots: Lake copper, 13.25c. to 13.50c.; tin, 30.50c.; lead, 4.50c.; spelter, 4.75c.; antimony, 6c., in less than carload lots. On old metals we quote: Copper wire, crucible shapes and copper clips, 9.50c.; copper bottoms, 7.50c.; red brass, 7.50c.; yellow brass, 6c.; lead pipe, 3.25c.; zinc, 2c.; pewter, No. 1, 22c.; tin foil, 23c.; block tin, 25c.; all buying prices for less than carload lots.

St. Louis

MARCH 14.—Reports from the tri-state field of Kansas, Missouri and Oklahoma tell of improved business conditions and a larger production of lead and zinc. The Eagle Pilcher Lead Co. has resumed full operations at Joplin, Mo., by adding 75 men to its force, bringing it up to 600. We quote lead at 4.40c., car lots, and slab zinc at 4.65c. On old material we quote: Light brass, 3.50c.; heavy red brass, 7c.; light copper, 7c.; heavy yellow brass, 4c.; heavy copper and copper wire, 7.50c.; pewter, 15c.; tin foil, 16c.; tea lead, 2c.; aluminum, 9c.

Cutting Tests for High-Speed Tool Bits

During the past month the Bureau of Standards of the Department of Commerce completed 60 more tests of ½-in. high-speed steel tool bits. The bits were of several grades of high-speed steel which had been subjected to various heat treatments. The steel used was the same for each test, the percentage of the various elements being as follows: Carbon, 0.62; chromium, 3.5; tungsten, 15.5, and vanadium, 1.6 per cent. The results, in pounds of metal cut away, are given in the accompanying table.

Results of Cutting Tests for High-Speed Tool Bits			
Preheating (20 Min.) Deg. Fahr.	Hardening (5 Min.) Deg. Fahr.	Quenched in	Metal Cut Per Tool (4 Tools Tested) Lb.
1400	2417	Oil	9.1
1500	2417	Oil	10.1
1600	2417	Oil	5.1
1600	2417	Water	5.1

Testing conditions were the same in all cases. The results obtained when using water as the quenching medium are about the same as when using oil for this particular case.

PERSONAL,

E. G. Rippel, who has been sales manager of the Buffalo Foundry & Machine Co. since its organization, has resigned that position and withdrawn from the company with a view to absentsing himself from business for some time. It is more than 21 years since Mr. Rippel organized the Buffalo Foundry Co., the expansion of which into the present company was a noteworthy development. C. W. Pearson, assistant treasurer of the Buffalo Foundry & Machine Co., succeeds Mr. Rippel as sales manager.

The Ohio Locomotive Crane Co., Bucyrus, Ohio, formerly represented in the New York district by J. N. Kinney, 30 Church Street, New York, has appointed Scott B. Lilly, formerly associated with J. N. Kinney, its representative with office at 30 Church Street.

E. M. Griffiths the founder of Burton Griffiths & Co., Ltd., of London, England, has resigned his position as managing director and chairman of that business and has also retired from the board of the Birmingham Small Arms Co., Ltd., so that he is no longer associated with the control of either company. His city address is now 30-32 Ludgate Hill, London, E. C.

Benjamin Graves, milling machine engineer Brown & Sharpe Mfg. Co., Providence, R. I., last week delivered an address on the construction and use of milling machines at the March meeting of the Engineering Club, Greenfield Tap & Die Corporation, Greenfield, Mass.

J. B. Bartholemew, structural steel sales agent, Bethlehem Steel Co., Boston, has accepted a position with the W. B. Kilgoire Co., Chicago. A. D. Dickson is acting structural steel sales agent, Bethlehem Steel Co., Boston.

G. R. Demming, of the Demming Co., Salem, Ohio, was elected president of the Salem Manufacturers' Association at the recent annual meeting, and H. M. Silver of the Silver Mfg. Co., was elected vice-president.

H. W. Gledhill, formerly Philadelphia district manager and special representative of the marine and terminal department of the Shepard Electric Crane & Hoist Co., Montour Falls, N. Y., has been appointed eastern sales manager in the New York office. The eastern district territory now includes Delaware and eastern Pennsylvania, formerly in the Philadelphia district and New Jersey, New York and the New England states.

Charles S. Vought, formerly vice-president and European representative of American Steel Export Co., who has recently returned from a trip around the world, has joined the sales force of the New York office of the Donner Steel Co. Mr. Vought for many years was connected with the Cambria Steel Co., Johnstown, Pa., where he received his early training in the steel business.

R. O. Gill, formerly production manager of the Packard Motor Car Co., Detroit, has been promoted to be factory manager.

Charles Rogers, formerly superintendent of the Michigan Gray Iron Castings Co., Detroit, has become a superintendent for the Monroe Steel Castings Co., Monroe, Mich.

J. R. Camm has been appointed assistant to C. J. Sturgeon, manager of the Cleveland office of Hearnsey & Liecker Co., Milwaukee, and will cover the southern portion of Ohio, with residence at Dayton. Mr. Camm is a brother of J. A. Camm, sales manager of Hearnsey & Liecker, and has been connected with the company's Milwaukee office for the past two years.

At the recent yearly meeting of the Lumen Bearing Co., of Buffalo and Youngstown, L. S. Jones, general manager, was elected to the board of directors, succeeding H. P. Parrock, who has severed his connection with the interest. The board and its officers are: W. H. Barr, president and treasurer; C. H. Bierbaum, vice-

president; N. K. B. Patch, secretary, and L. S. Jones, general manager, all of Buffalo; Kester Barr, Lucius B. McKelvey, Thomas Parrock, B. G. Parker and J. Fearnley Bonnell, all of Youngstown. Kester Barr is manager of the Youngstown plant of the company, which is now operating about 20 per cent.

J. G. Hoffman, Wheeling, W. Va., has been elected president of the Buckeye Aluminum Co., Wooster, Ohio, to fill the vacancy caused by the recent death of George W. Blake, who was both president and treasurer. Robert Blake, who has been secretary, was elected secretary, treasurer and general manager. W. R. Curry of Wooster, Ohio, was elected first vice-president and J. L. Ellis, of Wheeling, second vice-president. Oscar H. Foss has been appointed sales manager.

Alfred Herbert, Ltd., British machine tool builder, has closed its New York office at 50 Church Street and the American representative in charge, E. D. Mitchell, will return to England on April 19. The Vandyck-Churchill Co., 149 Broadway, New York, has been appointed sales agent in this country for the Alfred Herbert turret lathes and chucks.

Controversy as to Molders' Wages in Boston

Definite action is anticipated this week in the controversy between the foundry owners in Boston and vicinity and the molders' union, over wages. The foundry owners' original agreement with the molders' union expired Feb. 15, but was extended another month at the ruling wage because at that time the question of a new wage scale was not settled.

The molders are receiving 75c. an hour, with a working schedule based on an eight-hour day, 48 hours per week. The employers have offered the men 70c. an hour on the same basis of hours, the agreement to run until Aug. 15, next, and refuse to recede from their position. The local molders' union has voted against acceptance of this wage schedule, but has failed to sanction a strike. There the matter rests.

About five years ago, a disagreement over wages and hours arose between employer and employee, and there was a strike which lasted about a fortnight. At that time, the foundries were busier than they are today. To-day few foundries in Boston and the vicinity are operating a full week, and it is largely because of this fact that the union members are against accepting a reduction in wages. They demand the present wage scale be continued until Aug. 15.

Coke Production Maintained

UNIONTOWN, PA., March 13. — Coke production is being maintained in the Connellsville region, as is the output of by-product coal, especially in the southern Klondike plants of the H. C. Frick Coke Co. The present situation in the coke market apparently is unaffected by the threatened strike in the union coal fields. Production during the past week probably will show an increase of around 7000 tons. A few additional ovens were added to the active list during the week. Highest coke quotations as the week closed were \$3.25 to \$3.60 for furnace coke and \$4 and \$4.50 for foundry coke.

The coal market is presenting an unusual situation as March wears on. Apparently the consumers have discounted the strike, for the market in the Connellsville bituminous region this week has been decidedly softer. Observers believe that consumers have pretty ample reserve stocks and are depending, should the emergency develop, upon non-union fields to meet the present demands of the industry. There will be no change in wage schedules in the Connellsville region this quarter.

The Board of Water Supply, Twenty-second Floor, Municipal Building, Park Row and Centre Street, New York, is taking bids until 11 a. m., March 2, for a quantity of steel castings, gate valves and steel pipe appurtenances for use on the Catskill Aqueduct, as per plans and specifications on file (Contract 212). Benjamin F. Einbigler is secretary of the board.

OBITUARY

COL. JOHN SARGEANT, 59, of Bellevue, Ky., president the Domhoff & Joyce Co., Cincinnati, whose death March 4 in a Buffalo hospital was announced in THE



COL. JOHN SARGEANT

IRON AGE of March 9, had been under a physician's care for several months. Colonel Sargeant was born May 10, 1862, at the village of Wass, Northern Yorkshire, England. He came to the United States at the age of 17, and located at Cincinnati, where he secured a position with the claims department of the Southern Railroad in 1879. In 1889 he left the railroad and became associated with the Matthew Addy Co., pig iron merchant. He continued with that company until 1896, when he organized the Domhoff & Joyce Co., then a small selling concern dealing in pig iron and steel. Through his efforts this concern has grown steadily and rapidly. Mr. Sargeant was president and treasurer of the Domhoff-Joyce Co., also president of the South Dayton Railway Co., director of the Campbell County Bank, Bellevue, and financially interested in a number of other business enterprises. He was looked upon throughout the country as an authority in the iron and steel business. He was a member of the Cincinnati Business Men's Club, Cincinnati Chamber of Commerce and Cuyler Press Club, also a member of the Southern Club of Birmingham, Ala., and Mountain City Club, Chattanooga, Tenn. He was a leader in Republican politics in Campbell County and the State of Kentucky, and was a close personal friend of United States Senator Richard P. Ernst and Governor Edwin P. Morrow of Kentucky. When Governor Morrow assumed office, one of his first official acts was to appoint Mr. Sargeant a colonel upon his staff. He was very philanthropic and no interest of charity ever sought assistance without obtaining liberal response. He is survived by his wife, one daughter and two sons, Chas. A. Sargeant, vice-president and treasurer of the Domhoff & Joyce Co., and Harry Sargeant, also a director of the same company.

Harry Firmstone

HARRY FIRMSTONE died in Philadelphia on March 10 in his seventy-fourth year. He was born near the York Road in the northern suburbs of Philadelphia. He was educated at the Polytechnic Institute, which stood on what is now the southwest corner of Market and West Penn Square, the site of the Third National Bank. Mr. Firmstone's father and grandfather came to the United States from England about 1834 and went directly to Scioto County, Ohio, under an engagement to build a hot blast stove in connection with a charcoal furnace that was being operated in that county. In 1836 William Firmstone, Harry Firmstone's father, built a hot blast stove for the Vesuvius furnace in Lawrence County, Ohio. In 1837 he blew in a furnace at Phoenixville, Pa., for Reeves, Buck & Co. In 1835 he was successful in making good gray forge iron at the Mary Ann furnace in Huntingdon County, Pa., using coke made from Broadtop coal, and in 1839 he made pig iron with coke in Clearfield County. Soon after this he became associated with the Pardees and the Fells and located at Glendon, near Easton. Harry Firmstone and Frank Firmstone were associated with their father, as young men, in the operation of the Glendon and the Andover furnaces. Along about 1867 these interests came into possession of a large tract of ore land and a charcoal furnace in Virginia, and they developed what was

afterwards known for a great many years as the Longdale property at Longdale, Va. These same interests were also the owners of the Cranberry mine in North Carolina, and for many years operated the charcoal furnace at Cranberry, N. C., and were interested in the operation of the Johnson City furnace, Johnson City, Tenn., which still uses the Cranberry low phosphorus ore. In 1912 the Longdale Iron Co. started to liquidate, selling all their various properties, except the home property at Longdale, Allegheny County, Va. Harry Firmstone had made his home for many years at this place and so he made a proposition to his associates that he buy this property for a home, and they agreeing to this, he purchased it, and has been living there ever since.

"There is probably no family more deeply interested and more responsible for the birth and progress of the pig iron industry in America than the Firmstone family," said a prominent pig iron merchant of Philadelphia. "They were pioneers in many of the great changes and improvements in the business, and, at the same time, they were good business men, and successful operators. The companies with which they were connected and for whose management they were responsible always made money, and no man who has lived in the iron business was more scrupulous than Harry Firmstone in living up to his contracts and agreements. Many times when there was a question in Virginia in regard to a contract it was decided to leave it to Harry Firmstone, even if he were one of the parties at interest."

WILLIAM C. SKINNER, chairman board of directors Colt Patent Firearms Co., Hartford, Conn., died in that city March 8. Mr. Skinner was a native of Malone, N. Y., where he was born in 1855. He became an official of the Hartford arms company in 1889, was made vice-president and a director in 1901, and president in 1909.

JAMES E. GREENSMITH, president Boston Scale & Machine Co., Boston, died March 8. He was born in Burton-on-Trent, England, where he was educated as a mechanical engineer. His early business experience was in India, whence he came to this country to take charge of the Pond Machine Tool Co., which at that time was preparing for a new factory in Plainfield, N. J. He supervised the construction and equipment of this plant, as well as the design and development of a new type heavy gun turning and boring lathe later installed at the Watervliet arsenal. Mr. Greensmith's next position was with the Portland Co., Portland, Me., as superintendent, where he remained a short time, going then to the Mason Machine Works, Taunton, Mass., where he was superintendent for many years. For the past six years he has been the president and general manager of the Boston Scale & Machine Co. He was an early member of the A. S. M. E.; also the Engineers' Club of Boston.

JOHN HASSALL, president of John Hassall, Inc., Brooklyn, nail manufacturer, died at his home on March 12. He was 82 years of age and a veteran of the Civil War. Mr. Hassall is credited with having built the first wire nail machine, in 1851. It was in use in his plant for 52 years and is now on display in the industrial museum of the American Steel & Wire Co. at Worcester.

The Dickson Construction & Repair Co., Youngstown, Ohio, has taken over maintenance-of-way work on the entire system of the Western Maryland Railway, with headquarters at Baltimore. The company is handling the work on a contract basis and has largely retained the old force of laborers, but at reduced wages. J. B. Dickson, formerly a general manager of the Erie railroad, heads the construction company, which likewise has charge of maintenance-of-way work on the Ohio Region of the Erie Railroad.

The H & G Die Head Works of the Eastern Machine Screw Corporation are working 10 hours a day, five days a week, and January and February this year have shown decided improvement.

BOOK REVIEWS

Wealth and Income of the American People. By Walter Renton Ingalls, director of the American Bureau of Metal Statistics, formerly editor of *Engineering and Mining Journal*. Cloth; pp. xiv + 321, 5½ x 8½; G. H. Merlin & Co., York, Pa. Price, \$4.

The poor rewards received by prophets are well known. When the prophecy comes true, it appears as if it had been easy to make the prophecy. The value of the work Mr. Ingalls has done is likely to be similarly underrated. While he presents a great amount of valuable fresh information, his chief work is the dispelling of illusions and the reader accompanies him with such confidence that when it is all over the fact that the illusions did exist is apt to be slighted.

The title does not suggest the real scope of the work. Statements of the wealth and income of the American people are made not as an end, but as a basis for determining what occurred during the war and during the period of extravagance afterward and for forecasting what we are going to be forced to do.

Recently the National Bureau of Economic Research made a careful study and compiled statistics of the income of the people of the United States in each of the years 1909 to 1919 inclusive. The bureau refrains from drawing conclusions from the statistics it gathers. Part of Mr. Ingalls' work is to interpret the findings, but the book is much more than a mere interpretation of these findings, for Mr. Ingalls first makes a careful study of the wealth of the people. The fact is perhaps commonly known that in certain non-census years the Bureau of the Census has presented a statement of what has been called the "wealth" of the United States, but few, probably, know what the figures have been or have any clear conception of what they represent. The latest was for the year 1912, and would therefore be useless for a study of economic changes wrought by the war even if trustworthy, which Mr. Ingalls doubts.

An inventory of the national wealth is obviously very difficult. Mr. Ingalls attempts such an inventory for the two years 1916 and 1920 for comparative purposes, and displays such aptness in guessing the probable error in each item considered and such knowledge of the details as to make even this part of the work of no little interest to the average reader.

Of course the majority of men realize that they entertained illusions as to the economic effects of the war, and they rather pride themselves on having lately seen the light, but Mr. Ingalls' conclusions would indicate that the illusions were greater than have been commonly admitted, hence there has remained much misconception to be dispelled.

The estimates of the internal wealth of the United States are \$268,000,000,000 at the end of 1916 and \$272,000,000,000 at the end of 1920, with a probability that the figure for 1920 is overstated, so that it is doubtful whether there was even the trifling increase indicated. The wealth in each case is, of course, measured in 1913 dollars, there being nothing else conceivably possible as a standard. It is a fallacy that the United States profited during this period. It may have profited during the war prior to its own entrance, but the profits are represented chiefly in debts due to the country, the eventual payment of which is more or less doubtful. One of the fallacies prevalent at the time at least is that the high prices obtained for goods in 1915 and 1916 contained correspondingly large profits, the fact being that much of the excess price was simply payment of the capital necessary to be employed in creating productive facilities, the usefulness of which would afterward disappear.

Mr. Ingalls undertakes to show that the increase in production during the war was greatly overrated, that not enough allowance was made for the increase in prices, so that the physical increase was almost negligible. Thus he deduces that the quantity of raw material produced per capita was about 11.5 tons in 1913, 11.9

tons in 1917 and 11.7 tons in 1918 and 1920, while in every other year since 1913 it was either less or at least no greater than in 1913. Then it is added: "Nor is there any good evidence of the exercise of increased man-power in manufacturing, carrying and trading, but rather are the indications the other way. If there had been no war, the probability is that the American people would have proceeded along the even tenor of their way, adding annually to the national wealth by accounts varying a little according to whether it were a good or a bad year, but in general accumulating at a rate a little in excess of the rate of increase in population."

The fallacy that the war has produced or procured a much higher standard of living is one we know has not been dispelled from the minds of many people. Mr. Ingalls quotes an interview given on as late a date as Aug. 21, 1921, by Samuel Gompers: "Certainly we are going to fight to our utmost the reduction of wages. . . . The workman needs some of the worthwhile things of life, and we are going to fight to see that he gets more than a bare existence." Plausible budgets in support of an income of \$2,000 to \$2,500 for the family have been presented, but the income of the American people does not find the money.

The Great War did not so increase efficiency in production and distribution that the losses of the war would be outweighed and the people as a whole would benefit out of the net result. The war was not only destructive but also it was, broadly speaking, sterile. There was no lasting uplift in the minds of the people. On the contrary, there was deterioration in morale, and also in morals. Of invention in military machinery and methods there was much; in industrial machinery and methods there was some, but on the whole it was disappointing.

This cursory review of Mr. Ingalls' book merely gives a few illustrations of the method of treatment of the theme that runs throughout. As to the corporations and the war, the author says: "The prevalent idea has been, and still is, that the corporations of the United States waxed greatly during the war. They are regarded as comprising the quintessence of profiteering. Taxation has been directed especially toward them. Let us therefore try to ascertain what are the facts." Then with nine pages of analysis he finds "the surpluses were economically fictitious" and "the misconception about this is a part of the tragedy of Wall Street."

The findings of the National Bureau of Economic Research, as to incomes, have been published. What Mr. Ingalls does not analyze the figures, but it is not inappropriate to mention an interesting point in the bureau's findings, that of the total income in 1909, 68.7 per cent went for wages and salaries and 31.3 per cent for management and property. To and including 1914 the percentage for wages and salaries increased, while in the next two years there was a sharp drop, because prices and profits advanced more quickly than wages, the proportion becoming 66.7 per cent in 1916. Then the proportion increased, so that in 1918 it was 77.3 per cent for wages and salaries and 22.7 per cent for management and property. There the bureau's division ends. For 1919 Mr. Ingalls estimates 80 per cent and 20 per cent respectively. He believes there must be a reversion to 75 per cent or 70 per cent, or perhaps less in the proportion for labor and a retraction in the scale of living.

The above gives but hints of Mr. Ingalls' various conclusions. The book should be read by those who wish information and are willing that new lines of thought be suggested to them. The style is lucid throughout.

NEW BOOKS RECEIVED

Gleaserel-Handbuch.—Compiled by the German Society of the Iron Foundry Industry. Pages 344, 6½ x 9½ in.; Illustrations, 34. Published by R. Oldenbourg, Gluckstrasse 8, Munich, Germany. Price, 300 marks.

Engineers License Laws.—Compiled by the American Association of Engineers, 63 East Adams Street, Chicago. Pages 136, 8½ x 6 in., paper covers. Price, 50 cents.

IRON AND INDUSTRIAL SHARES

Investment Buying Appears When Steel Shares Are Offered for Sale

Increased mill activity and higher prices for mill products so far have had little appreciable influence on steel company share values. Such securities have ruled firm the past week, however, due to the appearance of good investment buying whenever shares were offered for sale. The offering in this country of a large issue of a French steel producers' securities in banking circles is admitted as an act of confidence in the domestic industry. Most of the anticipated adverse 1921 reports have been issued by our steel corporations, and investors and bankers feel we have entered a period when slow yet steady expansion will be in order. Better buying of farm machinery already reflects higher prices for grains and cotton, and of railroad equipment increasing transportation revenue. On the strength of such buying, there has been more inquiry for shares of those corporations supplying these things.

The range of prices on active iron and industrial stocks from Monday of last week to Monday of this week was as follows:

Allis-Chal., com.. 45 - 47½	Int. Har., pf.... 108½-109
Allis-Chal., pf.... 91 - 92	Inland Steel 49 - 49½
Am. B.S. & F., cm. 57 - 61	Lacks. Steel 46 - 48½
Am. B.S. & F., pf. 101½-102½	Lima Loco., com. 94½-104½
Am. Can., com... 40½ - 45½	Lima Loco., pf. 102 - 104
Am. Can., pf.... 103½-104½	Midvale Steel ... 29½ - 30½
Am. C. & F., com. 149½-156½	Nat.-Acme 12 - 13½
Am. C. & F., pf.... 119½-121½	Nat. E. & S. com. 38½- 40
Am. Loco., com.. 107½-111½	Nat. E. & S., pf. 81 - 85½
Am. Loco., pf.... 117 - 117½	N. Y. Air Brake 63 - 66½
Am. Rad., com... 87½ - 88½	Nova Scotia Steel 22½- 23
Am. St. Ed., com. 32½ - 34½	Otis Steel 9½ - 10½
Am. St. Ed., pf.. 96 - 96½	Pressed St., com. 65½- 69½
Bald. Loco., com. 104 - 108½	Pressed St., pf.... 92 - 93
Bald. Loco., pf.. 108½-109	Rv. St. Spg., com. 97 - 98½
Beth. St., com... 58 - 59½	Replogle Steel ... 28½ - 30½
Beth. St., Cl. B. 62½ - 65½	Republic, com. ... 48 - 51½
Beth. St., 8% pf. 106½-110	Republic, pf.... 76½- 79½
Brier Hill, pf.... 94 - 94½	Sloss, com. 34½ - 37
Brit. Rm. Steel.. 8½ - 8½	Steel of Can. 58 - 58
Brit. Rm. St., 2 pf 19½- 21½	Steel & Tube, pf. 68 - 70
Chlc. Pneu. Tool. 65½ - 66	Stewart-Warner .. 33½- 36½
Colo. Fuel 26½ - 27½	Superior Steel ... 28 - 28
Cruc. St., com... 55½ - 58	Un. Alloy Steel.. 27½- 28½
Cruc. St., pf.... 83 - 85	U. S. Pipe, com.. 28½- 31½
Dom. Steel 22 - 23	U. S. Pipe, pf.... 63½- 65½
Deere & Co..... 71½ - 72	U. S. Steel, com.. 93½- 95½
Gen. Electric ... 152½-157	U. S. Steel, pf.... 116 - 117½
Gt. No. Ore Cert. 34½ - 34½	Vanadium Steel... 34½- 37½
Gulf States St... 68½ - 73½	Va. I. C. & Coke. 45 - 46½
Gulf. S. St., 1 pf.. 90 - 90	W'house A. R.... 85 - 100
Harb.-Walker ... 100 - 100	W'house Elec. ... 54½- 58
Int. Har., com... 90½- 92½	

Industrial Finances

Preliminary statement of General Motors Corporation, for the year ended Dec. 31, 1921, shows that, after providing for depreciation, inventory adjustments, etc., and setting up a reserve of \$14,000,000 to cover anticipated losses not yet ascertainable, there was a deficit of \$38,680,770. This compares with net income of \$37,750,375 in 1920, which, after deduction of preferred and debenture dividends, was equivalent to \$1.58 a share earned on the common stock. Deficit, after dividends for 1921, was \$65,459,056, against a surplus of \$14,236,660 in the preceding year. Profit and loss surplus at the close of last year totaled \$55,814,160, compared with \$121,273,217 on Dec. 31, 1920.

The Taylor-Wharton Iron & Steel Co. for 1921 reports a deficit of \$1,148,827, after charges for interest and depreciation, comparing with a surplus of \$32,045 in the previous year.

New York Air Brake Co.'s report for the year ended Dec. 31, 1921, shows net loss, after charges and taxes, of \$458,699. This compares with net profits of \$751,860, equivalent to \$7.51 a share in the preceding year, earned on the \$10,000,000 capital stock in the preceding year.

Earnings of American Steel Foundries from operations last year, after deducting manufacturing, selling and administration expenses, were \$1,423,187.61. Adding miscellaneous income of \$325,885.47 and deducting for depreciation \$512,784.55 and an aggregate of \$566,329.48 for interest charges, for earnings of subsidiary company appertaining to minority stockholdings and for excess profits and income taxes, leaves a balance of net profits for the year of \$875,009.05. Cash dividends of 7 per cent on the preferred stock and \$3 a share on the common stock were declared during the year; the statement shows that the common dividend of \$1,833,090 was paid largely out of surplus. The unappropriated surplus now stands at \$8,971,083.03. The appropriated surplus is \$3,314,143.50.

The National Lead Co. is one of the few concerns able to report satisfactory earnings for last year. Its net earnings for 1921 after deducting all expenses, reserves, etc., amounted to \$3,481,513. Dividends deducted from these earnings

amounted to \$2,945,056. The surplus to Dec. 31, 1921, was \$20,880,874.

The report of the Worthington Pump & Machinery Corporation for the year ended Dec. 31, 1921, shows net income of \$1,810,949 after interest, depreciation and federal taxes, but before inventory losses. A charge of \$1,999,579 was made for inventory adjustments, making net loss for the year of \$188,630. In 1920 the company reported net income after interest, depreciation and federal taxes of \$2,030,923, equivalent after allowing for annual dividend requirements on Class A and Class B preferred stock, to \$7.85 a share, earned on the \$12,992,149 common stock.

The annual report of the National Acme Co., Cleveland, for the year 1921 shows net sales of \$3,879,072, as compared with \$15,758,921 in 1920. The operating loss for 1921 was \$920,987 and total losses, including \$2,315,137 as adjustments on inventories, were \$3,727,498. Deducting inventory adjustments, depreciation and taxes, the direct operating loss was \$462,500. The size of the inventory loss is explained by the statement that Treasury Department rulings prevented full inventory readjustments during 1920, only \$855,000 being written off during that year. The surplus Dec. 31, 1921, was \$1,536,775.

The Electric Controller & Mfg. Co., Cleveland, in its annual report for 1921 shows an operating loss for the year of \$240,719. After paying dividends and retiring a portion of the preferred stock the surplus was decreased \$441,101. Inventories have been reduced more than \$200,000 and the current assets are \$954,128, against current liabilities of \$113,340.

After all charges, depreciation and federal taxes, the Yale & Towne Mfg. Co., holds, etc., showed net profits last year of \$1,269,214, equivalent to \$25.39 a share on its \$4,998,774 stock. In 1920 the profits were \$2,324,470, or \$46.51 a share. On Dec. 31 last the profit and loss surplus stood at \$11,780,131, as against \$11,465,795 at the close of 1920.

The Northway Motors Corporation, 1 Beacon Street, Boston, manufacturer of motor trucks, is perfecting plans for a merger with a number of allied companies, with a note issue of \$400,000 to carry out the details of the amalgamation. Arrangements for the manufacture of 1500 motor trucks during the present year, recently announced, will be changed to a lower production schedule.

Harry J. Lewis and L. C. Bardy have been appointed receivers for the Pittsburgh Steel Tube Co., with a plant at Beaver, Pa.

Directors of the Westinghouse Air Brake Co., Wilmerding, Pa., at a meeting held March 9, reduced the common stock dividend from \$7 annually to \$4, declaring a quarterly dividend of \$1 per share, payable April 29 to stockholders of record March 31, as against \$1.75 quarterly, the rate from 1918 to 1921, inclusive. Part of the dividend disbursements in 1921 were from the surplus. The annual report of the company for 1921 shows net profits of \$1,412,490 and a surplus of \$12,931,100.

The Superior Steel Corporation, Pittsburgh, in its report for 1921, shows a net operating loss for the year after expenses and depreciation charges of \$273,395, as compared with a net profit in 1920 of \$1,022,820. After deducting sinking fund and dividend requirements in 1921, there was a deficit of \$1,115,373, against a surplus of \$205,547 in 1920.

Penn Seaboard Steel Deficit

The 1921 report of the Penn Seaboard Steel Corporation shows a deficit after expenses, tax, interest, etc., of \$749,045. This compares with a deficit of \$768,247 in 1920.

The income account compares as follows:

	1921	1920
Loss after expenses.....	\$207,188	*\$379,366
Interest, sinking fund, etc....	541,857	388,881
Deficit	749,045	768,247

*After expenses, adjustment of inventory, and Federal tax.

The profit and loss account shows surplus on Jan. 1, 1921, of \$4,915,251. Proceeds from additional shares issued for purchase of Rockaway Rolling Mills, Titusville Porch Company, etc., were \$1,660,223, making a total of \$6,575,479. Deducting deficit of \$749,045 in 1921, adjustment and extraordinary charges of \$847,434, and dividends on Tacony Steel preferred stock of \$18,832, the surplus as of Dec. 31, 1921, amounted to \$4,960,168.

The Rendall Steel Products Co., Real Estate Trust Building, Philadelphia, has been appointed sole United States agent for a term of years of Mellowes & Co., Ltd., Sheffield, and is distributing that firm's catalog descriptive of lead sheathed skylight bars.

Machinery Markets and News of the Works

NO DEFINITE TREND TO MARKET

Machine-Tool Sales and Inquiries in Small Volume with No Improvement

Better Operation of Industrial Plants Brings Hope, However, That Betterment Will Come Soon

Indications are still lacking of any definite trend toward improvement in machine-tool business. During the past week in some markets, notably New York and Chicago, there has been extreme dullness. In New York it is noted that even inquiries have fallen off.

The most hopeful sign of prospective increase in machine-tool buying is the gradually increasing operation of metalworking plants. The interest of machine shops in new equipment has been manifested by the fairly large number of inquiries issued since the first of the year, but buyers continue hesitant about placing orders.

A number of important projects which involve substantial purchases of machine-shop equipment are pending, but action has been repeatedly deferred.

New York

New York, March 14.

No improvement in machine-tool business in this market has developed in the past week. In fact many sellers report that the situation has turned quieter. There are fewer inquiries, while orders are very few and usually for single machines. A large dealer handling both new and second hand machines reports that sales are about equally divided between new and used tools.

The New York Central Railroad has placed an order for its lines West for a 90-in. driving wheel lathe.

The auction sale of the machine-tool equipment of the Owen Magnetic Motor Car Co., Wilkes-Barre, Pa., March 7, 8 and 9, developed prices and disclosed a demand that was highly pleasing to the machine-tool trade. The sale was attended by many dealers, but a large part of the machines sold were purchased by buyers who not only paid good prices but also paid extra for loading for shipment. Including both large and small tools, the prices obtained were something better than 50 per cent of to-day's market. All of the equipment was high-class. Some of the prices obtained follow:

- One 42 x 42 in. x 12 ft. Cincinnati planer, \$3,600.
- One 42 x 42 in. x 12 ft. Cincinnati planer with two heads, \$2,050.
- One 36 in. Bullard turret lathe, \$3,250.
- One 14 x 72 in. Norton grinder, \$1,550.
- One No. 4 Cincinnati vertical milling machine, \$1,600.
- One No. 4 Cincinnati vertical milling machine, \$1,300.
- One No. 3 Hendey cone-driven milling machine, \$1,532.
- One No. 2 Brown & Sharpe plain milling machine, \$560.
- One No. 2 Brown & Sharpe plain milling machine, \$750.
- One No. 0 Giddings & Lewis horizontal boring machine, \$2,000.
- One 22-46 x 12 ft. Putnam drop lathe, \$1,100.

Herbert Crapster, 1 Madison Avenue, New York, dealer in railroad equipment, reports the sale to Worcester, Mass., of three 6-ton gasoline locomotives for sewer work.

The crane market is quiet, few sales and new inquiries being reported the past week. Makers of chain blocks and similar hand power equipment, generally sold out of stock, report a tendency on the part of dealers to cut the market prices to unloaded stocks. Of pending business, only the order of the American Car & Foundry Co. for two 16-ton, 70-ft. and 90-ft. span overhead traveling cranes has been placed. It is reported to have been awarded to the Pawling

Orders are expected soon, however, for about 20 tools and 20 cranes for extensions to the Whitaker-Glessner steel plants, and the West Leechburg Steel Co. is expected to buy a 16-in. continuous hot strip mill and auxiliary equipment within a week or two.

About \$100,000 worth of mail trucks, platform trucks, mail conveying machinery and other equipment has been purchased for the new Union Station in Chicago.

The Western Clock Co., La Salle, Ill., has purchased about 20 automatic screw machines. The H. H. Franklin Mfg. Co., Syracuse, N. Y., has bought several lathes.

Railroad buying is in small volume. The New York Central has bought a 90-in. driving wheel lathe and the Glouchester Railroad is reported to have bought several tools. The Rutland Railroad's tool requirements total about \$40,000 and those of the Central of Vermont about \$25,000, but official approval of these lists, it is understood, has not yet been given. The Bangor & Aroostook Railroad is in the market for four small tools. The Santa Fe has added a few tools to its outstanding inquiries.

A considerable improvement in the demand for locomotive cranes is an indication of expansion of general construction work.

& Harnischfeger Co. Among recent export sales was a 5-ton Reading hand power crane sold by Arthur Appleton, 29 Broadway, New York, to the New Sabinas Co., Cloete, Coahuila, Mexico.

The Ward Baking Co., Southern Boulevard and St. Marys Avenue, New York, will equip its machine shop with lathes, drills, grinders and other tools. Purchases will be made at an early date.

Officials of the Standard Oil Co. of New Jersey, 26 Broadway, New York, are perfecting plans for the formation of the Standard Oil Co. of Argentina, a subsidiary company, for the operation of oil wells and refineries in the Argentine Republic. About 25,000 acres in the Neuquen field, Argentina, have been acquired and operations will commence at an early date.

The Staten Island Rapid Transit Co., St. George, S. I., operated by the Baltimore & Ohio Railroad Co., Charles Janaway, vice-president in charge, Baltimore, has surveys and plans in progress for the electrification of its entire line, with initial installation to include the division between St. George and Tottenville. The work will comprise power houses, distributing system, car equipment, etc. T. A. Davis is electrical engineer of the Baltimore & Ohio system.

The Advance Boiler Co., Poughkeepsie, N. Y., has awarded a contract to the H. K. Ferguson Co., Euclid Avenue, Cleveland, for a one-story foundry, 100 x 300 ft., brick and steel, to cost about \$100,000, including equipment.

Hugh L. Cooper & Co., 101 Park Avenue, New York, consulting engineers, have tendered a proposal to the International Joint Commission, Toronto, for the construction of a series of hydroelectric generating plants on the St. Lawrence River, with dam and main power station near Morrisburg, Ont. The initial installation will comprise 400,000 hp. capacity, and is estimated to cost in excess of \$50,000,000. The project will be carried out by private capital, under the direction of the Cooper company and authority as granted by the commission. The entire development totals 1,000,000 hp., with investment of about \$150,000,000.

William R. Noe & Sons, 43 East Tenth Street, New York, manufacturers of portable and other electric lamps and fixtures, have purchased property at Willoughby Avenue and Raymond Street, totaling about 18,000 sq. ft., for a three-story, reinforced concrete factory, plans for which are being drawn.

The Cox Klemm Aircraft Corporation, College Point, L. I., manufacturer of airplanes and parts, will install new equip-

ment in its machine shop, including rivet punches, shears and bench tools.

The National Enameling & Stamping Co., 411 Fifth Avenue, New York, is arranging for financing, either by bond or note issues, to an amount of \$15,000,000, the majority of the proceeds to be used for plant extensions and improvements.

The Remington Arms & Ammunition Co., 25 Broadway, New York, will devote a portion of its plant at Ilion, N. Y., to the manufacture of a new cash register and parts, and it is proposed to have the initial machines ready for marketing at an early date. Branch offices will be established in a number of cities.

The Light Car Corporation, 401 West Fourteenth Street, New York, has leased property at 171 Christopher Street for the establishment of a new automobile plant. The site is improved with a two and two and one-half story building, 45 x 95 ft.

The Police Department, 240 Centre Street, New York, will use a portion of a fund of \$1,000,000 for the erection of an automobile service building and general machine repair works. A site for the structure has been selected under the Williamsburg bridge. Police Commissioner Enright is in charge.

The Long Island Lighting Co., 50 Church Street, New York, is arranging a fund of about \$1,000,000 for extensions and improvements in its electric power plant and system. A new 10,000-hp. generator and auxiliary electrical equipment will be installed at the power house at once.

The Board of Estimate, Municipal Building, New York, has granted an appropriation of \$600,000 to the Borough of Queens, Long Island City, for the construction of a new incinerator plant and bulkheads, to include electrical apparatus, conveying and material-handling equipment, etc. The Borough engineer is in charge.

A power plant, 67 x 165 ft., with radial brick stack 175 ft. high, will be erected by the Clark Thread Co., 260 Ogden Street, Newark, N. J., at its new bleaching plant at Bloomfield, N. J. Work will commence at once. The installation will comprise two 500-hp. boilers, one 500 kw. generator, and auxiliary equipment. The entire plant will cost \$200,000, exclusive of site.

The Board of Freeholders, Court House, Newark, has commissioned Guilbert & Betelle, architects, 546 Broad Street, to prepare preliminary plans for a three-story, brick and steel vocational school, 36 x 184 ft., with two wings each 40 x 120 ft., to be erected at Bloomfield Avenue and Franklin Street, Bloomfield, N. J., estimated to cost \$500,000. It will include machine shops, foundry, electrical department, etc.

The Inter-State Safety Appliance Co., Moorestown, N. J., will install new equipment for stamped metal production at its plant.

A vocational department will be installed in the new high school to be erected by the Board of Education, Millville, N. J., estimated to cost \$250,000. N. Corson is secretary.

Alfred Hofman & Co., Union, N. J., recently organized, will take over the plant and business at 150-52 Hudson Avenue, heretofore operated in the name of Alfred Hofman. They will manufacture special machinery and parts, including equipment for the production of electric lamps. Alfred Hofman is president, and Victor Anderson, vice-president.

Electric motors and other electrical and mechanical equipment will be installed in the new plant to be erected by the Paterson Industrial Development Co., 5 Cbit Street, Paterson, N. J., and occupied under a 20-year lease by the Periodical Press, 80 Lafayette Street, New York. It will cost about \$400,000, including machinery.

Export Opportunity

J. R. Smallacombe, First Avenue, Joslin, South Australia, desires catalogs and information regarding a small plant for the manufacture of aluminum sauce pans and other aluminum utensils.

Chicago

CHICAGO, March 13.

Evidences of a definite trend in the machine tool business are still lacking. Some local machinery houses report a slight gain in orders, while others find the situation as dull as ever. That there are signs of a slow recovery of industrial activity, however, is rather generally agreed and it is only a question of time when the market will feel the effects of this betterment in the general situation.

The local tractor plant of the International Harvester Co., which resumed operations only a few weeks ago after a long period of idleness, is now running at close to 75 per cent. Other shops, notably those making railroad supplies, are steadily getting back on a better operating basis.

Prominent among recent orders booked in this district is one placed by the Western Clock Co., La Salle, Ill., for 24 automatic screw machines. A local manufacturer has placed

an order for one 4-ft. radial drill, one 20-in. upright drill, one 14-in. x 6-ft. engine lathe and a sensitive drill. The Santa Fe has sent out the following additional inquiries: One heavy duty 24-in. crank shaper; one heavy duty-type gap engine lathe with a swing of 18 in. overbed, 36 in. through gap with bed 14 ft. long; one 54-in. boring mill with two heads; two 18-in. x 8-ft. heavy duty lathes; one 4-spindle combined turning and threading machine for straight and radial stays, and one 2-in. heavy duty-type bolt cutter. The inquiry of the Universal Portland Cement Co., referred to last week, calls for the following machines for delivery at Huntington, Ind.:

- One 60-in. x 26-ft. heavy-duty engine lathe.
- One 84-in. vertical boring mill.
- One type "J" Gisholt turret lathe with 28-in. swing and 7½-in. spindle bore.
- One four-head quick return planer with bed 42 in. wide and 12 ft. in length.
- One 24-in. x 15-ft. engine lathe.
- One No. 1 horizontal spindle milling machine with table 14 in. x 8 ft.
- One cold cut circular saw to cut material up to 12 in. in diameter inclusive.
- One 1000-lb. single frame steam hammer.

The only new price change reported is the reduction of 20 per cent on pipe machines by the Williams Tool Co., Erie, Pa.

The Red Oak Bridge & Iron Works, Red Oak, Iowa, is in the market for a second-hand steel derrick with an 80-ft. mast and 100-ft. boom to be guyed with 6½-in. galvanized wire ropes; capacity 15 tons. Must be complete with slewing attachments and operated by electric motor.

The Hanna Engineering Works, Chicago, has received an order from the Wyatt Metal & Roller Co., Dallas, Tex., for a 126-in. reach, 18-24-in. gap, 80-ton riveter, and an order from Imperial Oil, Ltd., Sarnia, Ont., for a 102-in. reach, 15-18-in. gap, 70-ton riveter.

The Boyle Ice Co., 847 Larabee Street, Chicago, has let contract for a two-story ice manufacturing plant at 542 Linden Avenue, Evanston, Ill., to cost \$40,000.

The National Phonograph Co., 824 Albert Street, Chicago, has leased a three-story factory containing 50,000 sq. ft. of floor space, at 2837-47 North Ashland Avenue, for 10 years. The lessor sold \$15,000 worth of wood-working machinery and equipment to the lessee.

J. Huether, manufacturer of store fixtures, 1315 West Twenty-first Place, Chicago, has let contracts for a one-story factory, 123 x 124 ft., at 4511-21 Broadway, to cost \$20,000.

The Holton-Seelye Co., realtor and builder, 140 South Dearborn Street, Chicago, has let contract for a one-story factory, 50 x 150 ft., at 5100-8 Ravenswood Avenue, to manufacture electric irons, and to cost \$10,000.

Ernest J. Kruetgen & Co., engraver, 626 Federal Street, Chicago, will build a two-story plant, 50 x 100 ft., at 913-21 North Fairfield Avenue, to cost \$35,000.

The James T. Igoo Co., printer, 117 West Harrison Street, Chicago, has purchased the northwest corner of Van Buren and Jefferson streets, 100 x 125 ft., and will erect a ten-story printing plant to cost \$450,000.

A fire in the shop of the Passenger Elevator Safety Lock Co., 119 North Washington Street, Peoria, Ill., recently did damage to the extent of \$15,000, of which \$10,000 represented damage to machinery.

The Cotta Transmission Corporation, Rockford, Ill., recently incorporated, has taken over the business of the Cotta Transmission Co., manufacturer of Cotta transmissions, and will continue to produce the same line of constant mesh transmissions for trucks, tractors, buses and gasoline locomotives. No increase in plant space or equipment is contemplated at present.

Work is rapidly progressing on the renovation of the former Fisk-Jencks foundry building at Aurora, Ill., recently purchased by the Diversey Foundry Co., Chicago. It is expected that the plant will be ready to resume operations in a short time.

The Jones Road Machinery Co., Galva, Ill., has been re-organized, the new corporation having taken over the entire stock and equipment of the old company. Under the terms of the transaction Charles Jones, the inventor of the Jones road machinery, will receive a royalty on each machine manufactured, besides the original purchase price. The new company has \$50,000 capital stock and the officers are: President, George Jones; vice-president, E. H. Fielder; treasurer, H. A. Smith; secretary, Arthur H. Johnson.

The Village Board, Leigh, Neb., contemplates the purchase of a 100-hp. oil engine for the municipal electric light and power plant.

The South Chicago Radio Electric Co. has been formed for the manufacture and installation of wireless telephone

apparatus. Headquarters are at Peulecke's Garage, 9237 Houston Street, Chicago. Walter Peulecke is business manager and construction engineer.

A power house, electrical and mechanical equipment, and other machinery will be installed in the three-story plant, 60 x 140 ft., to be erected by the Mid-West Box Co., 111 West Washington Street, Chicago. Matteson, Ill., estimated to cost about \$300,000. Harvey C. Miller, 112 West Adams Street, Chicago, is architect. K. I. Herman is in charge.

The Gopher Machinery Co., New Prague, Minn., has plans under way for a one-story factory, 80 x 100 ft., to cost about \$50,000. It will form the first unit of a plant. J. C. Niemeyer, 633 Endicott Building, St. Paul, Minn., is engineer.

The Common Council, Eagle Grove, Iowa, has tentative plans under consideration for the erection of a municipal light and power house.

The Hurley Machine Co., West Twenty-second Street and South Fifty-fourth Street, Cicero, Chicago, manufacturer of electrically operated washing and ironing machines, has acquired the plant and business of the Superior Machine Co., De Kalb, Ill., manufacturer of similar equipment. The new owner will maintain operations at the Superior works as heretofore and no immediate change will be made.

The International Harvester Co., 606 South Michigan Avenue, Chicago, will take bids at once, through Day & Zimmerman, 608 Chestnut Street, Philadelphia, for its new plant on West Wayne Street, Fort Wayne, Ind., for the manufacture of automobile and tractor equipment, and machinery. The work has been held in abeyance for several months, and is estimated to cost about \$500,000.

The Common Council, Granite Falls, Minn., is considering plans for a municipal electric power plant, with improvements in present station. L. M. Marcuson is city clerk in charge.

Architects Michaelson & Rognstad, 3815 West Congress Street, Chicago, are preparing plans for a one-story foundry and machine shop, the owner's name and location to be announced later.

The Western Instrument Co., Chicago, recently organized to manufacture electric precision equipment, has leased property at 1001 Washington Boulevard, totaling about 8,000 sq. ft. for its new plant. A department will be operated for brass finishing and plating. Julius Severus is vice-president and general manager.

The Northwestern Iron Works, Devils Lake, N. D., is considering the erection of a two-story and basement addition. Plans will be prepared in the near future. Samuel A. Hahn is president.

A vocational department will be installed in the two-story and basement high school to be erected at Preston, Minn., estimated to cost \$150,000. Tolz, King & Day, Inc., 1410 Pioneer Building, St. Paul, Minn., are architects.

Buffalo

BUFFALO, March 13.

The Richardson & Boynton Co., 260 Fifth Avenue, New York, manufacturer of stoves, furnaces, etc., with plant at Dover, N. J., is completing arrangements for the purchase of the property and buildings and equipment of the W. A. Case & Son Mfg. Co., Kensington Avenue, Buffalo, manufacturer of similar products. It will be used for a branch plant, transferring certain branches of manufacture from the Dover works to the new location.

The Board of Education, Buffalo, has adopted a resolution requesting the City Council for an immediate appropriation of \$3,500,000 for the erection of seven trade and vocational schools to cost \$500,000 each, including equipment. Plans will be prepared at once.

Fire, March 5, destroyed the annex to the erecting shops of the Pennsylvania Railroad Co., Olean, N. Y., with loss estimated at about \$100,000, including pipe shops, airbrake shops, paint shops and other structures. The buildings were erected as an extension to the main locomotive shops during the war, and it is undecided whether or not they will be rebuilt. The principal erecting shop, damaged by the fire, will be repaired at once.

The Vacuum Oil Co., 61 Broadway, New York, operating refineries at Rochester and Olean, N. Y., has awarded contract to the White Construction Co., Inc., 95 Madison Avenue, New York, for an addition to its Olean plant, with power house, to cost about \$1,000,000, including equipment.

The Acme Pattern & Machine Co., 1553 Niagara Street, Buffalo, has leased a portion of the plant of the Thorpe Co., Courtright Street, Bridgeburg, Ont., for the establishment of a branch works. Possession will be taken at once.

A vocational department will be installed in the two-story high school, 130 x 130 ft., to be erected at Williamsville, N. Y., estimated to cost about \$175,000.

Edwin J. and John H. Wolf, operating Wolf's Garage, 378 East Delavan Avenue, Buffalo, will install an automobile repair department.

The New York State Gas and Electric Corporation, Ithaca, N. Y., has arranged for a bond issue of \$700,000, the proceeds to be used in part for extensions and improvements in electric power plant and system. S. J. Magee is president.

A vocational department will be installed in the three-story high school, 128 x 215 ft., to be erected at Hornell, N. Y., estimated to cost \$350,000. Plans are being drawn by Tooker & Marsh, 101 Park Avenue, New York, architects and engineers.

The G. A. Aber Mfg. Co., Watertown, N. Y., will install equipment for the manufacture of automobile motors and parts.

The Mutual Ice Co., Erie, Pa., has plans under way for the erection of a new one-story ice-manufacturing plant, estimated to cost about \$65,000. A. C. Bishop & Co., 426 Guardian Building, Cleveland, are architects and engineers.

Cleveland

CLEVELAND, March 13.

Orders and inquiries for machine tools continue to gain, and if the present volume of business holds up March sales will show a fair increase over January and February. Orders are still mostly for single machines, but some buying is being done in lots of two or three tools. Sales are confined for the most part to small and medium size machines, and the business is well scattered among various metal-working industries. Some orders are being placed by automobile parts manufacturers, but very little business has come from automobile plants. The placing of some railroad business has been deferred because of the possibility of a coal strike.

The demand for locomotive cranes has increased considerably, orders coming from various sources particularly from contractors and cement companies. A few export orders are also coming out. The city of Cleveland has placed an order for an 18-ton Orton & Steinbrenner locomotive crane and is in the market for a second crane. The Brown Hoisting Machinery Co. has increased its plant operations, largely for locomotive cranes, from 32 to 44 hr. per week. There is also a better volume of orders coming out for hand operated travelling cranes.

The Erie Railroad has leased several of its large car and locomotive shops to the Meadville Machinery Co., which took over the operation of the shops March 1. They include those at Hammond and Huntington, Ind., Marion, Gallon, Dayton and Cleveland, Ohio, and Elmira, N. Y., as well as other shops. The Meadville Machinery Co. was recently incorporated and its officers include William Schlafke, president, and W. C. Cotton, secretary and treasurer.

The Dover Tank & Plate Co., Dover, Ohio, has been incorporated with a capital stock of \$24,000 and has taken over the plant of the Acme Boiler Works, Dover. It will specialize in the manufacture of electric welded tanks.

The Lisbon Agricultural Lime Co., Lima, Ohio, has been incorporated with a capital stock of \$50,000 and will operate the plant of the Lisbon Lime Co., which will be enlarged and new equipment installed.

The Chastain Automatic Headlight Control Co., Conneaut, Ohio, has been incorporated with a capital stock of \$50,000 and will make automatic automobile headlight controls. It is stated that a factory will be erected. W. J. Chastain is president.

New England

BOSTON, March 13.

Sales of individual used machine tools in this district the past week in the aggregate were larger than a week ago. The market, however, is far from active. Competition for business from used tool dealers and among manufacturers is bringing out some low prices from the latter, although few if any changes are being made in list quotations. Sales the past week include one No. 164 Toledo press and one No. 84 Bliss reducing press to a South Boston manufacturer of silverware; one No. 40E used Perkins press to a Boston manufacturer of leather buttons; one 6 x 6 x 1/4-in. double angle shear to the Lamson Co., Lowell, Mass.; conveyors; and a new 20-in. brass working lathe to the Boston & Albany Railroad.

Inquiries have increased, mostly for single used tools, however. The Bangor & Arctostook Railroad is in the market for four new small tools. The Rutland Railroad's list calls for the expenditure of about \$45,000, and includes a wheel press, shaper and some smaller tools and pumps. This list has not had the official O. K., however, nor has the Central Vermont Railroad's, which involves about \$25,000 worth of

machine tools. A Laconia, N. H., maker of textile mill equipment has bought practically everything on its list excepting a fairly large lathe and shaper, negotiations on these still being in progress. The United Fruit Co., Boston, wants a 14-in. lathe for the Tropico Radio Telegraph Co. The United Lace & Braid Co., Auburn, R. I., is equipping a complete machine shop for the manufacture of its own machinery.

Small tools and machine tool parts continue in good demand, prices on most of which are firmer. The local market on Critchley reamers, however, is now 35 per cent discount, heretofore it was 25 per cent.

The American Sanitary Products Co., Stamford, Conn., organized more than a year ago, will begin at once the erection of a 40 x 60 ft. addition.

The Board of Commissioners, Wakefield, Mass., is considering plans for extensions and improvements in the municipal electric lighting plant to cost about \$50,000.

The Central Maine Power Co., Augusta, Me., has arranged for a bond issue of \$810,000, a portion of the proceeds to be used for extensions and improvements in its hydroelectric generating plants and system. Harvey D. Eaton is president.

Barker & Barker, 86 Page Street, Providence, R. I., manufacturing jewelers, have awarded contract to Mahoney & Tucker, 72 Weybosset Street, for a new factory, 10 x 100 ft. Edgar R. Barker is head.

A vocational department will be installed in the two-story high school to be erected at Laconia, N. H., 125 x 164 ft., and estimated to cost \$400,000. Bids will be asked early in April by P. S. Avery, 99 Chauncy Street, Boston, architect.

The Cambridge Electric Light Co., Cambridge, Mass., has filed plans for the erection of a two-story power house at Western Avenue and Blackstone Street to cost \$160,000.

The Board of Water Commissioners, New Britain, Conn., will install a new Diesel engine and auxiliary operating equipment at the Polkville pumping station.

A vocational department will be installed in the new high school to be erected at Petersboro, N. H., plans for which are being drawn by John P. Kingston & Son, 507 Main Street, Worcester, Mass., architects.

Reeds & Thorpe, 60 Prospect Street, Hartford, Conn., engineers, have started work on the new power house to be erected at the plant of the Handel Co., manufacturer of lamps and fixtures, East Main Street, Meriden, Conn.

The Magna Automobile Co., Division Street, Holyoke, Mass., is planning to build a two-story garage, sales and service station to cost about \$50,000.

The town of Millinocket, Me., plans a vocational department in the new \$400,000 high school to be erected. Harry S. Coombs, 11 Lisbon Street, Lewiston, is the architect.

Morris Spirt, 129 Willow Street, Waterbury, Conn., is having plans prepared by C. Jerome Bailey, architect, 65 Bank Street, for a one-story 50 x 110-ft. garage and service station.

Philadelphia

PHILADELPHIA, March 13.

The Philadelphia Steam Heating Co., Juniper and Cherry streets, Philadelphia, heating and equipment engineer, has awarded contract to George H. Evans, 105 North Fourteenth Street, for a two-story and basement factory, 24 x 51 ft., at 3316-20 Lancaster Avenue.

A power plant will be constructed by Albert M. Greenfield & Co., Fifteenth and Chestnut streets, Philadelphia, on property recently acquired at Fifteenth and Ionic streets, for service for a new eighteen-story office building to be erected on adjoining site. The entire project will cost, \$4,000,000.

A vocational department will be installed in the high school to be erected at Jenkintown, Pa., estimated to cost about \$170,000.

The Bureau of Yards and Docks, Navy Department, Washington, will make extensions and improvements in the power plant at the Philadelphia Navy Yard to cost \$240,000.

The United States Radiator Co., Detroit, has leased the three-story building at the corner of Twenty-fourth and Vine streets, Philadelphia, totaling about 27,000 sq. ft., for a factory branch.

The General Processing Co., Trenton Avenue and Willard Street, Philadelphia, will install new conveying machinery, shafting, pulleys and other transmission equipment, at its textile mill.

Electric motors, power apparatus and other mechanical equipment will be installed in the first unit of the new four-story building to be erected by the Public Ledger Co., Independence Square, Philadelphia, at Seventh and Sansom streets, estimated to cost \$2,000,000.

C. Kohn, Morris Building, Philadelphia, will soon com-

mence the erection of a two-story plant at Glenwood Avenue and Oxford Street, 125 x 300 ft., for the manufacture of boilers, radiators and other heating equipment. It is estimated to cost \$80,000.

Vocational equipment will be installed in the new junior and senior high schools to be erected by the Board of Education, Keystone Building, Philadelphia, in different parts of the city, plans for three of which have been prepared, estimated to cost \$800,000, \$200,000 and \$150,000, respectively.

The Trenton Emblem Co., 120 Hamilton Avenue, Trenton, N. J., has filed plans for a one-story foundry.

Subject to final approval by the Court, the Waterbury Clock Co., Waterbury, Conn., has acquired the entire property and business of Robert H. Ingersoll & Brother, manufacturers of watches, bankrupt, for \$1,500,000. The sale includes the plant at Trenton, N. J., with rated capacity of 8000 watches a week, and the factory at Waterbury, with output of 11,000 watches weekly. Both plants will be continued by the purchasing company, and operations will be increased at the Trenton works, now running on a curtailed schedule.

The State Highway Department, Broad Street Bank Building, Trenton, N. J., R. J. Wasser, State engineer, will break ground at once for the erection of a one-story automobile service and repair works, 106 x 400 ft., at Fernwood, N. J., to cost \$95,000.

The Pennsylvania Edison Co., Easton, Pa., has arranged for a preferred stock issue of \$1,350,000, about \$800,000 of which will be used for a new generating plant, and other improvements and extensions. The company is a subsidiary of the General Gas & Electric Co., and operated by W. S. Barstow & Co., 50 Pine Street, New York.

The Board of Works, Altoona, Pa., is having plans prepared for a one-story and basement municipal automobile service and repair works, for city cars and trucks. Bids will be asked early in April. H. G. Huckle is city manager.

Pittsburgh

PITTSBURGH, March 13

Actual business in machinery and equipment in this district still is moderate, but in almost all lines a good inquiry exists. There is an inquiry for four grinders for export and the trade is expecting action before long on the tools which will be wanted for the new rod and wire plant of the Wheeling Steel Corporation at Portsmouth, Ohio. The West Leachburg Steel Co., which is to install a 16-in. continuous rod strip mill with auxiliary equipment is expected to close this week. The U. S. Electrical Tool Co. reports the sale of two grinders to a Pennsylvania oil company.

The market for cranes still is more active in the prospective than in the actual. The Coshocton Iron Co., Monongahela City, Pa., has taken bids on four cranes, including one 10-ton, one 5-ton and two 2-ton capacity, and is expected to place the order soon. The Standard Plate Glass Co., Butler, Pa., recently closed for a 5-ton, 57-ft. overhead Shaw crane. Much interest centers in the 20 cranes inquired for by the Wheeling Steel Corporation for its Steubenville, Ohio, and Beech Bottom, W. Va., plants awards, of which are likely in the near future.

The Wheeling Machine Products Co., Wheeling, W. Va., is in the market for one 250 or 300-hp. direct-connected steam generator unit, including boiler.

The Galena Signal Oil Co., Franklin, Pa., has purchased about four acres at Richmond, Cal., as a site for the construction of a new refinery, estimated to cost about \$500,000 with machinery. Charles A. Miller, superintendent of the refinery at Franklin, will be in charge of construction.

The Harbison-Walker Refractories Co., Farmers' Bank Building, Pittsburgh, has tentative plans under consideration for a new plant at Elgart, Iowa.

The American Window Glass Co., Kane, Pa., is dismantling its plant at Smethport, Pa., preparatory to the installation of new machinery of improved type. It is proposed to have the work completed to permit operation in the fall.

A vocational department will be installed in the central high school to be erected by the Red Stone Township Board of Education, Republic, Pa., estimated to cost about \$200,000. J. H. Harmon, 632 Fayette Title & Trust Building, Uniontown, Pa., is architect.

Klenck Brothers, Warren, Pa., operating an automobile service works, will install a complete machine repair works.

The Gilmore Coal Co., Oliver Building, Pittsburgh, will build a one-story power plant at its properties near Venice, Pa., to cost about \$50,000.

The Interstate Glass Co., Bradford, Pa., has completed plans for extensions and improvements in its plant at Clarks-

burg, W. Va., to cost about \$75,000, including equipment. H. J. Waters is president and general manager.

The Dayton Construction Co., P. O. Box 470, Elkins, W. Va., is planning to purchase air compressors, cable guard and other equipment.

The Electric Power Equipment Corporation, 215 Tenth Street, Huntington, W. Va., recently organized, will establish a plant to manufacture wireless equipment and other electrical apparatus. E. C. Broskie is treasurer and general manager.

The American Coal Co., Bluefield, W. Va., will build a new steel tippie at its properties, with capacity of about 400 tons per hour. E. J. McQuall is general manager.

The Slab Fork Coal Co., Slab Fork, W. Va., is planning for the construction of a new steel tippie. It recently increased its capital to \$500,000 for expansion. H. G. Caperton, Jr., is manager.

The West Virginia Pulp & Paper Co., 200 Fifth Avenue, New York, is considering rebuilding the portion of its plant at Cass, W. Va., recently destroyed by fire with loss estimated at \$200,000, including machinery.

The Common Council, Athens, W. Va., has plans under way for an electrically operated pumping plant for the waterworks department. C. E. Collins, Drexel Building, Philadelphia, is engineer.

The Board of Water Commissioners, Fairmont, W. Va., will build an electrically operated pumping plant in connection with new filtration works, estimated to cost about \$150,000. Fuller & McClintock, 170 Broadway, New York, are consulting engineers.

The E. E. White Coal Co., Glen White, W. Va., is perfecting plans for a new steel tippie.

The Ashland Coal & Coke Co., Ashland, W. Va., is planning to rebuild its tippie, recently partially destroyed by fire with loss estimated at \$50,000, with hoisting and other machinery.

Indiana

INDIANAPOLIS, March 13.

The Monroe Automobile Co., Indianapolis, recently organized, will take over the plant and business of the William Small Co., 33 West Eleventh Street, heretofore manufacturing passenger cars under the Monroe name. The new owner will make a number of improvements, and proposes to develop capacity production. William Small, head of the acquired company, will be sales manager for the new organization.

The Standard Oil Co., Davidson and Lord streets, Indianapolis, will build a new two-story works, 40 x 200 ft., at Twenty-ninth and Schurman streets, to cost about \$100,000. A portion of the structure will be equipped as an automobile service and repair department for company trucks.

A vocational department will be installed in the new junior high school to be erected at Columbus, Ind., for which bonds for \$125,000 have just been voted.

The Interstate Public Service Co., Indianapolis, is perfecting plans for a new electric power plant on the Tippecanoe River, near Norway, Ind. The construction of the dam will be commenced at once. The entire plant, with equipment, will cost about \$1,225,000 and will be the first of a number of such plants to be established in this vicinity. Edward C. Burch, Monticello, Ind., is manager for the company in this section.

The Indiana Oil Refining Co., Columbus, Ind., is arranging to proceed with the erection of its new refinery, now about one-half completed, work upon which has been held in abeyance for several months. About \$100,000 will be expended to bring the plant to completion. The machinery installation will commence some time in April. Louis J. Scheldt is president.

Clayton Cooper and associates, Elwood, Ind., are organizing a company to take over and operate the plant of the Elwood Foundry Co., bankrupt. The building and other property have been acquired recently from William O. Maines, trustee in bankruptcy. The new company will manufacture metal traffic signs and kindred products, as well as general iron castings.

The Northern Indiana Gas & Electric Co., South Bend, Ind., is negotiating for the purchase of the plant and property of the Lafayette Service Co., Lafayette, Ind., now in receivership. Upon acquisition, the new owner will make a number of improvements in line extensions, and connect with its general system.

The Board of Sanitary Commissioners, City Hall, Indianapolis, will receive bids until March 30, for power plant equipment for use in connection with a sewage disposal plant, including: Three 400-hp. watertube boilers, with superheaters, soot blowers and auxiliary apparatus; three chain

grate stokers, with capacity 150 per cent of rating, including operating mechanism; three steam turbine blowers, each with capacity of 16,000 cu. ft. per min.; two steam-turbo electric generators, each 500 kw., provided with exciters; five surface condensers, each with about 750 sq. ft. of cooling surface, provided with air and condensate pumps; one electric switchboard, six or more panels, with instruments. Charles H. Hurd, 1405 Merchants' Bank Building, is consulting engineer. Jay A. Craven is president of the Board.

Cincinnati

CINCINNATI, March 13.

Local manufacturers report that while there is still a lack of machine tool orders, the situation is showing signs of improvement, with more inquiries for single machines coming from widely scattered points. Most of the orders placed during the week were for single machines. The Sewell Valley Railroad has purchased one or two tools against its recently revived list and the Cincinnati Railroad has also taken several tools, including a large planer. The H. H. Franklin Mfg. Co. is reported to have placed orders for several lathes, an Eastern manufacturer booking the business. A local manufacturer is figuring on a fairly large order and expects to close the business within the next week or two.

No new railroad lists have been issued, although a large Western railroad is expected to be in the market shortly for a number of machine tools. Action on the Whitaker-Glessner list of 20 tools and 20 cranes is looked for within the next ten days. A recent order placed with a Columbus manufacturer calls for \$100,000 worth of equipment for the new Union station at Chicago, consisting principally of mail trucks, platform trucks, mail moving machinery, etc.

The William Kohl Co., 1034 Hulbert Street, Cincinnati, paper box manufacturer, has awarded contract for a five-story fireproof building, 50 x 100 ft., to cost approximately \$50,000, to the Ferro-Concrete Construction Co.

The plant and equipment of the Knox Tire & Rubber Co., Mt. Vernon, Ohio, has been purchased by stockholders of the company at Middletown, Ohio, for \$175,000. Middletown capitalists were represented by F. D. Litsch. No announcement has been made as to the intentions of the new owners with regard to the operation of the plant.

The plant of the Licking Window Glass Co., Utica, Ohio, was damaged by fire on March 5 to the extent of \$150,000. Harry McCanh, president, states that it will be rebuilt.

Baltimore

BALTIMORE, March 13.

The property of the Globe Shipbuilding & Dry Dock Co., recently adjudged bankrupt, Curtis Bay, Baltimore, has been purchased by Henry W. Williams and a number of creditors for \$1,050,000. The company will be reorganized, new capital secured, and the plant placed in operation.

The United States Radiator Corporation, Detroit, will improve the three-story building at 1162 Scott Street, Baltimore, recently leased for a factory branch. Arthur E. Thain, 2116 Mt. Holly Street, is local manager.

A one-story power house will be erected by the J. L. Gilbert & Brother Lumber Co., Eastern and East Falls avenues, Baltimore, at its new mill, on property recently acquired. An automobile service and repair plant will also be constructed.

The Board of Street Commissioners, Hagerstown, Md., is negotiating with the City Council for a new municipal electric power plant, replacing the present station.

The Empire Sherardizing Co., Baltimore, is establishing a new local plant for metal treatment and will begin operations at an early date.

Fire, March 5, destroyed a portion of the power plant of the North State Power Co., Wendell, N. C., with loss estimated at about \$22,000. It will be rebuilt.

The Industrial Department of the Chamber of Commerce, Newberry, S. C., is arranging for the establishment of a local plant to manufacture iron, brass, bronze and other metal products.

Cecil C. Davis, Seventh Street, Bristol, Va., is planning to rebuild his automobile machine shop, recently destroyed by fire with loss estimated at about \$17,000.

The Carolina Power Co., Raleigh, N. C., recently organized by officials of the Carolina Power & Light Co., as a subsidiary, has plans under way for the construction of a dam on the Pee Dee River, near Babin, N. C., and hydroelectric generating plant, with capacity of about 35,000 hp. A transmission system will be built to connect with the lines of the parent organization. The entire project is estimated to cost close to \$2,000,000. Charles M. Johnson is president of both companies.

The Summerville Cotton Mills, Summerville, Ga., John D. Taylor, president, have preliminary plans under way for a hydroelectric generating plant on the Chattahoochee River.

The City Council, Danville, Va., is planning for the construction of an electrically operated pumping plant, with capacity of 5,000,000 gal. in 12 hr. at the municipal water-works.

A vocational department will be installed in the two-story and basement high school to be erected at Suffolk, Va., 60 x 150 ft., to cost \$100,000. Charles M. Robinson, Times-Dispatch Building, Richmond, Va., is architect.

Fire, March 8, destroyed the engine house, water tank tower and other mechanical departments at the plant of the Crozet Cider Co., Charlottesville, Va. The structures will be rebuilt.

The Macon Ice Co., Macon, Ga., has plans under way for a new one-story ice-manufacturing plant on Wall Street.

The Hanson Motor Car Co., Atlanta, Ga., manufacturer of automobiles, is planning for an addition to increase the output from 20 to about 50 complete cars per day. It recently acquired the plant of the American Motors Export Co., Jacksonville, Fla., as a branch. The two organizations will be merged under the Hanson company name.

Hackney Brothers, Wilson, N. C., operating an automobile works, are planning to rebuild the two-story structure destroyed by fire, Feb. 22, with loss estimated at about \$110,000, including equipment and stock.

The Gulf States

BIRMINGHAM, March 13.

The Eureka Foundry Co., Gadsden, Ala., has plans under way for the construction of a new foundry to manufacture iron and other metal castings. Evan Owen is president.

Fire, March 3, destroyed a portion of the machine shop of the Hooten-Phillips Co., Sulphur Springs, Tex., with loss estimated at close to \$25,000.

The Citizens Light & Power Co., New Orleans, recently organized with a capital of \$2,000,000, is completing plans for a new electric power plant at Carrollton, La.

Fire, Feb. 28, destroyed a portion of the plant of the New Boston Cotton Oil Co., New Boston, Tex., with loss estimated at \$100,000, including machinery.

S. F. Bowser & Co., Fort Wayne, Ind., manufacturers of gasoline pumps, tankage devices, etc., have leased a building at Dallas, Tex., for a Southern branch. It will concentrate on the production of gasoline filling equipment for garage service.

The Leeds Mfg. Co., Leeds, Ala., recently organized, has plans under way for the erection of a new ice-manufacturing plant. Frank R. Hurst heads the company.

The City Council, Dothan, Ala., is taking bids for electric power equipment for a new unit at the municipal lighting plant, comprising a 750-kw. generator set, with exciter, boilers, stokers and other equipment. R. W. Lisenby is city clerk; B. R. Plicher is consulting engineer.

The Darco Co., Marshall, Tex., will build an electric power house at its new manufacturing plant, now in course of erection and estimated to cost in excess of \$250,000.

A vocational department will be installed in the new high school to be erected at Greenville, Tex., bonds for which in an amount of about \$100,000, have been voted.

The Worsham Brothers Co., Lamar Avenue, Houston, Tex., will soon commence the erection of a three-story automobile service and repair works, 65 x 113 ft., estimated to cost \$110,000. A complete machine shop, paint shop and other departments will be installed. R. D. Steele, Houston, is architect.

The City Commission, St. Petersburg, Fla., is perfecting plans for a municipal electric power plant.

An electrically-operated pumping plant will be constructed by the Birmingham Waterworks Co., Birmingham, Ala., in connection with extensions and improvements in its system, estimated to cost about \$500,000. The company has increased its capital to \$3,029,700.

The Common Council, Brownwood, Tex., has perfected plans for the erection of a municipal electric light and power plant at the waterworks station, and work will commence at an early date.

Butler Brothers, Eastland, Tex., will soon commence the erection of a new gasoline producing plant and oil works, estimated to cost about \$300,000, including machinery. It has acquired a portion of the Johnson tract, about 3 miles from the city for the works. The company will also establish a number of subsidiary plants in neighboring districts, with entire project estimated to cost \$1,500,000, inclusive of machinery.

The Orange Ice, Light & Water Co., Orange, Tex., is planning for the erection of additions to its ice-manufacturing plants, estimated to cost about \$50,000.

A vocational department will be installed in the new high school to be constructed at San Antonio, Tex., plans for which will be prepared by M. L. Waller, 311 Brady Building, San Antonio.

Fire, March 5, destroyed a portion of the plant of the Wichita Mill & Elevator Co., Wichita Falls, Tex., including steel elevator bins, conveying equipment, etc., with loss estimated at about \$50,000.

A vocational department will be installed in the new high school to be erected at Gadsden, Ala., estimated to cost in excess of \$150,000.

The Common Council, Elton, Tex., has plans under way for a municipal electric light and power plant.

The Common Council, Fernandina, Fla., has called a special election on April 4 to vote bonds for \$150,000, for extensions and improvements in its electric power and ice-manufacturing plants.

The Central South

ST. LOUIS, March 13.

The Western Supply Co., 424 Boulder Street, Tulsa, Okla., will build a new one-story and basement forge shop, 50 x 60 ft., at 405-7 North Cheyenne Street.

The Jefferson City Light, Heat & Power Co., Jefferson City, Mo., has plans in progress for an addition to its electric power plant and for other improvements and extensions in the system, to cost about \$85,000. H. S. Kilby is general superintendent.

The Common Council, St. Charles, Mo., has called a special election to vote bonds for \$175,000 for the construction of a municipal electric light and power plant. Benham & Mullergren, 512 Gimbel Building, Kansas City, Mo., consulting engineers, will prepare plans.

Fire, March 6, destroyed a portion of the plant of the Brinly-Hardy Co., 334 East Main Street, Louisville, manufacturer of agricultural implements and equipment, with loss estimated at about \$150,000, including machinery.

The Hackney Iron & Steel Co., Enid, Okla., recently organized, is arranging for the operation of a local plant to manufacture iron and steel products for oil well and other service. The initial works will be about 40 x 60 ft. D. R. Hackney is president and manager.

The Memphis Fender & Enamel Works, 52 South Fourth Street, Memphis, Tenn., recently organized, has leased a one-story building, 25 x 175 ft., for the establishment of a plant to manufacture automobile fenders and other sheet metal products, with repair department. F. H. May is president and general manager.

The Caruthersville & Kennett Light & Power Co., Kennett, Mo., is planning for extensions in its electric power plant and equipment, to cost about \$100,000. A new transmission line will also be built.

The Miners Ice & Fuel Co., 318 Main Street, Joplin, Mo., is planning for a two-story ice-manufacturing plant at Kentucky Avenue and Tenth Street.

The Indianola Refining Co., Okmulgee, Okla., operating a local oil refinery, and similar plant at East St. Louis, Ill., has arranged for a note issue of \$900,000, a portion of the proceeds to be used for extensions and improvements. Elmer E. Schock is president.

A vocational department will be installed in the three-story and basement high school, 125 x 207 ft., to be erected at Oklahoma City, Okla., estimated to cost about \$250,000. Parker & Rittenberry, Oklahoma City, are architects.

The Nashville Pulp & Paper Corporation, Nashville, Tenn., is planning for the construction of a new power house. R. J. Cullen is president and general manager.

A vocational department will be installed in the three-story and basement high school to be erected at Liberal, Kan., estimated to cost \$175,000. Lorentz, Schmidt & Co., 121 North Market Street, Wichita, Kan., architects, are preparing preliminary plans.

The Chase Mfg. Co., 3216 Morgan Street, St. Louis, manufacturer of steam vulcanizing equipment, has awarded a contract to August Stollman, St. Louis, for a new one-story factory, 50 x 100 ft. R. L. Chase is president.

A vocational department will be installed in the high school to be erected by the Board of Education, Owensboro, Ky., estimated to cost about \$225,000. A. F. Hussander, 25 North Dearborn Street, Chicago, is architect.

The Standard Crate & Filler Co., Jefferson City, Mo., has awarded a contract to the Fruin-Colnon Construction Co., St. Louis, for a one-story addition, 100 x 200 ft., estimated to

cost about \$35,000. A list of machinery for installation is being arranged. A. W. Happy is president.

The Choctaw Brick & Gas Co., Kennedy Building, Fort Smith, Ark., has acquired a building at Mansfield, Ark., and will establish a plant to manufacture brick, tile and kindred products. Allen Kennedy is secretary.

The Cumberland Power Co., Cumberland, Tenn., is planning for extensions and improvements in its power plant and system, estimated to cost about \$150,000. A new transmission line will be constructed. G. S. Numanaker, vice-president, is in charge.

The Common Council, Savannah, Tenn., is planning for a municipal hydroelectric power plant, and will commence the installation at an early date. A municipal ice-manufacturing plant will also be established. A. M. Patterson is chairman of the committee in charge.

A vocational department will be installed in the new high school to be erected at Hill City, Kan., estimated to cost about \$135,000. William H. Saylor & Co., 305 Mutual Building, Kansas City, Mo., are architects.

Milwaukee

MILWAUKEE, March 13.

While the machine tool trade so far has experienced only a slight resumption of activity, confidence is expressed that the improvement in the general metal-working situation must carry the tool industry upward in due time. In the milling machine trade a feature of the past week has been a relatively brisk inquiry from automotive shops in Detroit, Cleveland and Indianapolis. Sales in this period were somewhat larger than before, but were confined to purchases of one or two tools. Large lots are still absent even in the inquiries being put out for miscellaneous requirements.

The Excel Mfg. Co., 3402 South Pierce Street, Milwaukee, manufacturer of interior woodwork, millwork, cabinets, billiard tables and store and office fixtures and furniture, will start work April 1 on the erection of a two-story brick addition, 40 x 120 ft., which will require some additional machinery, motors, etc. L. C. Neumann is secretary and treasurer.

The Six Wheel Truck Co., Fox Lake, Wis., which for several months has been negotiating with business men's associations for a permanent location, has decided to retain its establishment in Fox Lake and will begin work after April 15 on a one-story brick and concrete factory, 50 x 110 ft., estimated to cost \$50,000 with equipment. For the past four years a small experimental shop has been maintained for the development of a heavy duty motor truck with dual sets of rear wheels, designed by F. N. Pettegrew, president of the concern.

John A. Luke, Burlington, Wis., will build a \$45,000 public garage and service shop, 66 x 133 ft. part two stories and basement. The architect is Martin F. White, 908 Trust Building, Milwaukee.

The Board of Education, West Allis, Wis., will take bids until March 25 for an addition to the high school, to be equipped exclusively for vocational training purposes. The estimated cost is \$120,000. The architects are Robert A. Messner & Brother, 221 Grand Avenue, Milwaukee.

The Ever-Bilt Auto Appliance Co., Milwaukee, has been incorporated with a capital stock of \$15,000 to manufacture mechanical specialties and appliances. Arrangements are being made for a shop. The incorporators are C. M. Modney, Edward Guetzkow and A. C. Carlson, 1655 Tenth Street, Milwaukee.

The DePere, Wis., Board of Education has accepted the bid of the Hub City Construction Co., Stoughton, Wis., to build the new high and vocational training school at a price of \$93,950. Contracts for heating, ventilating, etc., will bring the cost up to \$165,000. Manual training equipment will be bought later. The architects are Foeller, Schober & Stephenson, Green Bay, Wis.

The Blum Brothers Box Co., Marshfield, Wis., has let the general contract for designing and erecting a brick and steel addition, 10 x 120 ft. and a wing, 56 x 80 ft., to the Krasin Construction Co., local. Inquiry is being made for wood-working, veneer cutting, nailing and motor equipment.

The Common Council, Kaukauna, Wis., has approved a bond issue of \$175,000 for a new junior high and manual training institute. Parkinson & Dockendorff, architects, La Crosse, Wis., are revising original plans to come within the appropriation. Bids will be taken shortly after April 1.

The Northern Tool & Machinery Co., 736 Winnebago, Street, Milwaukee, is increasing its force and expects later to add some new equipment and take more space to accommodate the growing demand for tools, dies, jigs, fixtures and welding work. It was established two years ago at 946

Bremen Street and moved to the present quarters last fall. John Umanski and Leonard Kaszoka are the owners.

The Fahrenkrug & Voissem Electric Co., Oshkosh, Wis., has been incorporated with \$15,000 to manufacture and repair electrical equipment, etc. The principals are Alois Voissem, Menasha, Wis., and George H. Fahrenkrug, Oshkosh.

M. Tullgren & Sons, architect, 425 East Water Street, Milwaukee, are preparing plans for a \$200,000 general storage and service garage, 102 x 150 ft., five stories and basement, to be erected by a local syndicate at Fifth and Wells streets. Work will start some time in April.

The Merrill, Wis., Board of Education will close bids April 4 for the construction of a vocational training annex to the present high school, and a new graded school building, the whole to cost about \$200,000. Harry R. Allen is secretary of the board.

Detroit

DETROIT, March 13.

The Mason Motor Truck Co., organized last December, has secured the former plant of the Young Spring Co. in Flint, Mich., which will give 35,000 sq. ft. of floor space. Full production is planned by July 1. The company is headed by A. C. Mason, formerly with the Cadillac and Buick companies and later with the General Motors Corporation as consulting engineer.

The Benton Harbor Auto Machine Shop, Benton Harbor, Mich., will soon begin the manufacture of a line of automobile accessories, including an oil gage and a patent wheel rim remover.

The Corodum Sand Brick Co., Pontiac, Mich., will start work on a new plant as soon as weather permits.

The Pere Marquette Railway has entered into a contract with the Kellogg-Grice Co., Chicago, whereby the latter company took over operation of the shops at Tonia, Mich., on March 1.

The Stafford Roller Bearing Co., Lawton, Mich., will soon start construction work on a new factory, one story, 40 x 60 ft.

The Kirsch Mfg. Co., Kalamazoo, Mich., will build a new three-story factory, 180 x 200 ft., to cost about \$100,000.

The Reiber-Kels Co., Adrian, Mich., manufacturer of deflector spotlights and kindred equipment, has been reorganized, and has plans under consideration for improvements and extensive production. Walter G. White is president and general manager.

The Kirkland Brothers Machine Co., Detroit, recently organized with a capital of \$250,000, is arranging for a local works to manufacture special machines for cylinder grinding work, and a line of small tools. Thomas H. Kirkland, 31 Elm Street, Springfield, Mass., heads the company.

The Saginaw Products Co., Saginaw, Mich., manufacturer of automobile equipment, will install new equipment in its machine shop. F. W. Mowbray is superintendent in charge.

Motors, transmission, and other equipment will be installed in the addition to be erected by the Kalamazoo Paper Box Co., Kalamazoo, Mich., estimated to cost about \$175,000. Robert E. Staebler is secretary-treasurer and general manager.

A one-story power plant will be erected by the Cadillac Lumber & Chemical Co., Cadillac, Mich., at its new plant at Sault Ste. Marie, Mich., for which a site has recently been acquired.

The Pacific Coast

SAN FRANCISCO, March 7.

The California Car Co., Alexander Building, San Francisco, will soon commence the erection of a new plant at Martinez, Cal., for the manufacture of automobiles, estimated to cost in excess of \$75,000. C. R. Manspert, 496 Twelfth Street, Oakland, Cal., is architect.

The Board of Trustees, University of California, Berkeley, Cal., will build a new power plant at the institution. William C. Hays, First National Bank Building, San Francisco, is architect.

The Los Angeles Gas & Electric Co., 645 South Hill Street, Los Angeles, has plans under way for a one-story compressor plant, 72 x 145 ft., estimated to cost about \$60,000.

The Regan Forge & Engineering Co., Regan Street, Los Angeles Harbor, Los Angeles, has awarded a contract to the Austin Co., 702 Pacific Electric Building, for a new one-story machine shop, 80 x 200 ft.

The City Commission, Sacramento, Cal., is planning for the erection of a new hydroelectric power plant on the South Fork of the American River, in the vicinity of Saylor Flat. Albert Glivan, city engineer, is in charge.

The Concrete Lumber Co., Los Angeles, recently organized with a capital of \$1,000,000, has acquired about four acres on the San Fernando Boulevard for a new plant to manufacture concrete building products. The company is headed by George A. Masick and Henry W. Schlueter.

A two-story cold storage and refrigerating plant addition will be erected by the Christopher Ice Cream Co., Los Angeles, estimated to cost about \$30,000, exclusive of machinery. Richard D. King, Los Angeles, is architect.

The Kersey Pattern Works, 702 Date Street, Los Angeles, manufacturer of metal and wood patterns, and other foundry and machine shop equipment, is having plans prepared for a one-story factory, 50 x 120 ft., on Santa Fe Avenue. Herbert A. Hamm and Glen E. Smith, 412 Central Building, Pasadena, Cal., are associated architects.

A vocational building will be constructed at the group of high school buildings by the Santa Barbara High School District, Santa Barbara, Cal., estimated to cost about \$500,000. W. H. Weeks, 369 Pine Street, San Francisco, is the architect.

The Santa Fe Railway Co., Kerckhoff Building, Los Angeles, has authorized an expenditure of \$204,000 for extensions to its shops at San Bernardino, Cal., in addition to the new machine shop now in course of construction and which will cost about \$300,000, with machinery. Plans for the other structures are being prepared, to include a power house.

The Union Oil Co. of California, Mills Building, San Francisco, is perfecting plans for the erection of its new oil distributing plant at Hoquiam, Wash. It is estimated to cost about \$200,000, including machinery.

The Bourne Gold Mining Co., Bourne, Ore., has secured permission to use waters from Cracker and Little Cracker creeks, and will erect a hydroelectric generating plant.

The Albina Electric Co., Mississippi Avenue and Shaver Street, Portland, Ore., manufacturer of electrical specialties, is planning for enlargements. W. D. Williams is head.

The Wonder Electric Mfg. Co., Chamber of Commerce Building, Portland, Ore., will operate a plant at York and Twenty-fourth streets for the manufacture of electrical products and appliances. Property has been acquired. John W. Henry is president.

Canada

Toronto, March 13.

The demand for machine tools is showing steady improvement. Users who have been contemplating entering the market for some time are buying two or three machines and it is the general opinion that business is making good progress. The construction of industrial plants and additions is also more pronounced and dealers are looking forward to a larger buying movement in the early future. The automobile and car repair industries continue to furnish the greater part of the demand for equipment, although some dealers point out that wood-working concerns and the general industrial trades are buying more freely than in the past. Small tools continue to move freely with consumers buying for future use as well as for immediate requirements.

The Pease Foundry Co., 118 King Street East, Toronto, will rebuild its machine shop at Brampton, Ont., recently destroyed by fire, and is expected to enter the market in the early future for equipment.

The City Council, Edmonton, Alta., has authorized the expenditure of \$115,000 for power plant extensions and improvements.

The mill owned by the Canadian Lumber & Timber Co., Vancouver, B. C., recently destroyed by fire with a loss of \$110,000, will be rebuilt immediately.

The cartridge factory of the Dominion Arsenal, Quebec, Que., was damaged by fire about a week ago, and a second fire caused further damage to the main plant on March 10.

The machine shop of the Home Logging Co., Courtney, B. C., was destroyed by fire with a loss to building and equipment of approximately \$75,000.

Birmingham Motors, Ltd., Peterborough, Ont., recently incorporated, has acquired the Canadian rights for the manufacture of the Birmingham car now being manufactured at Falconer, N. Y. The Hope plant at Peterborough, has been taken over by the company and manufacturing operations will be started in the early future. It is not the intention of the company to purchase any machinery or equipment at present.

The Canadian Aluminum & Brass Co., is opening a branch in Windsor, Ont., in a part of the plant occupied by the Dominion Motor Castings Co. It is affiliated with the General Aluminum & Brass Co., Detroit, and J. P. Carrille, president, states that manufacturing operations will commence about the end of March.

Rebuilding of furnaces and additions to the plant of Pilkington Brothers, Thorold, Ont., are responsible for a temporary shutdown of the plant, according to J. E. Harrison,

general manager. Mr. Harrison further stated that he was looking forward to a revival of business in the building trades which would control to an extent the speed with which the alterations would be accomplished.

The Canadian Electric Castings, Ltd., is building a two-story foundry, 50 x 250 ft., on the former site of the foundry of the Canadian Electro Foundries at Orillia, Ont., destroyed by fire some time ago. It will specialize in steel castings, including grinding balls for the mining and concrete industries and is expected to be ready for operation by the middle of April. Equipment will include two electric, three phase Heroult furnaces having a daily capacity of 18 tons.

Electro-Castings, Ltd., Collingwood, Ont., which is erecting a foundry, expects to have it in operation before the end of April. W. T. Stephens, manager, is supervising the installation of a two-ton electric furnace of his own design with a capacity of 12 heats in 24 hr. Production in general and special lines will be in gray iron, hard iron and semi-steel.

Sharon Steel Hoop Co. Report

According to the annual report for 1921 of President Severn P. Ker, the Sharon Steel Hoop Co., Sharon, Pa., sustained a total loss last year of \$2,711,674.86. The income account shows the following items:

Gross loss for operations after repairs of	
\$600,367	\$575,827.59
Idle plant expense	911,285.90
	\$1,487,113.49
Miscella	114,234.25
Net loss	\$1,372,879.24
Add:	
Depreciation	\$376,968.23
Interest	570,711.81
Inventory write-off	391,114.58
	\$1,338,795.62
Total loss for 1921	\$2,711,674.86
Deduct surplus 1-1, 1921	1,013,390.34
Deficit	\$1,698,284.52

The company's gross assets are given as \$25,314,502, including property account of \$14,459,389.67. Its balance sheet shows current assets of \$4,135,007, including \$2,610,134 in inventories and \$275,972.61 cash. Its current liabilities are \$2,673,727.11, leaving a working capital of \$1,561,280.39. Its statement carries an item of good will to the amount of \$3,844,727.91.

Gross sales in 1921 were \$5,274,942 on 93,383 tons of semi-finished and finished steel products.

During the year the company was obliged to sell \$5,000,000 of a \$10,000,000 bond issue. After this issue of 8 per cent first mortgage bonds, there is outstanding \$13,317,300 of stock. The company has established a reserve of \$4,152,510.69 and has set up a fund of \$62,314 for contingencies.

Electric Steel & Forge Co. Plans

The Electric Steel & Forge Co., Cleveland, has announced new financing plans to meet present financial needs. It is proposed that the company be reorganized under a new name, probably the Mid-West Steel Co., with a capital stock of 7500 shares of 8 per cent preferred stock, par \$100, and 39,000 of no par common stock. The new preferred stock will be entitled to dividends from Jan. 1, 1923, and will be redeemable at \$110. It is estimated that \$150,000 is needed at the present time and it is stated that the directors have already subscribed to \$75,000 of the new preferred stock, or one-half of the amount required. The exchange of stock is to be made on the basis of one share of preferred for one share of new common and one share of old common for one-half share of new common. The company's obligations amount to \$640,000 distributed as follows: merchandise creditors, \$85,000; banks, \$70,000; mortgages, \$450,000; taxes, \$35,000.

Subject to the successful consummation of this financing plan, creditors are asked to agree to a three-year extension upon payment of 10 per cent to merchandise creditors and 25 per cent to banks, while mortgage holders are asked to agree to an extension until December, 1923. The company states that many creditors and stockholders have already agreed to the plan.

Joseph S. Webster, New Haven, Conn., has organized a sales force to be known as Joseph S. Webster & Co., to represent the Kingsford Foundry & Machine Works, Oswego, N. Y., in the New England states for the Kingsford-Webster water tube boiler. Offices will be established in New Haven, Providence and Boston.

Current Metal Prices

On Small Lots, Delivered from Merchants' Stocks, New York City

The following quotations are made by New York City warehouses.

As there are many consumers whose requirements are not sufficiently heavy to warrant their placing orders with manufacturers for shipment in carload lots from mills, these prices are given for their convenience.

Iron and Soft Steel Bars and Shapes

Bars:	Per Lb.
Refined bars, base price.....	2.53c.
Swedish bars, base price.....	10.00c.
Soft steel bars, base price.....	2.53c.
Hoops, base price.....	3.38c.
Bands, base price.....	8.13c.
Beams and channels, angles and tees	
3 in. x ¼ in. and larger, base.....	2.63c.
Channels, angles and tees under 3 in. x ¼ in., base.....	2.53c.

Merchant Steel

	Per Lb.
Tire, 1½ x ½ in. and larger.....	2.50c.
(Smooth finish, 1 to 2½ x ¼ in. and larger) ..	2.70c.
Toe-calk, ½ x ¾ in. and larger.....	3.20c.
Cold-rolled strip, soft and quarter hard.....	6.25c. to 7.25c.
Open-hearth spring steel.....	3.55c. to 6c.
Shafting and Screw Stock:	
Rounds.....	3.35c.
Squares, flats and hex.....	3.85c.
Standard cast steel, base price.....	12.00c.
Extra cast steel.....	17.00c.
Special cast steel.....	22.00c.

Tank Plates—Steel

¼ in. and heavier.....	2.63c.
------------------------	--------

Sheets

Blue Annealed

	Per Lb.
No. 10.....	3.28c. to 3.53c.
No. 12.....	3.33c. to 3.58c.
No. 14.....	3.38c. to 3.63c.
No. 16.....	3.48c. to 3.73c.

Box Annealed—Black

	Soft Steel C. R. One Pass Per Lb.	Blued Stove Pipe Sheet, Per Lb.
Nos. 18 to 20.....	3.55c. to 3.80c.	
Nos. 22 and 24.....	3.60c. to 3.85c.	4.10c.
No. 26.....	3.65c. to 3.90c.	4.15c.
No. 28.....	3.75c. to 4.00c.	4.25c.
No. 30.....	4.00c. to 4.25c.	

No. 28 and lighter, 36 in. wide, 10c. higher.

Galvanized

	Per Lb.
No. 14.....	3.85c. to 4.10c.
No. 16.....	4.00c. to 4.25c.
Nos. 18 and 20.....	4.15c. to 4.40c.
Nos. 22 and 24.....	4.30c. to 4.55c.
No. 26.....	4.45c. to 4.70c.
No. 27.....	4.60c. to 4.85c.
No. 28.....	4.75c. to 5.00c.
No. 30.....	5.25c. to 5.50c.

No. 28 and lighter, 36 in. wide, 20c. higher.

Welded Pipe

Standard Steel

	Black	Galv.		Black	Galv.
¾ in. Butt..	-56	-40	¾ in. Butt..	-30	-13
¾ in. Butt..	-61	-47	1½ in. Butt..	-32	-15
1-3 in. Butt..	-63	-49	2 in. Lap....	-27	-19
3½-6 in. Lap..	-60	-46	2½-6 in. Lap..	-30	-15
7-8 in. Lap....	-56	-34	7-12 in. Lap..	-23	-7
9-12 in. Lap..	-55	-33			

Wrought Iron

Steel Wire

BASED PRICE* ON NO. 9 GAGE AND COARSE

	Per Lb.
Bright basic.....	3.50c. to 3.75c.
Annealed soft.....	3.50c. to 3.75c.
Galvanized annealed.....	4.25c. to 4.50c.
Coppered basic.....	4.00c. to 4.25c.
Tinned soft Bessemer.....	5.50c. to 5.75c.

*Regular extras for lighter gage.

On a number of articles the base price only is given, it being impossible to name every size.

The wholesale prices at which large lots are sold by manufacturers for direct shipment from mills are given in the market reports appearing in a preceding part of THE IRON AGE under the general heading of "Iron and Steel Markets" and "Non-ferrous Metals."

Brass Sheet, Rod, Tube and Wire

BASE PRICE

High brass sheet.....	16½c. to 17 c.
High brass wire.....	17 c. to 17½c.
Brass rod.....	14½c. to 14¾c.
Brass tube, brazed.....	26 c. to 27½c.
Brass tube, seamless.....	18½c. to 19 c.
Copper tube, seamless.....	20½c.

Copper Sheets

Sheet copper, hot rolled, 24 oz., 19½c. to 20½c. per lb. base.	
Cold rolled, 14 oz. and heavier, 2c. per lb. advance over hot rolled.	

Tin Plates

Bright Tin	Grade	Grade	Coke—14-20	Primes Wasters
	"AAA"	"A"		
	Charcoal	Charcoal		
	14x20	14x20		
IC..	\$10.00	\$8.50	80 lb..	\$6.05 \$5.80
IX..	11.50	10.00	90 lb..	6.15 5.90
IXX..	13.00	11.25	100 lb..	6.25 6.00
IXXX..	14.25	12.50	IC..	6.40 6.15
IXXXX..	16.00	14.00	IX..	7.40 7.15
			IXX..	8.40 8.15
			IXXX..	9.40 9.15
			IXXXX..	10.40 10.15

Terne Plates

3-lb. Coating 14x20

100 lb.	\$7.00
TC	7.25
IX	7.50
Fire door stock	10.00

Tin

Straits, pig.....	32c.
Bar.....	37c. to 42c.

Copper

Lake ingot.....	15 c.
Electrolytic.....	14½c.
Casting.....	14¾c.

Spelter and Sheet Zinc

Western spelter.....	6½c. to 7c.
Sheet zinc, No. 9 base, casks.....	10½c. open 11c.

Lead and Solder

American pig lead.....	5½c. to 6½c.
Bar lead.....	6½c. to 7 c.
Solder, ½ and ⅓ guaranteed.....	23c.
No. 1 solder.....	21c.
Refined solder.....	17c.

*Prices of solder indicated by private brand vary according to composition.

Babbitt Metal

Best grade, per lb.	75c.
Commercial grade, per lb.	35c.
Grade D, per lb.	25c.

Antimony

Asiatic.....	5½c. to 6c.
--------------	-------------

Aluminum

No. 1 aluminum (guaranteed over 99 per cent pure), in ingots for remelting, per lb.	25c. to 27c.
--	--------------

Old Metals

The market is stronger and shows a little activity. Dealers' buying prices are nominally as follows:

	Cents Per Lb.
Copper, heavy crucible.....	10.75
Copper, heavy wire.....	9.75
Copper, light and bottoms.....	8.00
Brass, heavy.....	5.00
Brass, light.....	4.50
Heavy machine composition.....	7.50
No. 1 yellow brass turnings.....	5.25
No. 1 red brass or composition turnings.....	6.75
Lead, heavy.....	2.75
Lead, light.....	2.50
Zinc.....	2.50

THE IRON AGE

ESTABLISHED 1855

New York, March 23, 1922

VOL 109, No 11

Polishing of Metals an Art in Itself*

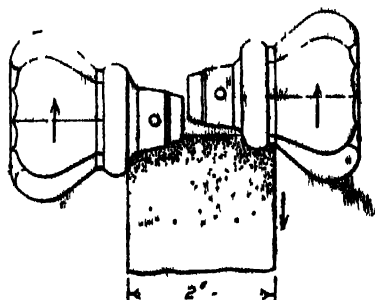
Lack of Standards Attributed to Lack of Appreciation of
What the Problem Means—Major Importance
of the Lowly Glue Pot

BY SIDNEY G. KOON

WITH the start of the nickel plating industry, about 1876, began the real need for giving metals a polished or refracting finish which would take from them the crude, rough appearance left by the preliminary processes and develop their inherent beauty. From small beginnings, the business of polishing and highly finishing metals has grown in a cumulative manner, and has lately received a considerable impulse from the disinclina-

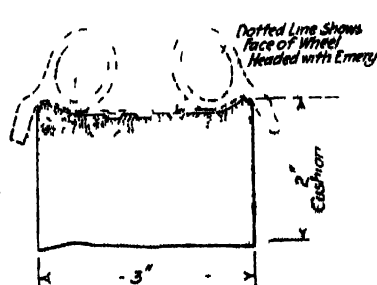
far superior to that left by the lathe or planer tool, it must be regarded merely as a stepping stone or preliminary operation to the real finishing or polishing processes.

Polishing may be regarded primarily as flexible grinding, in that it is accomplished by means of emery or other abrasive held by glue on the periphery of a flexible wheel, made usually of cloth or leather. Buffing, on the other hand, while done



Polishing Two Brass Door Knobs on One Specially Shaped Canvas Wheel. The knobs revolve while being finished

Special Faced 18 In Compress Canvas Polishing Wheel of Hard Density, Used in Finishing Scissor Handles. The sketch shows how the emery heading fits the wheel contour



tion of buyers to purchase materials which lack such a finish.

Manufacturers, feeling this condition of affairs through the inability of their sales departments to maintain an adequate volume of sales, have not been slow to learn the cause, and to look about for means of giving their products a satisfactory luster. Where they have succeeded in this effort, they have been able in many cases, during the prevailing depression, to hold their customers and add new ones, and to preserve a better proportion of their sales than have their less fortunate neighbors.

This element of sales resistance is centered ultimately very largely in women, who want everything in the household bright and shiny. This attitude applied not only to kitchen utensils, but to door-knobs and other house hardware and a multitude of other things which formerly were left dull. The finely polished nickel-plated electric iron, as compared with the rough black flat iron of a generation ago, is a familiar example.

Grinding with a solid wheel of emery or other abrasive has been used for a long time as a shaping or finishing operation. While this leaves a finish

with tripoli-rouge, lime or other abrasive powder, and producing the most highly finished product possible, does not have the abrasive firmly attached to the wheel. In buffing the abrasive is applied during the process by means of a "cake," using wax or grease as a body or bond, and held to the wheel, whence it is transferred to the part being treated. It is thus rubbed in by the application of the buffing wheel.

There has long been much confusion in connection with these treatments; many people call them indiscriminately by either name. Hence, it is perhaps not strange, in view of the recent development of the processes, and the utter lack of general information about them, that encyclopedias, even those devoted primarily to mechanical subjects, do not clear up the matter. The paucity of written information in this field is extreme. There is no book dealing adequately with it, nor are there many magazine or other technical articles which cover it, except in fragmentary form.

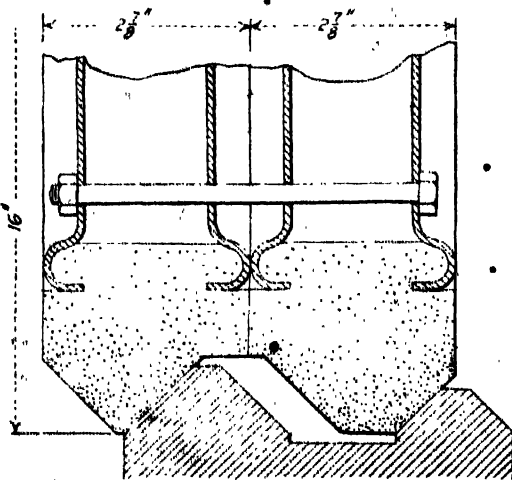
An idea of the importance of polishing operations to the metal working industry may be obtained when it is realized that about 85 per cent of the cost of making pocket knives is represented in the finishing operations. This leaves only 15 per cent for the material, the forging, grinding and other

*Prepared from an interview with Bradford H. Divine, President Divine Brothers Co., Chicago, N. Y.

ONE man calls it "buffing"; another says it is "polishing"; still a third refers to "flexible grinding." Confusion of terms implies lack of standards. Lack of standards connotes—in many plants—lack of interest. And lack of interest is the forerunner to loss of profits. When five-sixths of the entire production cost of a pocket knife is incurred in the finishing operation, up-to-date management realizes that that finishing operation deserves the most expert attention and painstaking skill which money can buy. It demands equipment properly fitted, in all its details, to the particular operation to be done on that particular job.

processes. Due doubtless to a lack of realization of its importance, the polishing operation of the usual metal working plant has been neglected to such an extent that this has been characterized as the one department of modern plants which is not run in accordance with modern engineering methods.

The beginning of the importance of polishing was simultaneous with the advent of the nickel-plated bicycle, which was followed almost immediately by nickel-plated faucets and other plumbing fixtures. From this starting point, the process has passed to a myriad of uses, until to-day a very large proportion of metal parts for final use have to be polished. It may seem a far cry from the small blade of a pocket knife to a locomotive bell,



Special Compress Polishing Wheel for Finishing Simultaneously Two Parallel Surfaces on a Lathe Guide. The two other inclined parallel surfaces may likewise be finished simultaneously with this same wheel, merely by changing the setup. Note that the wheel consists of annular rings, held in place by special clamps and bolts.

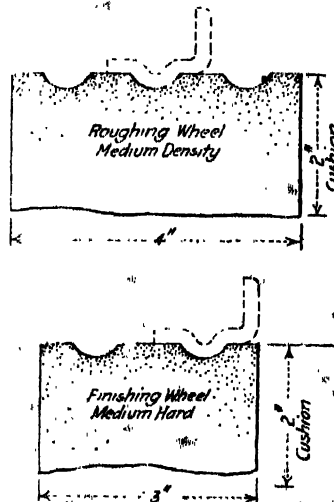
but both are now treated largely in the same manner, under modern methods.

Solid grinding does not produce a truly finished surface except in some forms of high precision work. Even then, the rigidity of the abrasive wheel is likely to produce scratches on the surface. Carborundum crystals are prone to dig in. These troubles are avoided when flexible grinding is used,

because of the smooth running of the wheel and because the mere property of flexibility in the wheel prevents the resistance to its passage across the part being finished from becoming sufficient to cause scratches.

Engineers, who have given this subject of polishing practically a lifetime study, hold positively that the entire proposition of abrasive metal-finishing processes, from whatever angle considered, gets back eventually to the character and quality of the glue used in tying the abrasive to the wheel, and to the method and care by which the glue is applied to the wheel.

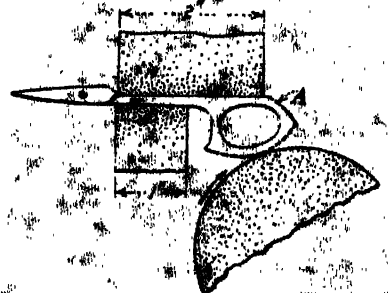
It is perfectly obvious that the glue must hold the abrasive particles tightly in position, for it is



Special Angles for Use in Construction of Rheostats Are Polished on Two Wheels, One Following the Other. Both are special 14-in. diameter compress leather wheels. The roughing wheel, of medium density, has three grooves; the finishing wheel, medium hard, has but two. This is on the theory that the abrasive on the rougher operation will wear away more quickly; hence the wheels were designed for an equal amount of service before redressing.

quite impossible to do a satisfactory polishing or flexible grinding job if particles of glue and emery fly from the rapidly revolving wheel onto the floor. And the resultant of the wheel and its peripheral velocity must give a hardness sufficient to cut the metal, or the cost will be increased, a satisfactory production volume not reached and the desired finish or luster not obtained. At the same time, the glue has to be flexible enough to bend slightly,

Two Wheels with Plain Contour Polish Simultaneously the Edges of the Handle Stem of the Scissor Blade, the Blade Being Held in a Suitable Jig. The third wheel, shown in a different plane, is used to polish the edge of the handle, as indicated by the dotted line A.

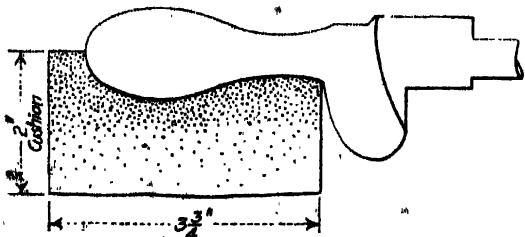


otherwise the wheel ceases to be flexible and the process approaches that of solid grinding. These two functions of the glue, seemingly almost diametrically opposed, can readily be obtained in a glue manufactured especially for this purpose in accordance with standard formulas. They are almost certain, however, not to be obtained from the general-purpose glues on the market.

Grinding, polishing and buffing are all alike in the fact that they are all performed with wheels. Beyond that point, they differ materially and each in itself has differences due to the character of

the work to be done. For instance, coarse grinding is used for removing scale and humps from the surface of the metal. Medium grinding carries the process one step further and reduces the surface to a certain degree of smoothness. Fine grinding is used for precision work and for leaving a perfectly smooth surface for the following operations. There is no definite dividing line between these three designations of coarse, medium and fine, for there are many grades of fineness of abrasive wheels from the coarsest to the finest.

Similarly, polishing may be classified about in the same way as grinding, into coarse, medium and fine, the coarse and medium being similar in the results desired to the coarse and medium grinding. Fine polishing, sometimes called "glazing," grease polishing, etc., is used to prepare on non-ferrous metals a surface which will later be buffed or plated.

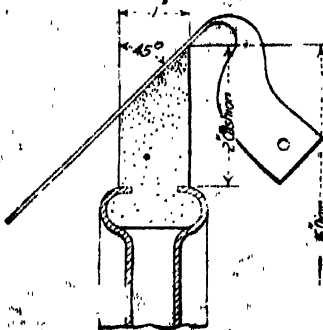


Shaped Compress Canvas Wheel, 12 In. in Diameter and of Medium Hard Density, Used in Finishing Gear Box Handles. The handle rotates at a speed different from that of the polishing wheel

The final and finish polishing, when applied to bare steel, is often called buffing.

Buffing may also be divided into three groups, coarse buffing consisting in cutting down non-ferrous metals, this operation being done often direct on the casting as it comes out of the sand. Fine or medium buffing follows the rougher process and produces a smoother finish, which may later be carried further. The final or finest buffing process, known as coloring, is used to produce high light

To Get Up Into the Goose-Neck Section of a Hoe Blade, an Acute Angle Is Needed on the Edge of the Wheel. This is a special compress composition wheel



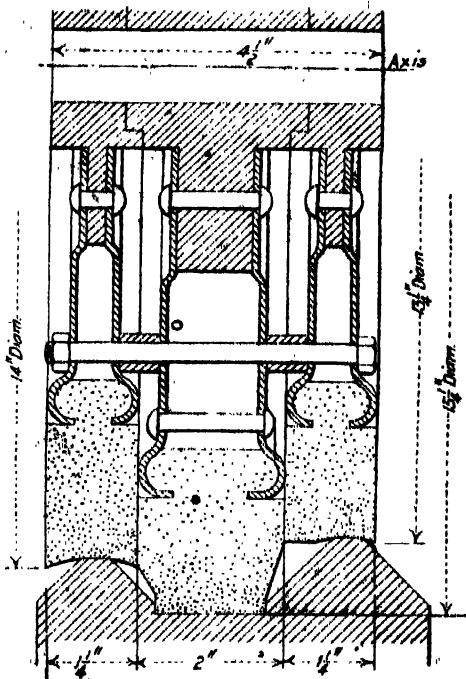
refracting surfaces on either bare metal or plated ware.

Polishing is governed first by the character of the metal being treated. A second governing point, and furnishing a sub-division within each class of metal, is the type of article to be polished. The third governing factor is the contour of that article, which governs not only the density of the wheel but the shape of its face. The fourth and final governing characteristic is the finish which it is desired to obtain upon the metal part.

The character of the abrasive to be used depends upon the amount of metal to be removed, resolved into the number of processes necessary, as well as the character of the finish to be laid on the metal. The size of the abrasive depends on the character

WHEN the sales manager finds a competitor cutting into his customers with goods of a superior finish, then is the importance of proper polishing driven home with compelling force. This is purely an executive problem. The engineering and production elements have all been reduced to standards—but not in every shop. Where finishing technique and methods are still left to Tom, in one shop, to Dick and Harry in the others—there is the place for the expert in polishing to advise with the management and show how dollars may be saved, and others earned, through modern methods untrammelled by precedent and inertia.

or fibrous nature of the material being polished, and on the fineness of the surface desired. Whether natural or artificial abrasive is used depends upon the amount of cut required and whether or not the process is designed for a reduction of the metal. Artificial abrasives are used almost wholly in the cutting process, while the softer natural abrasives, with a certain admixture of dirt which it is difficult to remove from them, but which seems to help



Rough and Dry Finishing on Five Surfaces Simultaneously by Means of Special Sectional Compress Polishing Wheel Designed for This Particular Job

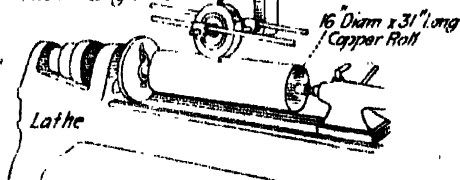
lubricate the process, are used for producing a finish on the surface.

Wheel speed is controlled by the same conditions, and is a matter of greater importance than is generally understood. The limit of operating speeds is controlled by the melting or softening point of the glue used, which action in turn is produced through excessive friction between the wheel and the metal, and through the crushing or glazing of

the abrasive particles. But there is no occasion, in general, to approach this limit. Far lower speeds are called for in many instances than are commonly used and, in these cases, the high speed of usual operation will not produce the finish desired.

Upon the surface to be covered depends the diameter of the wheel. Its speed depends upon the

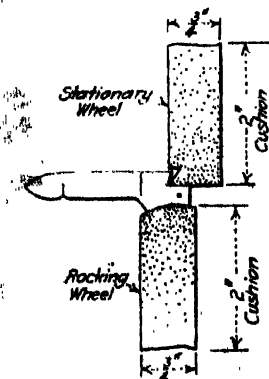
*Wheel Travels Automatically
at Right Angles to Work.
Adjustable for Pressure
Mechanically Driven*



Because of the Nature of Soft Copper, Which Would Tend to Clog a Polishing Wheel Rotating in the Same Plane as the Engraving Roll, This Concave-Faced Compress Canvas Wheel, with 2-in. Cushion and Extra Soft Density, Has Been Mounted at a Right Angle to the Work. The wheel is 16 in. in diameter, with 4-in. face; the copper roll 16 in. in diameter and 31 in. long

desired results for the several processes necessary to the completed article. The density of the wheel is governed by the shape of the article. The shape of the wheel, that is, whether the face is flat or formed, depends upon the contour of the surface to be polished. Our illustrations show a number of wheels designed for certain specific contours and fitted to those only.

A typical example of the sort of problem to be met in connection with polishing of metals may be drawn from the experience of a prominent optical company, which required a highly polished surface, absolutely true in a plane, for the comparison of lenses. Attempts were made to get this surface



Two Polishing Operations Performed Simultaneously on a Knife Blade by Special Medium Density Compress Leather Wheels 14 In. in Diameter. One wheel has shaped contour; the other, while plain in contour, is undercut to clear the heel of the knife blade

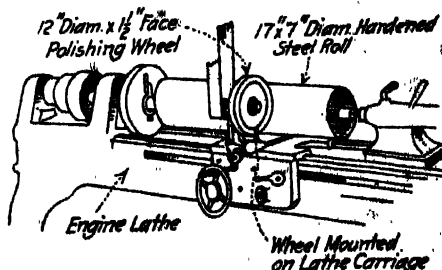
by the usual planing, followed by polishing with a very fine wheel, while the piece was held by clamps upon a planer. Invariably, however, it was found upon removing the piece from the planer that a certain amount of distortion had been set up, by the combined action of the restraining clamps and the heat of the process produced by the passage of the polishing wheel over the surface. Consequently, the familiar rainbows appeared when the plate was used.

In search of better methods of handling the operation, the engineers avoided the use of clamps by holding the piece in place on the planer bed by means of hot pitch, and polishing after the pitch had set. Still the rainbows appeared when a lens

was tested. This was due to the fact that the heating of the metal by the action of the wheel produced a local, though minute, heating of the pitch, and so caused the almost microscopic distortion of the metal.

A solution to this problem would be to bring both sides of the metal plate to as nearly as possible a uniform and plane surface, the two being parallel to each other, and then polishing one surface with a polishing wheel while the plate was held by the other surface magnetically on the planer bed. The polishing under this condition can be done with great nicety, care being taken so that the amount of heat previously experienced is considerably diminished. This illustration gives a clear indication as to the character of accuracy required in some polishing operations and as to how this accuracy may be obtained.

In another instance, a firm manufacturing tin foil equivalent to about 1/3000 in. thick only. The final rolling process was done by a roll 7 in. in diameter and 17 in. long, made of hardened steel and highly polished. It was found, however, that



Method of Polishing Hardened Steel Rolls Used in the Manufacture of Tin Foil

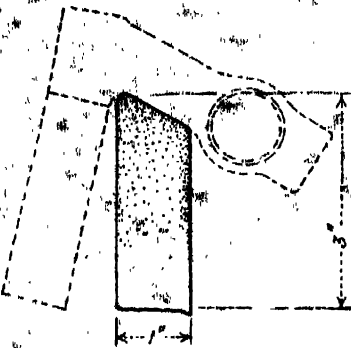
after a few days' work the roll began to give streaks, or tiny scratches, in the surface of the tin foil, which was a condition unacceptable to purchasers. Consequently these rolls had to be changed frequently and redressed before again being used. This redressing was done by a skilled operator, who smoothed the rolls by means of abrasive on a leather surface mounted on a block of wood, and applied by hand to the roll. The operation took him three weeks and, while it resulted in a smooth surface, produced an exorbitant upkeep cost.

This problem is being met by a flexible grinding equipment, shown in one illustration, where a polishing wheel 12 in. in diameter, and with a face of 1 1/2 in., runs back and forth on a lathe carriage while rotating at high speed against the surface of the rotating hardened steel roll. The use of a proper abrasive on this wheel produces the surface desired, while the continuous rotation of the steel roll, on a fixed axis, insures its perfectly cylindrical form after the conclusion of the operation. It is estimated that by this means a roll may be redressed within 30 minutes, instead of requiring three weeks.

Frequently it is necessary, in connection with polishing operations, to go back into the previous history of the manufacture of the article to be polished, and make some change in the manufacturing process so that conditions prejudicial to polishing may be avoided. This study of preliminary processes frequently results in a change in the shape of the piece, so that the polishing may more easily be done. Sometimes this results in the use of a larger amount of metal in the piece, which, of course, is rarely favored by the manufacturer. When it is made clear, however, that the use of an

additional dollar's worth of metal may save ten dollars in the finishing process, the desirability of the change becomes apparent.

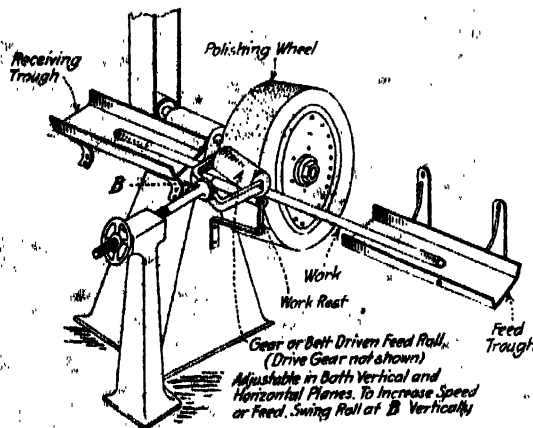
These pages contain a number of sketches show-



To Get into the Angle of a Bicycle Handle Bar Post a Wheel with Beveled Contour Is Necessary. This one is 14 in. in diameter, with 3-in. cushion, of compress canvas and soft density

ing typical polishing processes applied to a great variety of products, all the way from surgical scissors and pocket knives to lathe beds and other heavy pieces. Each one is a problem in itself and each one has to be separately studied. As an illustration of this, mention may be made of skate blanks turned out by a Massachusetts concern. They were cut out by dies from thin plates or sheets of steel. It happened that the manufacturer blanked the blade for the heel risers with one side of the sheet uppermost, while the toe riser was cut with the other side uppermost. The result was a piece so warped that it could not be held on a magnetic chuck, either for removing the burr, by grinding, or for polishing. The remedy was obvious.

The foregoing illustrations may serve to bring clearly to the attention of the executive end of a manufacturing concern the fact that the possibilities of accomplishments, both mechanical and financial, in polishing departments, are fully as large as



Polishing Pipes or Tubes Which Are Fed Across the Face of the Polishing Wheel by the Feed Roll Held Askew

any other department in the factory. The actual polishing processes themselves have been reduced to such absolute standard formulas that they are simple of introduction and execution. The basis of these processes, however, is a general knowledge of all other processes preceding polishing, in order to bring the work through to the polishing or finishing department in such condition that it can be properly operated upon and proper results secured.

It will appeal to the reader, no doubt, that a man who may have spent a lifetime in a plant as a polisher has not had the proper education, experience or training to permit him to do other than simply sit at his polishing wheel and polish a piece of metal.

Planning the work requires the best kind of technical training and manufacturing experience. A man, to be a competent executive in charge of a finishing department, should have a thorough knowledge not only of metallurgy, including the effect of various processes, such as heat treating, upon metals, but also of forging, casting, drawing, stamping, spinning, etc. He should have a comprehensive knowledge of the design of metal parts, having in mind the ability of the operator to reach every portion of the article with a polishing or flexible grinding wheel of the size, shape and character necessary to produce the desired finish.

Much could be said on the question of cost of operating finishing departments. It is true that, especially in buffing, the whole plan is so fundamentally loose to-day that enormous wastages, all of which are part of the cost, are present and foolishly so, simply because the proposition in the plant has not been standardized. It is, indeed, difficult to find two concerns, even in the same line of manufacturing, using the same process; and often they are operating at widely different costs. In connection with this, much of the work previously executed, undoubtedly by hand, is now being handled on automatic and semi-automatic machines, with the obvious advantage of decreased cost and increased speed of production.

Shaped wheels are coming rapidly into use, following along the principles of milling machine practice—for what is polishing, except another phase of metal production expressed so clearly in milling operations? Likewise, polishing is taking the place of lathe and planer operations, and, more generally speaking, flexible polishing and grinding are being substituted for other tooling operations at great reduction of cost, and are at the same time producing satisfactory finishes.

Progress in Molding Sand Investigation

The American Foundrymen's Association committee on molding sand research has been formulating instructions to be sent various State surveys as to methods to be followed in their investigations. The sub-committee on standard tests will report in due time on standard methods which will make possible a comparison of sands of one State with those of another. The committee desires information concerning investigations which have been carried on in foundries and laboratories in the testing of molding sand and the reclamation of old sand. The American Steel Foundries, Sivyer Steel Casting Co., Buckeye Steel Casting Co. and Ohio Brass Co. have already offered to contribute the results of tests made in their foundries. Three representatives of the American Society for Testing Materials have been appointed to represent that organization on the A. F. A. committee. They are G. K. Burgess, Bureau of Standards; G. H. Clamer, Ajax Metal Co., and Dr. Richard Moldenke, Watchung, N. J. The secretary of the committee, R. E. Kennedy, 909 W. California Street, Urbana, Ill., would like to be notified of any investigations that are being carried on by foundry companies or individuals.

The Pendergast Fence Co., Ltd., Sarnia, Ont., has begun operations in the manufacture of wire fencing. The plant is equipped with new modern machinery. The president is Maurice De Pendergast; vice-president, Archibald Weir; secretary, Judith M. Pendergast, and treasurer, Harvey Unsworth. Maurice De Pendergast started the manufacture of wire fencing in Sarnia in 1903 and the business gradually developed, but has been out of business for a few years preceding the organizing of the new company. He is also president and principal owner of the Pendergast Fence Co., Inc., with head office and a plant at Stillwater, Minn.

ELECTRIC STEAM GENERATOR

An Apparatus to Take the Place of Fuel-Fired Boilers

AN electric steam generator, utilizing the principle of heating produced by resistance to flow of electric current through water, has been placed on the market by the Electric Furnace Construction Co., Philadelphia. It is called the Electro steam generator.

Steam is generated at any specified pressure by means of high tension alternating current led directly



An Electric Steam Generator of 20,000 Kw., 6600 Volts, 3-Phase, Installed by Shawinigan Water & Power Co.

through electrodes of special design into the water to be evaporated. A vertical tank is used, constructed according to approved boiler practice. The whole apparatus occupies, it is emphasized, only a fraction of the space required for fuel-fired boilers and the cost of installation is much less.

The amount of steam generated, the pressure and amount of electric power used are governed by the height of water in the vertical tank. This is controlled and regulated by standard valves, thus to render the whole operation practically automatic.

Any water that is suitable for the ordinary boiler is satisfactory and it is not regarded as necessary to install water softening apparatus. Either condensate or raw water can be used or a mixture of the two. No part of the electric steam generator is exposed to a higher temperature than that of the steam and the only part subject to wear is the electrodes.

The most important application of this steam generator will be found in industries located within the range of hydroelectric power plants, where use may be made of surplus energy or water running to waste. Due to the inability of ordinary power consumers to operate 24 hr. per day, the load factor at most power plants runs from 60 to 80 per cent. Complete use may be made of this off-peak load, which is not now used, by the installation of such steam generators, and the load

factor of the power station can be considerably improved. The generators are found to operate with 98 per cent thermal efficiency and unity power factor. The generator can be paralleled in with existing coal or oil-fired boilers and operated on the off-peak loads, when cheap power can be had.

One large installation operates only on Saturday night and Sunday, and the resultant saving in coal, it is stated, paid for the whole cost in one season.

The chief advantages claimed are that the initial and operating costs are much lower than on fuel-fired boilers, the space occupied is much less, minimum expenses involved for buildings, and smokestacks, storage for oil or coal, fuel or ash-handling equipment, mechanical stoking devices and water softeners are not needed. Renewals, repairs, cleaning and shutdowns are reduced to a minimum as the highest temperature is that of the steam.

A number of large generators have been in successful operation for some months and already over 100,000 kw. of generators, representing 10,000 boiler horsepower, according to Frank Hodson, president Electric Furnace Construction Co., are running or being installed of the type described.

Wherever fuel is expensive and power can be had at cheap rates, the electric steam generator is regarded as the economical unit. This condition applies particularly to industries like paper, pulp and chemical, lumber, textiles, etc. Many companies purchasing power contract for blocks of electric power at a fixed rate per horsepower year. Yet few of these use this continuously, it is pointed out, and during idle periods the energy which they pay for can be converted into steam for heating or industrial purposes.

Air Reduction Sales Co. and Davis-Bournonville Co. Merge

The Air Reduction Sales Co., Canadian Pacific Building, New York, and the Davis-Bournonville Co., Jersey City, N. J., have consolidated. Plans which have been under way for several weeks were ratified at a meeting of the stockholders on March 17. New officers of the consolidated company have not yet been elected, nor have complete arrangements been made regarding the physical merging of the plants of the combined companies.

The Air Reduction Sales Co. was incorporated in 1915, acquiring its processes for the production of gases from liquid air largely from the L'Air Liquide Societe of France, and it owns exclusively the rights to these processes for the United States and Mexico. In addition to plants scattered at various industrial centers throughout the country for the manufacture of oxygen and acetylene, the company also markets the entire output of a plant in Baltimore, Md., operated and owned jointly with the U. S. Industrial Chemical Co., for the manufacture of calorene by a process developed by the two companies. It has a plant at Jersey City for the manufacture of cutting and welding torches, and a plant in Chicago for the manufacture of acetylene tanks. It has warehouses in 35 cities of the United States.

The Davis-Bournonville Co., which has a plant at Jersey City, is a pioneer in the development of oxy-acetylene apparatus and equipment, its products including the "Oxygraph," the "Radiograph," tube welding equipment and other special devices which will be combined with the "Aircro" line of the Air Reduction Sales Co.

At the annual meeting of the Engineering Advertisers' Association, held at the Great Northern Hotel, Chicago, March 14, the following officers were elected for the coming year: President, Julius Holl, assistant to president and advertising manager Link-Belt Co., Chicago; vice-president, J. B. Patterson, district manager P. H. & F. M. Roots Co., Chicago; secretary, H. N. Baum, advertising manager Celite Products Co., Chicago.

Fluorspar in Open-Hearth Practice

Effective Agent in Removing Sulphur from the Steel— Action on the Slag and Furnace Lining—Some Old Ideas Altered

FLUORSPAR has been used in the basic open-hearth process for many years, but very little is known as to the reasons for the effects it brings about. It has been found useful in helping to lower the sulphur in open-hearth heats, and in this connection a paper by S. Schleicher in *Stahl und Eisen*, March 17, 1921, is of great interest, as it deals entirely with this question of desulphurization and the use of fluorspar.

In Table 1 are shown the results with nine heats made from material very low in manganese and high in sulphur, and in the working of which no fluorspar was used. The last column shows the sulphur distribution coefficient and is obtained by dividing the sulphur content in the slag by that in the steel. In other words, it shows the ratio of the sulphur in the slag to that in the steel.

Table 1—Sulphur Contents of Heats Made without Fluorspar

Analysis of Metal					
Carbon, Per Cent	Manganese, Per Cent	Phosphorus, Per Cent	Sulphur, Per Cent	Sulphur in Slag, Per Cent	Distribution Coefficient
0.12	0.56	0.04	0.06	0.14	2.33
0.12	0.47	0.03	0.08	0.27	3.37
0.12	0.56	0.07	0.08	0.19	2.37
0.11	0.53	0.05	0.09	0.34	3.77
0.08	0.58	0.04	0.09	0.35	3.90
0.11	0.53	0.06	0.08	0.20	2.50
0.10	0.44	0.04	0.08	0.36	3.25
0.16	0.50	0.03	0.09	0.32	3.50
0.09	0.44	0.04	0.09	0.30	3.33

The distribution coefficient of these nine heats averages 3.15. Table 2 shows what a different result is produced when fluorspar is used and gives the analysis of nine 30-ton heats, as before, using the same lime charge but with addition of 400 kg. (882 lb.) of fluorspar.

Table 2—Sulphur Contents of Heats Made with Fluorspar

Analysis of Metal					
Carbon, Per Cent	Manganese, Per Cent	Phosphorus, Per Cent	Sulphur, Per Cent	Sulphur in Slag, Per Cent	Distribution Coefficient
0.10	0.38	0.02	0.05	0.32	6.4
0.13	0.47	0.03	0.05	0.32	6.4
0.08	0.32	0.02	0.04	0.30	7.5
0.17	0.50	0.05	0.06	0.38	6.3
0.15	0.47	0.02	0.04	0.26	6.5
0.13	0.44	0.06	0.05	0.30	6.0
0.12	0.53	0.04	0.03	0.20	6.6
0.12	0.41	0.02	0.05	0.33	6.6
0.12	0.47	0.03	0.06	0.36	6.0

The coefficient of these nine heats is considerably increased and averages 6.5. The steel of the first nine heats averages 0.08 per cent sulphur, which is above the allowable limit of 0.06 per cent, while with the last nine heats it is about 0.05 per cent. The addition of fluorspar brings about a noticeable increase in the distribution coefficient and a decrease in the sulphur in the steel.

The next matter to be investigated is the action of the fluorspar in the slag. After its addition the slag becomes very fluid. If the outgoing gases are conducted through water the well known jelly-like precipitate of silica is formed which is always produced when silicon fluoride is passed through water. The fluorspar has therefore reacted with the silica of the slag, silicon fluoride being given off as a fume, and lime formed according to the equation:



As silicon fluoride is formed, the calcium fluoride or fluorspar contents of the slag must decrease. This is shown by the following results, the first sample being taken immediately after solution of the fluorspar; that is, 10 min. after addition, and the other samples

at 10-min. intervals. The exact results of sulphur determinations in the steel, and calcium fluoride in the slag, were as follows:

Sulphur, per cent	0.110	0.076	0.074	0.070	0.063	0.056	0.053
Calcium fluoride, per cent	6.03	4.10	3.40	2.27	2.09	2.21	2.00

This shows that the decrease in calcium fluoride only goes on to about 2 per cent, the samples taken during the last 30 min. agreeing within allowable errors of analysis.

Seven finishing slags from seven heats in which fluorspar was used were then examined. The results were:

Calcium Fluoride, Per Cent	Fluorine, Per Cent
2.58	1.26
2.40	1.17
2.44	1.19
2.30	1.12
2.16	1.05
2.48	1.20
2.06	1.00

Here, also, with sufficiently long working, the calcium fluoride contents of the slag are reduced to 2.0 to 2.5 per cent, and then remain practically constant. Whether the fluorine is all present as calcium fluoride, or in some other form, was not determined, but the assumption was made that it was calcium fluoride.

Up to now it has also been assumed that desulphurization, when fluorspar is used, was brought about by the slag being made more basic and yet remaining fluid enough to permit a good reaction. The following results will show that desulphurization cannot be laid to this cause. The finishing slags of two similar heats, one made without fluorspar additions and the other with fluorspar, are given in Table 3.

Table 3—Open-Hearth Slags with and without Fluorspar

Without Spar				With Spar			
Slag, Per Cent	Steel, Per Cent	Slag, Per Cent	Steel, Per Cent	Slag, Per Cent	Steel, Per Cent	Slag, Per Cent	Steel, Per Cent
SiO ₂ 15.20	C 0.16	SiO ₂ 19.63	C 0.12	SiO ₂ 19.63	C 0.12	SiO ₂ 19.63	C 0.12
Fe ₂ O ₃ 3.57	Mn 0.50	Fe ₂ O ₃ 2.86	Mn 0.41	Fe ₂ O ₃ 2.86	Mn 0.41	Fe ₂ O ₃ 2.86	Mn 0.41
FeO 8.14	P 0.03	FeO 11.57	P 0.03	FeO 11.57	P 0.03	FeO 11.57	P 0.03
Al ₂ O ₃ 2.14	S 0.09	Al ₂ O ₃ 3.36	S 0.06	Al ₂ O ₃ 3.36	S 0.06	Al ₂ O ₃ 3.36	S 0.06
MnO 5.41		MnO 5.63		MnO 5.63		MnO 5.63	
P ₂ O ₅ 4.78		P ₂ O ₅ 2.62		P ₂ O ₅ 2.62		P ₂ O ₅ 2.62	
CaO 46.50		CaO 46.98		CaO 46.98		CaO 46.98	
MgO 12.97		MgO 4.55		MgO 4.55		MgO 4.55	
S 0.32	S. Coeff. 3.50	S 0.44	S. Coeff. 7.3	S 0.44	S. Coeff. 7.3	S 0.44	S. Coeff. 7.3
CaF ₂ ...		CaF ₂ 2.26		CaF ₂ 2.26		CaF ₂ 2.26	

The basicity of the two slags expressed as the ratio of the oxygen of the bases to that of the acids is 1.67 in the first case, 1.30 in the second, and yet the distribution coefficient in the first case is 3.50 and in the second 7.3.

In order to obtain conclusive information, the following experiment was carried out: A 60-ton heat was taken, and while working down 2000 kg. (4409 lb.) of spiegeleisen was added. In a half hour the manganese was worked out and the bath was in such condition that about a half hour's work with the finishing slag was needed. An addition of 900 kg. (1984 lb.) of fluorspar was made, the spar containing 95 per cent calcium fluoride. Samples of metal and slag were taken, as shown in Table 4. Especially striking is the fact that the silica does not decrease but increases, notwithstanding the calcium fluoride reacts with the silica as shown by the thick white smoke from the chimney after each addition.

To investigate the matter further, samples were taken from another heat giving results as follows:

Test	Time	Silica, Per Cent
1	10:28	17.23
2	10:30	800 kg. (1764 lb.) fluorspar
3	10:35	17.05
4	10:37	16.18
5	10:43	17.08
6	11:13	17.70

This heat also shows that the silica drops during the first seven minutes but then again increases. The slag takes up silica which must come from the furnace lin-

ing, and it must be mentioned that there is marked destruction of that part of the hearth and walls coming in contact with the slag. Through the fluorspar addition the slag has not become more basic. The sulphur in the bath (Table 4) is lowered from 0.081 per cent to 0.064 per cent and then 0.060 per cent. In the slag, however, the sulphur is not increased but decreases, and to a greater extent than is accounted for by the dilution of the slag with the spar addition. The same results were shown by another heat as given below:

Time	Sulphur in Steel, Per Cent	Sulphur in Slag, Per Cent
10:55	0.081	0.333
11:00	800 kg. (1764 lb.)	Spar addition
11:20	0.060	0.165
11:40	n. d.	0.182
12:12	0.042	0.220
12:13	Tapped	

A careful balance of the sulphur in the heat given in Table 4 shows that 18.39 kg. (4054 lb.) were volatilized. A test was carried out several times of taking outgoing gas from the furnace between the port and the air regenerator, through a water-cooled pipe, and bubbling through potash solution. The average

was 0.064 per cent in the steel and only 0.09 per cent in the slag. Careful calculation showed that 10.8 kg. (23.8 lb.) sulphur had volatilized. The finished metal showed 0.06 per cent sulphur, so the slag had absorbed sulphur again from the metal.

With soft heats, also, it has been found that there might be re-sulphurization but only when spar was added suddenly, in large amounts, to the finishing slag. In these cases there was always such a drop in the sulphur contents of the slag that the total of sulphur in metal and slag was decreased and sulphur was volatilized. In one case, of a 44-ton heat, after the addition of 700 kg. (1543 lb.) of spar there was an increase in the bath from 0.076 to 0.097 per cent, while the sulphur in the slag dropped from 0.385 to 0.016 per cent. Calculation also showed that 18.6 (41 lb.) of sulphur was volatilized. It is evident that such a slag is in good condition to take up sulphur from the bath.

For desulphurization, therefore, it is necessary that, after the fluorspar addition, the heat remain sufficiently long in the furnace. The fear that too early addition of fluorspar is harmful is therefore not true.

Table 4—Test with Fluorspar Addition*

Time	Steel				Slag									
	Carbon	Mangan.	Phos.	Sulphur	SiO ₂	FeO	Fe ₂ O ₃	MnO	CaO	Al ₂ O ₃	MgO	S	P ₂ O ₅	CaF ₂
2:15	0.145	0.36	0.026	0.081	19.90	10.80	2.14	17.07	38.80	2.08	6.16	0.21	2.63	...
2:30	0.115	0.32	0.033	0.083	17.90	10.67	2.71	16.77	39.30	3.16	6.35	0.35	2.52	...
2:32					Addition of 2000		kg. (4409 lb.)	spiegeleisen						
3:00	0.175	0.44	0.038	0.081	17.85	10.67	1.57	17.28	39.90	2.57	6.85	0.36	2.50	...
3:01					Addition of 900		kg. (1984 lb.)	fluorspar						
3:11	0.120	0.38	0.027	0.064	17.60	11.44	1.57	15.83	34.65	2.36	7.29	0.26	2.29	6.24
3:21	0.100	0.33	0.030	0.060	18.05	11.70	2.14	16.25	35.18	1.90	6.65	0.25	2.21	5.25
3:23					Addition of 300		kg. (661 lb.)	spiegeleisen						
3:33	0.100	0.35	0.030	0.060	18.25	11.70	2.71	16.02	35.50	2.51	7.15	0.24	2.13	3.49
3:34					Tapped									

*Data in percentages.

showed 0.22 gr. sulphur per cubic meter, and theoretically there should be 0.213 from the producer gas. Similar tests were made after the addition of fluorspar, but this method did not show an increase in the sulphur contents of the gas. This shows the sulphur is not in the form of SO₂, but there is the possibility of a fluoride being present, such as, for example, SF₆. There is a possibility that such a compound would be precipitated by the low temperature of the water-cooled tube, so the gas was sucked hot through a porcelain tube, and it was found that more sulphur was absorbed. The gas contained 1.966 gr. per cubic meter, and as 0.22 gr. came from the producer gas, the remainder or 1.766 gr. was volatilized from the slag. The amount taken for the test was 10 liters and the time was the seven minutes immediately following the fluorspar addition.

The test showed, therefore, that the influence of fluorspar addition to an open-hearth slag regarding the lowering of the sulphur is that in some form or other the sulphur is volatilized, and the slag is therefore in condition to take up more sulphur from the bath. The last mentioned tests show this clearly, the sulphur contents in the final slag being approximately the same as before the fluorspar addition, although previous to this it decreased. The sulphur in the bath dropped from 0.081 to 0.042 per cent. Where the slag is to be used for fertilizer, and it is necessary the phosphate be soluble in citric acid, fluorspar should not be used.

Next comes an abstract of the paper by J. Fohs in THE IRON AGE, May 27, 1909, p. 1692, with the conclusions of which Mr. Schleicher is not in agreement, as they are contradicted by the results of the tests previously described.

Under certain conditions, notwithstanding fluorspar additions, it is possible to get re-sulphurization of the bath, when there is a very rapid removal of carbon. An example of a 40-ton heat may be mentioned. The heat was very high in carbon and with a very thick slag. Ten minutes after the addition of about 10 per cent fluorspar to the slag, the metal after a good deal of foaming was soft. The sulphur before the spar addition was 0.048 per cent in the steel and 0.34 per cent in the slag. Ten minutes after the addition it

Experience proves that spar can be added with the lime, and it can at least be added while the lime is in lumps in the slag without danger that there will not be plenty of time to take care of possible re-sulphurization. Experience also shows that heats handled with spar are always very low in phosphorus.

The writer draws the following conclusions: If fluorspar is added to an open-hearth slag, it is only decomposed and reduced to a certain limit, namely, from 2.0 to 2.5 per cent calcium fluoride content. Silica is first removed from the slag as silicon fluoride, but this silica is replaced by silica from the furnace lining. Fluorspar is desulphurizing in its action in that sulphur is volatilized from the slag in some form and the slag therefore can take up more sulphur from the bath.

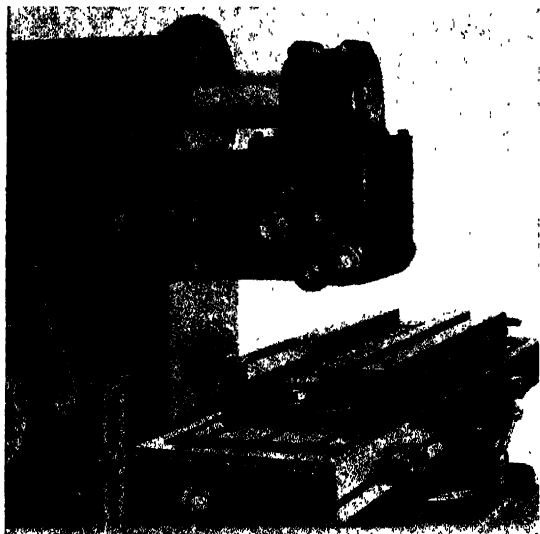
There was an interesting discussion of this paper which was read before the steel works committee of the German Iron and Steel Institute. One speaker mentioned the great danger of using fluorspar because of the deterioration of the furnace walls and port ends. The first result of the spar additions is to give greater fluidity to the slag, greatly increasing its capability for reaction. The whole melting practice is thereby favorably influenced and it may be assumed that the increased removal of sulphur is due to this cause. Mr. Schleicher disputed rapid deterioration of the furnace ends or walls when fluorspar was used, but admitted that the hearth suffered and the dolomite consumption was increased.

Another speaker mentioned that fluorspar burst into fine particles when added to the furnace because of its water of crystallization, and had a very harmful effect on the roof, walls and ends, and on this account was only to be used in the most urgent cases. In reply to another speaker, Mr. Schleicher said numerous cases had proved that, after spar additions, the sulphur in the slag first dropped considerably, and that the sum of the sulphur in slag and metal showed a loss in total sulphur, and also a re-sulphurization of the metal in the bath. In regard to the destructive effects of fluorspar, it had not been found that the port ends and roof suffered, but the ladle linings were very rapidly eaten away. It should not be used unless needed, but there were cases where it provided a means for reducing the sulphur in high sulphur heats.—G. L. W.

Rack-Cutting Attachment for Heavy Miller

A new rack-cutting attachment designed especially for the heavy-duty miller has been brought out by the Rockford Milling Machine Co., Rockford, Ill. Rigidity is a feature emphasized by the makers.

As shown in the illustration, the attachment is clamped securely to the face of the column, further support being given by the overhanging arm support immediately above the attachment spindle, at which point the greatest strain is received. This strain is said to be entirely overcome by the method of clamping to the overhanging arm. The drive is by a shank held in the main spindle by the tang and drawback. A wide face hardened spur gear on the shank drives a spur gear keyed to the double-lead worm, the latter being



The Attachment Is Clamped to the Face of the Column, as Shown. Further support is given by the overhanging arm

of alloy steel, supported at both ends and provided with two ball end-thrust bearings. The worm drives a heavy bronze worm wheel of coarse pitch which has keyed to it, one on either side, two spur gears of wide face and with staggered teeth. These spur gears drive two gears that are cut solid on the attachment spindle, one very close to the front, the other to the rear bearing. The wide face gears with staggered teeth are intended to assure smooth drive.

The attachment spindle is of special alloy steel and runs in bronze taper bearings which are provided with means for taking up wear through the adjustment of a single nut. The solid shaft on which the two spur gears and worm wheel are mounted extend through the attachment to serve as an over-arm support for the cutter arbor. The worm wheel and spur gears on the shaft, as well as the gears on the spindle shaft, run in a bath of oil, an oil cup at the side of the attachment serving as an oil line.

The rack-indexing attachment used in connection with the rack-cutting attachment is fastened to the T-slot in the left-hand end of the table and consists of a bracket which carries an indexing and locking disk with change gears. It provides for cutting racks and making settings without relying on the usual dial for this purpose. The various gear combinations permit racks of different pitches to be indexed by making either a half turn, a complete turn or two complete turns of the locking disk. Eighteen change gears provide for the cutting of the following diametral pitches: 3 to 6, by half pitches; all pitches from 7 to 16; and all even pitches from 18 to 32. Circular pitches from 1 to 1/16 in., varying by sixteenths of an inch. The rack vise used has jaws 30 in. long and opens 5 1/2 in.

The rack cutting attachment will be made also for the No. 1 1/2 machine.

The Keith Car Works, Sagamore, Mass., have resumed operations after a shutdown of three weeks.

National Metal Trades Association to Meet in New York, April 19 and 20

The 24th annual convention of the National Metal Trades Association will be held at the Hotel Astor, New York, on Wednesday and Thursday, April 19 and 20. On the Monday preceding, the executive committee will be in session and the 23 local branch secretaries will hold their semi-annual meeting. On Monday night, the Administrative Council and the local branch presidents and secretaries will meet at dinner. On Tuesday, the administrative council will hold its semi-annual meeting and the local branch secretaries will continue their sessions and at noon the administrative council, local branch presidents and secretaries will meet at luncheon. The annual dinner of the Alumni Association, consisting of the organization's past officers, comes on Tuesday evening.

The convention will open on Wednesday morning with a short business meeting, followed by a program of unusual interest. Able speakers have been secured to discuss business, financial and labor questions. The association, after a careful survey of apprenticeship training, covering a period of more than two years, has prepared a thorough-going plan of apprenticeship training, which will be submitted to the members at the convention.

Angle Fixture with Perforated Plate

A universal angle fixture with the plate perforated as shown in the illustration, for insertion of patent clamps, has been placed on the market by E. L. Krag & Co., 50 West Randolph Street, Chicago. The perforations and clamps are intended to facilitate fastening and adjusting the work, the fixture as a whole being designed to permit easy and economical angle set ups on milling machines, surface grinders and drill presses.

The plate swings a full 180 deg., or 90 deg. on each side from a horizontal position, and revolves a full 360 deg. on the base. Surfaces of the plate are ground true and square with each other. Both dials at the joints are graduated in degrees and the plate hinged



The Perforation of the Plate Is for Insertion of Patent Clamps, as Shown

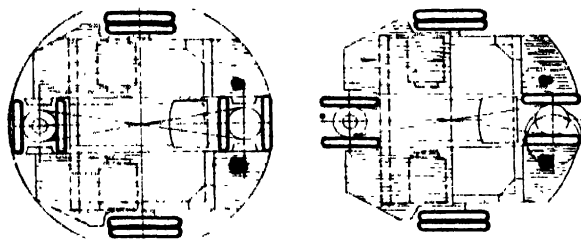
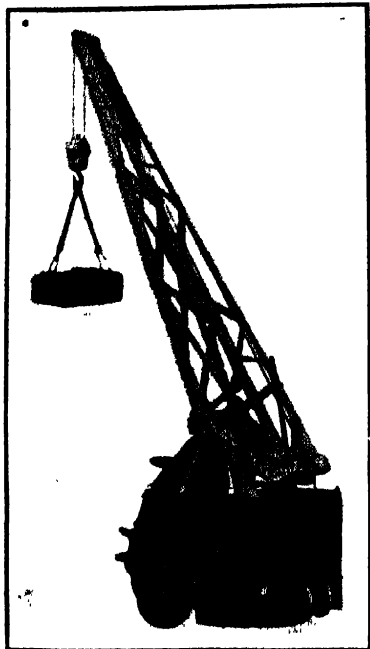
on a 3/4-in. stud which is threaded at one end and is used to clamp the plate in the desired position. The faces of the large flanges on the plate engaging the faces of the bosses on the yoke lugs afford the necessary friction required to hold the plate fast. The yoke casting revolves on a 1 1/4-in. pilot which fits into the center of the base, the yoke being fastened by two 1/2-in. bolts which ride in a circular T-slot in the base. All working surfaces are finished true and flat to assure perfect clamping. The three clamping nuts are of the same size, requiring but one wrench for all adjustments.

The base is 8 1/2 in. long and 6 1/2 in. wide. The height over all is 6 1/2 in. and dimensions of the plate 3 3/4 in. by 4 1/4 in. The weight is 25 lb.

Electric Runabout Crane Truck

An electric runabout crane truck of the type shown in the illustration has been recently developed in England, the truck being manufactured by Messrs. Ransomes, Sims & Jeffries Ltd., Ipswich, and the crane mechanism by Messrs. Ransomes & Rapier Ltd., also of Ipswich.

In this design the turntable usually employed to



Full View of Runabout Electric Crane Is Shown Above. In the left hand sketch the wheels are adjusted for swinging the load, the other showing position of wheels for traveling

enable the crane to swivel independently of the chassis frame has been dispensed with, the crane being rigidly fixed to the chassis. The vehicle is constructed to turn on its own axis or run forwards or backwards in a path of any curvature.

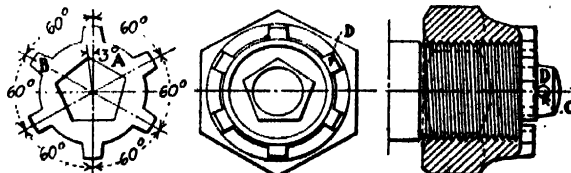
The crane being a fixture on the chassis, the jib is always in the same position relatively to it and there is no variation of the stability factor as the load is swung, resulting in a lighter weight of crane truck. The pressure on the road remains constant for all positions of the crane and is kept within low limits by its distribution between four wheels.

Each driving wheel is driven by an electric motor supplied by a battery carried on the truck. The steering wheels can be rotated in either direction to positions at right angles to the running positions, as shown in the illustration. Just before reaching this extreme position one of the running motors is automatically reversed so that the truck then rotates about its own axis.

Congress has approved an item of \$158,000 in the deficiency bill to be used in carrying into effect the Lampert Act reorganizing the Patent Office personnel and revising salaries there.

New Form of Lock-Nut

In a lock nut of a type frequently employed, with six serrations, the nut may be locked in position within one-sixth of a turn, or, with two pin-holes at right angles, to within one-twelfth of a turn. *Comptes Rendus* describes a locking arrangement with finer precision of adjustment, devised by A. Rateau, which is suitable for special cases or for large sizes of nuts. It consists of a washer A with a pentagonal center and six projections B. One axis of the pentagon is displaced 3 deg. from one axis of the equi-spaced projections. The pentagonal center is an exact fit upon a pentagon at the extremity of the bolt, and the projections fit into serrations in the nut, with an allowance



Hexagon-Pentagon Form of Lock-Nut

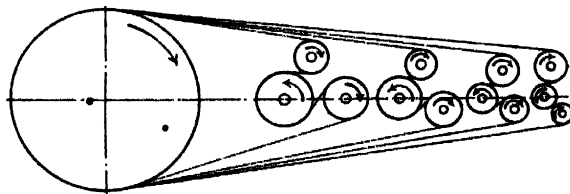
of 3 deg. play. The washer is kept in place by a pin C passing through the hole D in the bolt.

There are five possible positions of 12 deg. interval of the pentagon for each one-sixth rotation of the nut, and, by turning over the nut, another five positions 6 deg. from the previous. Thus, with a play of 6 deg., it would always be possible to place the washer in position. With a play of only 3 deg., the maximum tightening or loosening of the nut is $1\frac{1}{2}$ deg. or $1/240$ turn. If necessary, this precision could be increased by choosing, for the design, larger contiguous numbers than 5 and 6.

Novel Rolling-Mill Belt Drive

In a German wire factory a remarkable drive of approximately 1000 hp. for a continuous wire-rolling train has been running continuously for a period of over 10 years. Half the output of the engine is transmitted by spur-wheel gears to the roughing train with seven consecutive housings, while the remaining half of the output goes to the finishing train, to which it is transmitted by means of eight belt pulleys, four jockey pulleys, and four superimposed leather belts, all driven from the flywheel as shown in the illustration.

In view of the strong deflections and the high speed



Eight Mills Run from One Pulley

of the superimposed belts (98 ft. per sec.), the attempt at first sight appeared risky. The shocks and strains occurring in the working of the train are neutralized by the jockey pulleys being spring-loaded. The belt widths, are, successively, 40 in., 28 in., 26 in. and 24 in. According to *Engineering Progress*, the drive has given entire satisfaction.

The Erie Electrical Equipment Co., Johnstown, Pa., after considering various propositions to move from that city, has decided to remain there. At a special meeting of the directors, S. R. Burd was appointed sales manager, succeeding H. A. Selah, who retains his stock in the company and is still a member of the board of directors. Mr. Burd has been a resident of Johnstown for seven years and has been connected with the engineering department of the H. S. Kerbaugh Co. The officers of the company are: President, J. L. Hershberger; treasurer, J. F. Kress; vice-president, M. D. Bearer; secretary, Charles C. Kress.

Trade Aspects of Non-Ferrous Metals

The Manufacturer's Point of View Brought Out at Institute of Metals—British Specification Problems— Training Men for Management

(Special Correspondence)

LONDON, March 10.—The annual general meeting of the Institute of Metals, which concluded yesterday, was notable for the frank exposition of the manufacturer's viewpoint by the new president, Leonard Sumner. Among the papers submitted for discussion it was generally conceded that the one of outstanding merit and practical utility was Doctor Bengough's summary of the research work on the corrosion of condenser tubes, which he has been conducting, with the aid of various collaborators, for the past ten years, under the auspices of the corrosion committee of the institute. Doctor Moore and Mr. Beckinsale also contributed a valuable paper recounting their further investigations on season cracking, with special reference to condenser tubes.

The other papers were all of a high standard of merit, although in one instance the author appears to have made a rash attempt, for which he was politely but firmly reproved, to evolve a rather startling general theory from the results of a very special and restricted investigation. He is not the only sinner in this respect, however. The shoemaker thinks there is nothing like leather. Doctor Rosenhain thinks there is nothing like amorphous cement, Professor Thompson considers there is nothing like surface tension, while Professor Carpenter believes there is nothing like experimental data. No doubt, in a multitude of counsels metallurgical wisdom ultimately will be found.

Manufacturers More Coöperative

Beginning with a reference to the prestige of the institute, President Sumner said in his address that the *Journal* holds a very high place in the world's metallurgical literature. The membership increased in 1921 from 1298 to 1410. Student members, who numbered but 6 in 1916, are to-day no fewer than 116. Slightly over 13 years ago the institute began with 300 members. Much has been done to break down the old feeling of antagonism and mistrust that prevailed among manufacturers. The speaker said:

During the war every manufacturer desired to do all he could for his country in its hour of need, and one and all both gave and received information. Exchange of visits to works took place, processes and methods of manufacture were shown, and that interchange of ideas, so much desired, freely took place. I am happy to state that this same spirit still prevails to a very large degree to-day. Before the war I think I had been through only one works that was in competition with my own. Since then I, or a representative of my firm, have been shown "really" round the works of all our principal competitors, and we have also had the pleasure of showing our competitors through our works and exchanging notes and ideas with them. We therefore may feel happy that this particular object for which the institute was founded has been largely realized.

Other subjects discussed in the address were specification and the scarcity of men with talent for works management. On these questions the views of the speaker are indicated in the extracts given below:

Unusual Specifications

Some years ago Sir Gerard Muntz complained that manufacturers had to work to some arbitrary specifications, and that we had some weird and strange tasks to perform, whereby the user got something which might be unsuited for the purpose required. He went on to hope that in due course the influence of the Institute of Metals would be such that the issuing of these weird specifications would soon become a thing of the past. I cannot do better than quote the words he then used:

The chief matter is that the general knowledge of the non-ferrous metals is simply appalling by its absence; it leaves

the greater scope for the work of the Institute of Metals; there is much to learn, much already known which can be taught, better taught by such a body as the institute than by any individual, or even by any university or school of metallurgy, because it would come with more weight from an institute embracing so many different classes of thought than from anywhere else.

I venture to think that to-day the manufacturer does get many less of these weird specifications to which he is requested to work. The user has gained knowledge, and if he does now make a specification to which he asks the manufacturer to work, there is usually some reason for that particular specification. Then there are other users who may have little or no knowledge of non-ferrous metallurgy. These users generally make no specification, but leave it to the manufacturer to supply what he thinks most suitable. If the material supplied is unsatisfactory, then the onus falls on the maker. Whatever the attitude taken by the user the position is unsatisfactory for both user and manufacturer. What would be ideal would be that the user should consult with the manufacturer; the user should explain his views to the maker; the maker should give his views; and that both parties should be so well acquainted with the properties of various alloys that between them a suitable alloy should be produced to meet the user's needs.

Generally speaking, however, that branch of industry with which I am connected has usually to work to specifications which have been drawn up by responsible bodies, such as the Admiralty, War Office, or the British Engineering Standards Association. These specifications have been put into force after consultation with the manufacturer. . . . The policy of allowing a certain amount of freedom to the manufacturer has, I maintain, been a good one, and I trust that it will be continued in the future as far as possible. Particularly in these difficult times, it is vitally important for the commercial prosperity of the industry that the manufacturer should have a large variety and range of raw material to draw upon. His choice should be as little circumscribed as possible.

Responsibilities of Metal Merchants

There is another body of men whom I would like to see more actively interested in the work of the institute. I refer to the metal merchants and brokers. The manufacturer is many times offered a material containing, say, 98½ per cent copper. The manufacturer asks what does the other 1½ per cent represent. The merchant cannot tell him, and he neither knows nor cares, so long as he can sell. Or, it may be, he offers a spelter containing 98½ per cent zinc, and if he is asked what are the cadmium contents, the dealer says he does not know, and perhaps asks, "What is cadmium?" There are members of this institute who are metal merchants, and I have no doubt that since joining they have been much impressed by the necessity for the manufacturer to know everything about the metal that he is offered, if he is to produce satisfactorily the product that is demanded by the user. In consequence, these metal merchants do take a great deal more care in obtaining information as to the metal they are offering, and are now much more frequently in a position to give full information than they were some years ago.

Makers have in the past (and are doing so still to-day, although perhaps in a lesser degree) pushed their wares under a fancy name or names. The alloy or metal may be, and often is, quite an ordinary alloy, but it will be dubbed, say, Smith's bronze or Jones's metal. The traveler goes out and preaches the virtues and the merits of, say, Jones's metal, and he prates

loudly of what this metal will do, and he is cautious enough, if he is properly posted, not to say what it will not do. The traveler is more often than not glib of tongue; he knows a little metallurgy, but very little; he gives results of tests of the metal which very likely are not applicable to the use to which the user wants to put the metal. . . .

I am bold enough to assert that the time is coming when no Jones's metal or Smith's bronze will be accepted by the user unless the manufacturer is prepared to lay his cards on the table and say at once what his alloy consists of. The alloy may be called any name one likes, but its constituents should be stated, and the maker should be prepared to stand by or fall with the metal he puts on the market. I have noticed that in recent times the tool steel makers, where they are still advertising their goods under their different trade names, are giving a complete analysis of the different grades of steel which they offer for varying purposes. This is an example which might with advantage be copied by the manufacturers of the non-ferrous metals, and, in the case of the more enlightened firms in the non-ferrous trade, is being put into practice.

Training for Management

Some four years ago, Professor Carpenter, in his presidential address, emphatically laid it down that students who were expecting to occupy technical positions in works must have been afforded opportunities to have works practice in conjunction with their educational training. I am thoroughly in agreement with this view.

Professor Carpenter gave us the three types of students that the training developed. First, there is the type of man whose bent is originality, whose bent is research, who wishes to improve the product or find a new and improved product. To that man the task of seeing that the daily out-turn of tons of material of the same type was up to standard would be most irksome. His *métier* is research, seeking for something new, and in his sphere in a works he is most valuable. A second type of student is the man who is not bent on research work, but who takes a keen interest in works practice, who is interested in existing methods and processes, and brings about improvements and gets the best out of the men. He is keen not only on the quality of the product of his mill, but on the output of the mill—a most valuable type of man for a commercial manufacturing firm to have. In one sense he is much more valuable to a manufacturer than a man of the first type. This man is a producer, and helps to find the ways and means for carrying on the business, while the first type of man may be considered a bit of a luxury. Still, the first type must be employed, because, after a period of some years, he may produce, from his labors, knowledge and skill, something which may revolutionize not only one's ideas but works practice. The third type of man, as illustrated by Professor Carpenter, is the man who is afraid of taking responsibilities of his own, but is an accurate and faithful worker under some one else's guidance and direction. Occasionally this type of man blossoms out and displays some independence and originality, but it is not often.

Equipment for Management Rare

Of these three types of men, one would think that the second type would be the man who would rise to the position of works manager or managing director. The research worker would not have the inclination or the adaptability to attend to the mass of detail and routine work that falls to the lot of a works manager, and the analyst in all probability has not got the ability. And so it is to the second type of man that we look for the man to promote to the managership. And yet, what do we who are in charge of commercial undertakings in the non-ferrous industry find? It is one of the greatest difficulties we have, to find a man suitable for these positions. A fellow competitor was telling me only a short time ago that he could get trained metallurgists, chemists, engineers in plenty, but that he could not find the right man for the managership. Why should this be so? The man in charge of a mill who is keen on his product and his output,

and can get the very best out of the workers under him, should be simply invaluable, but is in my experience failing in appreciation of the fact that organization, detail and discipline are essential to the successful running of a commercial undertaking. For instance, the bringing together of figures for the cost clerk may be distasteful and irksome to him, and he probably resents the cost clerk, perhaps questioning some of the figures that he has sent up to the office. He would seem to fail altogether to appreciate the necessity for accuracy; and accurate costing is of the greatest importance in a factory. He fails perhaps to work with other departmental heads. He may be running his mill on A's order, and word comes to stop production on this order and turn on to B's order. This upsets his arrangement, and he resents it. He does as he is requested, but unwillingly and grudgingly. Why should this man be lacking in these essentials for works management?

Is it a fault of his training? I do not express an opinion, but I would like our professors and teachers to ponder over the fact and ask themselves why it is that the students they have trained so carefully and with so much pains do not rise, generally speaking, to take those higher positions on the non-ferrous manufactures to which it would seem their training would eminently fit them. I am not sure that in the training in this country we do not specialize a little too much, and that the training should not be broader and more varied. Sometimes, too, I am inclined to think that our teachers are prone to be too much interested in the brilliant student to the possible neglect of the student who is not so clever. They seem to overlook the fact that industry requires many sound and able men and but a few brilliant men.

Efficiency of Labor in Germany

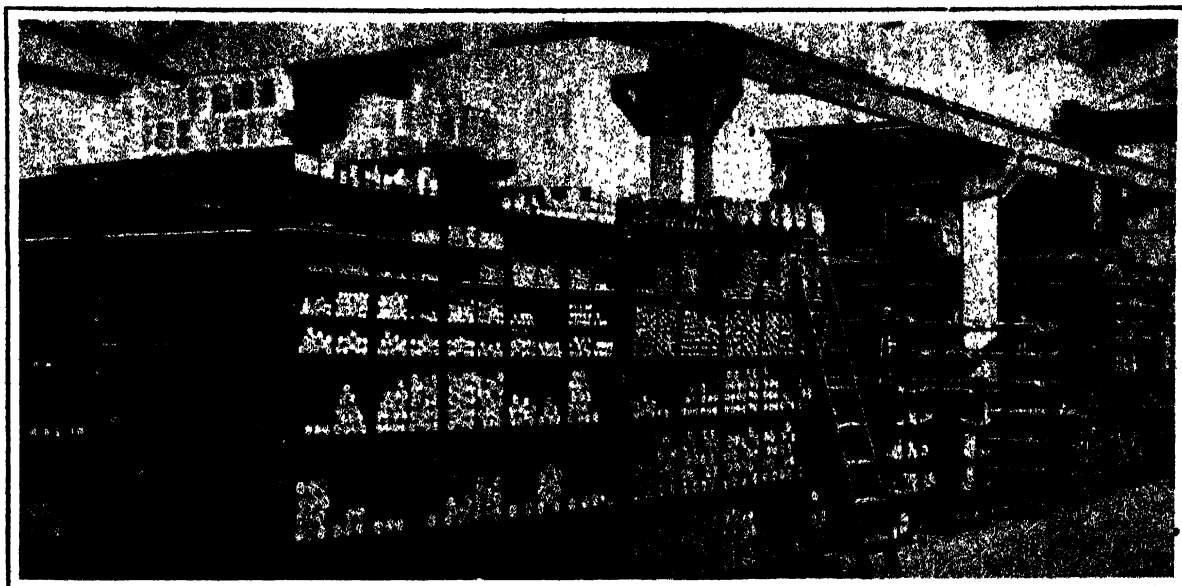
Reports from the German statistical office, relating to the daily output per worker in coal mines, show a steady falling off, together with a steady increase in the number of men employed in the mines, and a loss in mine production. The figures are drawn from three districts—Ruhr, Upper Silesia and Sarre. They show the number of workers employed in the average month of 1913, in each month of 1920, and in each of the first 8 months of 1921, together with the daily output per worker under each of those dates. The general results are tabulated below:

	Average Month		
	1913	1920	1921
<i>Ruhr District</i>			
Workers employed	390,600	496,600	542,800
Daily output, kilograms per man	972	582	569
<i>Upper Silesia</i>			
Workers employed	123,300	173,100	176,700
Daily output, kilograms per man	1,177	616	520
<i>Sarre District</i>			
Workers employed	46,700	71,200	74,800
Daily output, kilograms per man	868	479	499

It will be found from the above tabulation that the daily output in 1913 averaged 380,000 (metric) tons for the Ruhr district, this figure decreasing to 289,000 tons in 1920, and going up to 309,000 tons in 1921. In Upper Silesia the average output in 1913 was 145,000 tons per day; in 1920, 107,000 tons per day; and in 1921, only 92,000 tons per day. Part of this latter drop was due to the political troubles last May. Similar figures for the Sarre district show an output in 1913 of 40,500 tons; in 1920 of 34,100 tons; and in 1921 of 37,300 tons per day.

Canadian Iron and Steel Output in January

The year end decline in the Canadian production of pig iron was carried into the new year, states the Dominion Bureau of Statistics, Ottawa, and the output of pig iron dropped still lower in January to a new level of 32,184 gross tons, all made in blast furnaces, as compared with 39,917 tons in the month of December. The production of steel ingots and castings during January declined almost 10,000 tons from the quantity produced in December. The actual output was 33,011 tons of ingots and castings, comprising 31,163 tons of steel ingots and 1848 tons of steel castings.



STORING OF STEEL BARS

System Used by Machine-Tool Builder—Colors Denote Brand—Special Racks to Facilitate Handling

In standardizing the identification and storage of steel bars to conform to the efficient manufacturing system developed for their new plant, Gould & Eberhardt, Newark, N. J., have devised a system and equipment that has unique features. Construction of special racks was necessary because of the lack of standard equipment on the market that would meet the particular situation. The system developed has facilitated the handling of the steel, eliminating loss of time and the chance of error in locating the piece desired.

In the manufacture of shapers and automatic gear-cutting machinery many different kinds and sizes of steel bars, round, square, hexagon and rectangular, are used. In the method devised plain colors and combinations of colors are used to mark the steel, each color or combination serving to identify the metallurgical contents or the particular make. The identification colors are painted on the ends of the bars as they are received in the shipping department. To assist the raw-material clerk in selecting the proper steel, a conspicuous identification board, shown in the accompanying illustration, is hung above each rack. On this board are listed the names of the different kinds of steel used by the company, with a 2-in. disk as shown, painted in the corresponding color opposite each name. The board has a white background which shows the various colors to the best advantage. The various steels with their corresponding colors as listed on the board are:

20/45 Machine	Red
Hy-Speed Tool	Blue
Crescent	Yellow
10/15 Machine	Green
Cold Rolled	White
O.C.N.S.	Halves of green and red
Simplex	Green with white stripe
Tap	Halves of green and white

Racks Permit of Easy Handling

The storage racks are shown in the illustration. Each rack is built up of five duplicate steel frames, spaced 4 ft. apart and braced to form a rigid rack 16 ft. long. The individual section has a base consisting of an 8-in. I-beam, 8 ft. long, with six heavy 2 by 2 in. angles, 7 ft. high equally spaced and forming uprights to divide the section into five tiers. These tiers are in turn subdivided by 1/4-in. rods which extend from top to bottom, making ten tiers available in each rack. The cross pieces or shelves on which the steel bars lie are heavy 2 by 2 in. angles, spaced about 20 in. above each other at the bottom but diminishing in this distance until at the top, where the very small rods are stored, the distance between the shelves is only 6 in.

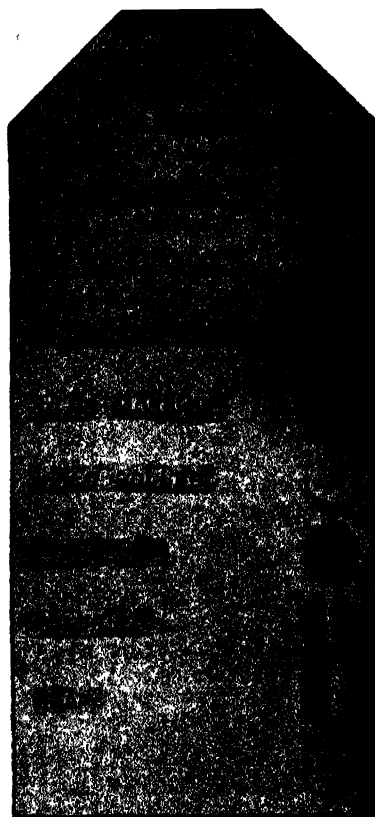
The top piece of each section is a heavy 2 by 3 in. angle, which makes a rigid top brace to complete the frame of the section, and also permits the storage of extra-large diameter short bars on top of the rack.

The five sections are spaced and held together to form the completed framework of the rack by 2 by 2 in. heavy angle stringers extending the full length of the rack at the top and bottom of each side. Further longitudinal bracing is provided by 1/4 by 2 1/2 in. flat bars crossed between and bolted to the top and bottom of the sections. An extra angle at the top on each side and extending the length of the rack prevents pieces from rolling off. Further precaution is taken by using timbers with half-round notches cut in them along the front on top of the rack, permitting short round pieces to be set in place.

The most convenient way to place the steel in the rack would seem to be to have all of the same kind in one tier, with the largest and heaviest pieces on the bottom shelf and the varying sizes in regular order, according to their dimension, with the smallest at the top. This order, however, has been reversed wherever possible. In some cases the square, hexagon, or rectangular shaped bars, which are generally smaller in size, are placed on the bottom shelves, and the very heavy bars on the top in order that they may be easily handled by the overhead traveling crane.

To facilitate the placing and finding of the various

The Storage Racks Are Shown Above. In some cases the heavier bars are placed at top to facilitate handling by overhead crane. The identification board is shown below



kinds and sizes of steels in their proper location, each rack is given a section number. Each tier in the rack is also lettered and each shelf numbered, making it a

simple matter to give instructions for the proper location of each bar as it is received, besides facilitating the keeping of stock records and taking inventory.

New Etching Medium for Chromium and Tungsten Steels

Special Solution for Detecting the Presence of Carbides—
Valuable as Applied to High-Speed Steels

A NEW etching medium, to be used in developing the microstructure of tungsten and chromium steels, is discussed by Dr. K. Daevs in the issue of *Stahl und Eisen*, Sept. 8, 1921. It was developed for steels containing carbides that were not attacked by the usual sodium picrate etching. The best solution has proved to be:

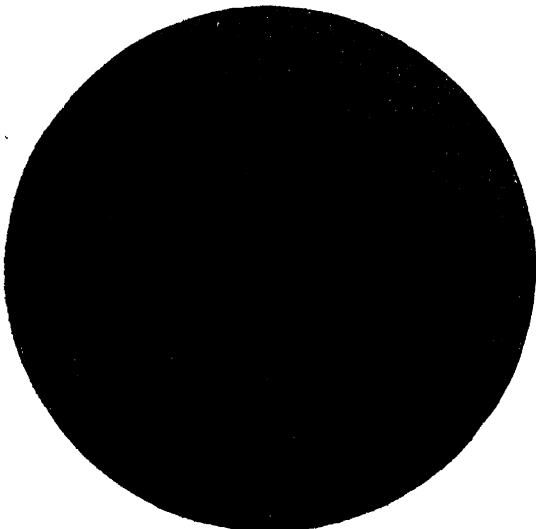
- 20 grams potassium ferricyanide
- 10 grams sodium hydrate
- 100 grams water

Such a solution was suggested by the two Japanese workers, K. Honda and T. Murakami, but further work was necessary to test and develop it. The solution given above slowly decomposes in the cold, and fairly quickly when heated, giving ferrocyanides. The microsections are polished and etched in either the cold or boiling solution for 15 to 20 seconds. Results are shown in the following table:

No	Composition—			Cold
	Carbide Per Cent	Chromium, Tungsten, Per Cent	Per Cent	
1	2.18	9.8		Eutectic colored.
	1.94			Eutectic colored.
3	1.23	0.54		No effect.
4	0.80	5.0		Excess eutectic colored.
5	0.54	5.25		Traces of eutectic were colored.
6	0.40	8.16		Traces of eutectic were colored.
7	0.21	11.50		Isolated carbide particles at the crystal junctions colored.
8	1.46	1.10		No effect.
9	1.00	1.37		No effect.
10	1.25		0.8	No effect.
11	1.15		1.2	No effect.
12	0.80	4.10	12.2	Small and large carbide particles were colored.
13	0.70	4.00	19.0	Small and large carbide particles were colored.

Etching Results

Boiling
Similar to cold solution, but stronger (more darkly colored).
Similar to cold solution, but stronger (more darkly colored).
Crystal junctions light brown.
Similar to cold solution, but stronger.
Similar to cold solution, but stronger.
Similar to cold solution, but stronger.
Similar to cold solution, but stronger.
Excess cementite blue, pearlite cementite weak yellow.
Excess cementite blue, pearlite cementite weak yellow.
Cementite of the pearlite yellow to blue.
Cementite of the pearlite yellow to blue.
Similar to cold solution, but stronger.
Similar to cold solution, but stronger.



A Chromium Steel Containing 9.80 Per Cent Chromium and 2.18 Per Cent Carbon Etched Cold with the New Solution

The appearance of sample No. 1 etched with the cold solution is shown in the illustration. Only the carbide in the eutectic of all steels with free eutectic is colored yellow to blue. Also with alloys that are just

For high-speed tool steels, which considerably exceed the limit, this method of examination is of value in determining whether the eutectic is properly broken up by forging and distributed properly through the metal. It can be used hot for showing the secondary cementite and pearlite of all tungsten steels, and as it only attacks the carbide of the pearlite it perhaps gives clearer, sharper structures than normal acid etching, which shows the difference in height between carbide and ferrite. It may be mentioned that very long etching with hot solution slightly colors the pearlite of ordinary carbon steels, probably due to decomposition of the solution.

The new solution, therefore, can be used cold for identifying the carbide of the eutectic of chromium steels, thereby showing whether excess eutectic is present, which is to be avoided in construction steels. It is also suitable for developing the structure of high-speed tool steels, and, as mentioned before, can be used for tungsten steels.—G. B. W.

A sentence in the article on page 786 of THE IRON AGE of March 16, reviewing the book, "Wealth and Income of the American People," was made meaningless by a typographical error. The second sentence in the paragraph next to last should read: "What Mr. Ingalls does is to analyze the figures," etc.

Development of Continuous Rolling Mills

Fundamental Conditions Affecting Design—Application to Specific Products and Specific Problems —Co-relation of Units

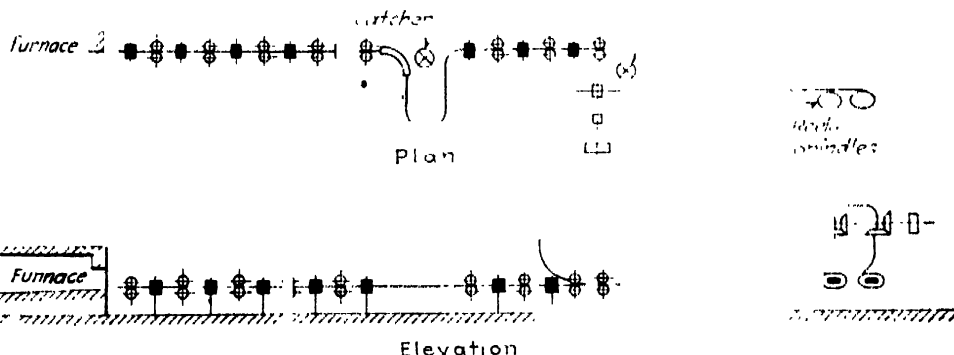
BY JOHN W. SHEPARDSON*

CONTINUOUS rolling is the most scientific method of forming metal so far discovered. It is for this reason alone that out of the round 30,000,000 tons of present-day annual production of hot-rolled steel in the United States, at least 30 per cent is roughed or finished in continuous mills. It is true that the con-

cal use, few people realize that it began its existence in the same period in which other types of mills were taking form. The decade between 1856 and 1866 saw the inception and establishment of several distinct types of mills now in use.

In the same decade—in 1862—George Bedson of

Fig. 1. Continuous Wire-Rod Mill at Works of Richard Johnson & Nephew, Manchester, England, with One Vertical Loop



struction and operation of continuous mills involve many difficult problems, and require greater experience than with other types of mills; nevertheless, the continuous process of rolling is being rapidly extended, particularly in this country, to many new lines of product, thus ever increasing the proportion of the total tonnages rolled on continuous mills. Changed labor conditions in other countries, as the result of the war, make necessary the use of improved labor-saving machinery, and many continuous mills are now being laid down in Europe.

For the mechanical treatment of steel some process better than rolling may be discovered; but, so long as rolls are employed, there seems to be no prospect of

Manchester, England, built and operated the first continuous rod mill. Fig. 1 shows the second mill built by Bedson, in 1868. It is still running and doing good work. The first mill laid down in the United States was made from the same patterns. It must be observed that the mill consists of alternate horizontal and vertical rolls. As first built, it was straight continuous from end to end. In 1896 it was divided into two parts.

Though the credit of building the first continuous mill belongs to England, it was in the United States that Charles Hill Morgan of Worcester, Mass., took up the development of this type of mill, and in his life saw it reach a place of great importance, due to the American ingenuity of himself and his associates. It was quite

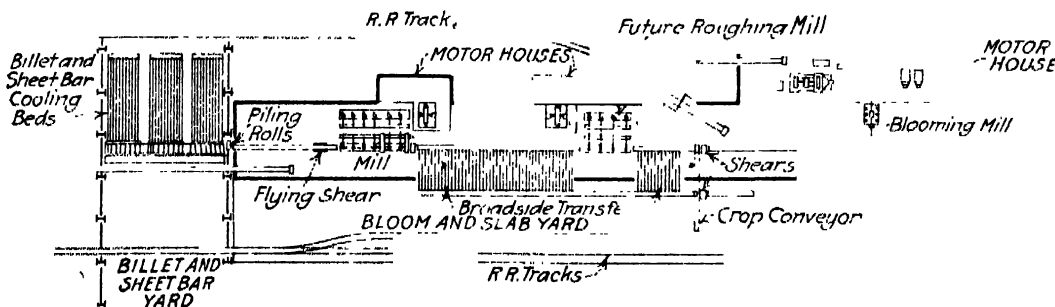


Fig. 2. Blooming Mill and Continuous Billet and Sheet-Bar Mill, the Roughing Mill Being for Future Installation

equalling the continuous mill in the following important and fundamental features:

The practicability of finishing very long lengths, limited only by the ability to handle the finished product.

The possibility of uniform heat treatment from end to end of a bar of any length, due to uniform time and exposure from furnace to finishing pass.

Low power consumption, due to rolls of small diameter.

Low fuel requirements for heating, because of rapid rolling and short exposure.

Freedom to use the maximum size of roll neck, due to two-high construction.

As the continuous mill is commonly thought of as being the last type to be conceived and put into practi-

natural that the New World, with its younger steel industry, should have taken up this advanced method of rolling. American capital was willing to provide special mills for the development of standardized products, and so gave the continuous mill the necessary impetus in its early life to reach the high place which it has held by demonstrated merit.

Continuous Billet Mills

A discussion of continuous billet mills naturally involves a discussion of the use of small billets, which these mills have made available at low cost. Before continuous billet mills became an integral part of blooming mills, the 4 x 4-in. billet held the field. This billet established itself so firmly because it was the smallest size the ordinary blooming mill could roll and maintain any semblance of output. When smaller initial sections were needed to satisfy the requirements of small mills, they were secured by special means.

*Engineer, Morgan Construction Co., Worcester, Mass. The paper was read before the Engineers' Society of Western Pennsylvania.

The development of continuous and other finishing mills to take small billets came simultaneously with the necessity of giving relief to the blooming mill, which, as a link in the production chain, was becoming severely taxed. It was, therefore, quite natural that, when the design of the continuous billet mill was undertaken, the following were the major aims:

To secure, direct from the ingot heat, as small a billet as was adaptable to subsequent use in finishing mills.

To start the continuous billet-rolling process from a section enough larger than a 4 x 4-in. to afford the desired relief for the blooming mill.

To roll the product of a whole ingot in one undivided length, and thus reduce to a minimum the losses in crops and shorts.

Minimum Billet Section

In the interests of both the continuous billet mills and the mills which use the billets, a standard length

with the extent to which the blooming mill is taxed by the steel making capacity back of it.

When a small beginning is being made, and the blooming mill is not taxed, a continuous billet mill of six stands can be employed, in which case the entering section is from 16 to 20 sq. in. In such cases, provision is usually made for the interposition of additional continuous roll stands between the blooming mill and the billet mill, for later tonnage development. Even in this case, the problem of dividing the work between the blooming mill and the billet mill is not clear cut. Quite frequently, an investment in an excess of soaking-pits proves attractive in order that the blooming mill may run single turn, while the steel-making plant is running 24 hrs. To maintain a high rate of output during its own operating time under these conditions, the blooming mill should be relieved of all extra passes by the installation of a 10-stand billet mill divided into two parts, and receiving a bloom section of about 42 sq. in. Such a combination, quite apart from its value in hav-

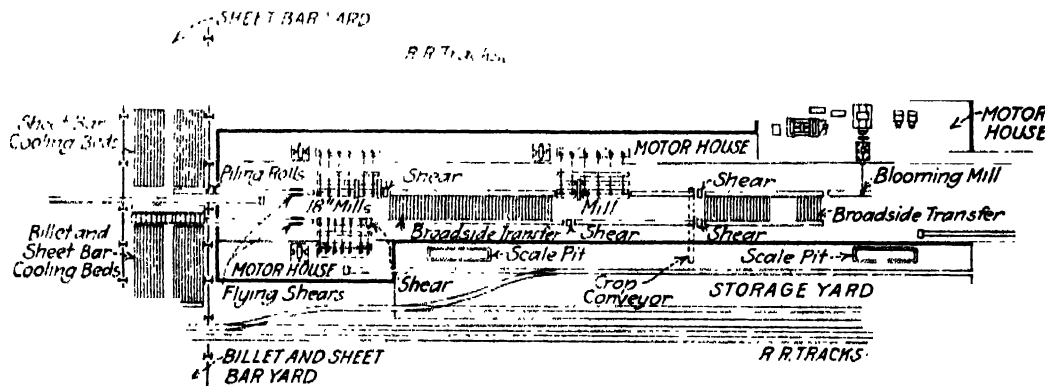


Fig. 3. Blooming Mill and Continuous Billet and Sheet-Bar Mill (One Roughing and Two Finishing)

is necessary. The practice of using 4 x 4-in. billets of every imaginable length, cut specially for each order, increases discards and throws an entirely unnecessary burden on the operating force in the mill and stock yard. The 1.75-in. billet is in the main the minimum commercial section, and has firmly established itself as a standard for a multiplicity of uses. It represents 100 elongations from the usual ingot cross-section. A No. 5 wire rod represents in turn 100 elongations from the 1.75-in. billet, which makes 1.75 in. a logical size at which reheating should be done. The 30-ft. 1.75-in. billet makes a rod bundle of 300 lb., a suitable and popular weight in American wire mills. Furthermore, 30-ft. lengths fit conveniently into railroad cars and can be easily loaded and unloaded in heavy lifts.

In the development of passes for the production of 1.75-in. billets, it was obviously necessary to bear in mind that not in all cases would the 1.75-in. billet be

ing sufficient capacity in a single turn to keep step with the plant, will also have ample capacity for promptly clearing congestion due to bunched heats.

Eight passes, corresponding to an entering section of 25 to 30 sq. in., are used very rarely in a permanent layout, and the conditions must indeed be very special to justify this rolling program. In such an instance, the eight passes are arranged in straight continuity without interruption. The point beyond which it does not seem advisable to extend pure continuous billet rolling is about 64 sq. in. of entering section. The billet mill for such a size should consist of two parts, each having six passes.

Rolling of Product of a Whole Ingot in One Length

The usual present-day ingot weighs about 7000 lb. The rolling of a whole ingot of this weight into 700 ft. of 1.75-in. billets is entirely beyond the limitations

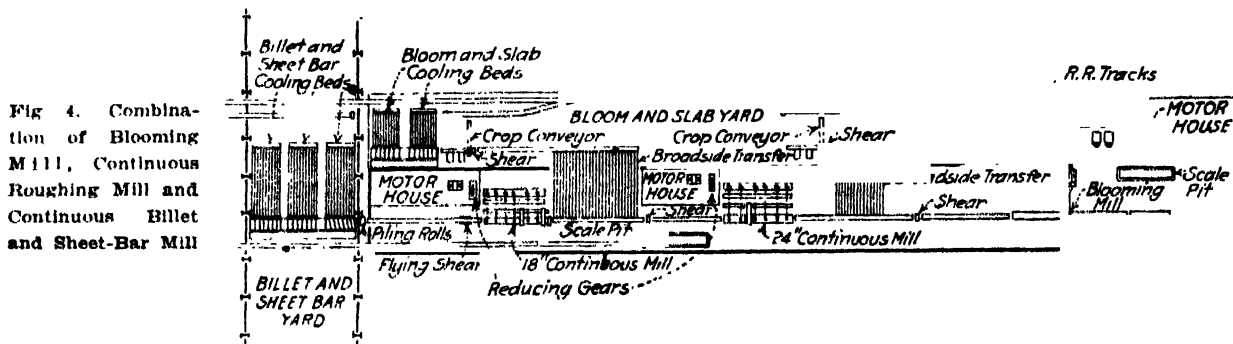


Fig. 4. Combination of Blooming Mill, Continuous Roughing Mill and Continuous Billet and Sheet-Bar Mill

the most advantageous section for subsequent rolling. As a consequence, suitable larger sizes were chosen and incorporated in one set of continuous rolls. Furthermore, provision was made to obtain 1.5-in. billets for purposes, where special conditions call for a similar initial section.

The Section Entering the Continuous Billet Mill

The size of the section entering the continuous billet mill depends upon local conditions, and varies directly

of any other than a continuous mill coupled with a flying shear. The invention of the flying shear by Victor E. Edwards has removed practically all limitations of initial ingot weight, and has given to the steel industry a piece of equipment which unquestionably has done more than any other machine to maintain yields at a high figure. It has also made the combined blooming and continuous billet mill realizable, and has given these mills their present-day tonnage making ability.

If one were entirely to disregard the low operating

cost of the continuous system as compared with any other rolling scheme, the high yield, the direct outcome of rolling long lengths, alone would be found to justify the continuous billet mill.

Continuous Sheet-Bar Mills

Sheet bar, like billets, is an intermediate product rolled direct from the ingot heat in continuous mills.

each plant, due to local requirements and conditions, proximity of other mills, available track service, etc. Nevertheless, such a mill properly laid down will realize certain minimum essentials:

The blooming mill must be provided with an independent outlet for its product through a bloom shear or slab shear to a bloom yard.

The continuous mill must be divided into two sepa-

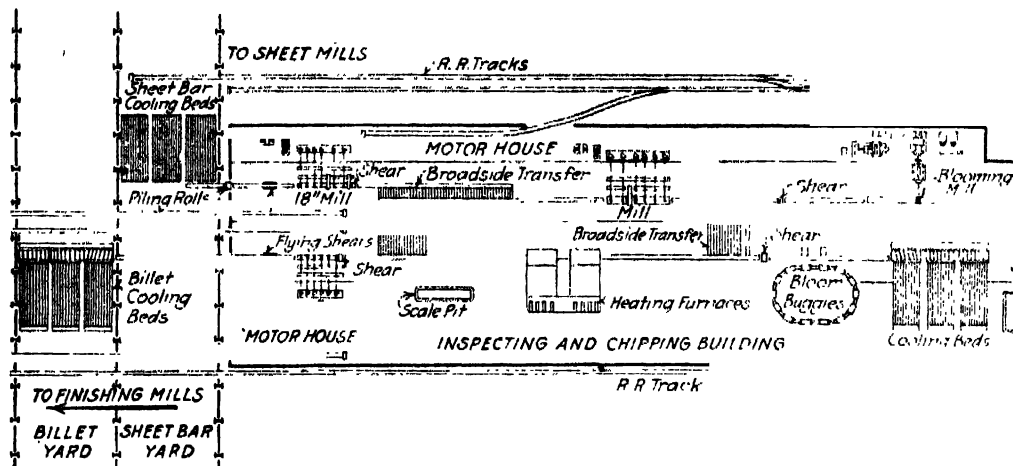


Fig. 5. Blooming Mill, Billet Mill and Sheet-Bar Mill Arranged for Special Conditions of Flexibility

Until recently sheet bar was used almost exclusively in 8-in. widths, but present day practice is properly extending the range of widths up to 12 and 14 in. in the heavier foot weights. This results in economies at the sheet mills.

Since practically the same considerations govern the design of continuous sheet-bar mills and of billet mills, the two mills are frequently combined, and one or the other product is produced by changing the rolls. Roll-speeds in such mills are governed, not by the sheet bar, but by the billet passes.

The demand for width variation in sheet bar has led to a departure from the tongue-and-groove method, which was used generally when sheet bar was confined to an 8-in. width. The combination of cylindrical rolls with vertical edging rolls now affords a maximum of

rate mills, and the distance separating them must be greater than the greatest length that the first mill will ever deliver, in order to afford a maximum of freedom in rolling, and also to permit diverting the product at this point through a shear into a yard.

The first mill, being necessarily of heavy construction, preferably 24-in. nominal diameter, must have in its rolls all the working and dummy passes to produce the range of sections its program embraces. Roll changing in such a mill is too much of a burden to be assumed except in occasional emergency, forced by breakage of rolls. All of these passes must be arranged in definite lines and must be fully equipped with guides, so that a bloom can be directed into any line by a switch in front of this mill.

The second mill must have a pass design which will

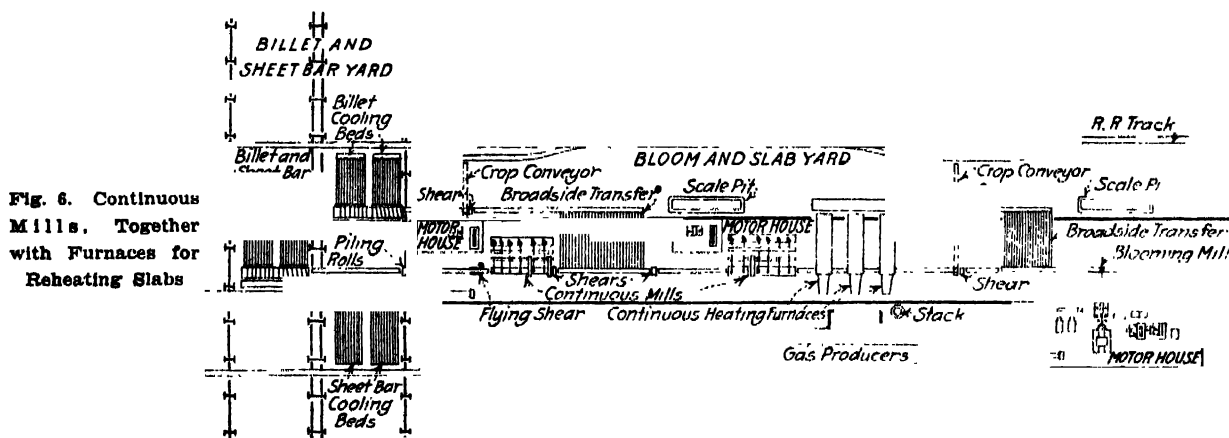


Fig. 6. Continuous Mills. Together with Furnaces for Reheating Slabs

flexibility, and produces sheet bar accurate in width, with clean edges, and of very uniform foot weight. One of the edging mills is located in front of the first pair of rolls of a six-stand sheet-bar mill. Its function is to perform the major part of the width reduction and to crack the scale, leaving a slight reduction for the second edging mill, located immediately following the second pair of horizontal rolls. This second edging pass is merely to iron out the inequalities and to dress the edges, as at this stage the ratio of the width to the thickness is great, and heavy side reduction is impossible.

Arrangement of Units for Blooming Mill, Billet Mill and Sheet-Bar Mill

The arrangement of the various units composing a blooming mill, billet mill, and sheet-bar mill differs in

render available all the desired small billet sections in a single set of rolls. In cases where both billets and sheet bar are produced, the mill must also have a set of sheet-bar rolls, which latter should preferably have their own set of housings, in order that the change from billets to sheet bar, and vice versa, may be made as expeditiously as possible. With a double equipment of housings, the rolls for billets can properly be longer than the short, stiff rolls that are required for accurate sheet-bar rolling.

In Fig. 2 to 6 are shown several plans of mill combinations for blooming, billet, and sheet-bar mills which satisfy these essential conditions. Each lay-out shows some particular feature of general arrangement which would be difficult to describe without the aid of illustrations.

With the arrangement of blooming mill and contin-

uous billet and sheet-bar mill shown in Fig. 2, blooms and slabs rolled by the blooming mill can be diverted by a broadside transfer through a heavy shear into a bloom yard. In this installation, the billet and sheet-bar mill is direct connected to an electric motor; and this motor is placed under the crane in the main building, but in a separate motor room, while the control and switchboard are in a lean-to. Provision is made, as shown in dotted lines, for the future installation of a continuous roughing mill, and a broadside transfer for carrying out heavier billets through the building columns into the bloom yard, for which purpose a girder

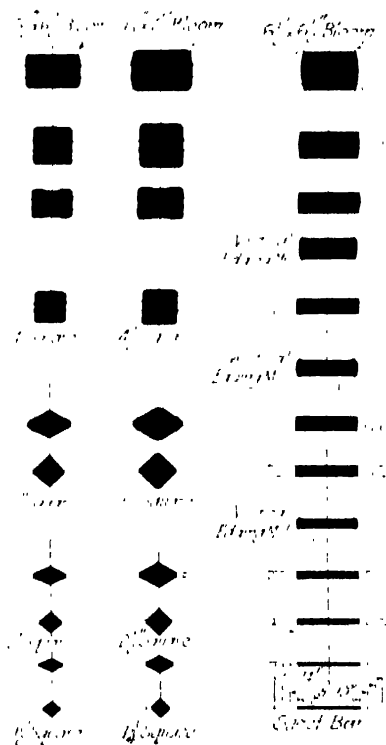


Fig. 7 Arrangement of Passes for Billets and Sheet Bar

of sufficient length has already been provided in the building.

Fig. 3 shows a blooming mill and a continuous billet and sheet-bar mill in which the bevel-gear, transmission and electric motors are in a lean-to of the main building, thus permitting the broadside transfers for blooms and for the product of the first continuous mill to be kept inside of the main building. Provision is made for the installation of a second 18-in. mill with a flying shear and cooling beds. When this is installed, one mill will be permanently for sheet bar, while the other will always make billets. The roughing mill over-feeds the 18-in. mill sufficiently to support both of them. An edging mill of heavy construction is provided in the continuous roughing mill, to afford flexibility in rolling a multiplicity of slab widths.

Fig. 4 shows a combination of a blooming mill, 24-in. continuous roughing mill, and 18-in. continuous sheet-bar and billet mill, in which high-speed motors drive the continuous mills through reducing gears. In this mill, a shear is introduced approximately midway in the connecting table between the two continuous mills, to part the billet so that it can be diverted into the adjoining yard over a narrow broadside transfer. When steel is not so diverted it is passed on to the 18-in. mill in a single length. This arrangement has the advantage of leaving the working side of the mill entirely unobstructed, and of requiring a girder of only moderate length to pass the broadside transfer into the billet yard.

Fig. 5 shows an arrangement of blooming mill and billet and sheet-bar mills for special conditions. In addition to the features previously emphasized, an inspection and chipping building runs parallel to the main

building of the mill. Two furnaces, capable of taking 30-ft. billets after they have been chipped, deliver them heated to the 18-in. billet mill. This provision is made to care for alloy steel, where it is advisable to remove surface imperfections before the steel is reduced to minimum section.

Skelp, when too wide for the continuous skelp mill and too narrow for the universal plate mill, can properly be rolled on continuous mills, provided the temperature can be maintained to secure the skelp thicknesses. Fig. 6 shows continuous furnaces for reheating slabs from 8 to 16 in. wide for rolling into skelp.

Fig. 7 shows a typical arrangement of billet and sheet-bar passes. The sheet-bar reductions are made on plain cylindrical rolls, with the width controlled by vertical edging rolls.

(To be continued)

New Small Tools and Gages

A micrometer depth gage, inspector's micrometer caliper gage, dial sheet gage and a less expensive combination square than its standard No. 11, are among the new tools recently placed on the market by the L. S. Starrett Co., Athol, Mass.

The micrometer depth gage has a 1-in. movement of the screw and is equipped with three measuring rods, 0 to 8 in., by thousandths of an inch. The inspector's caliper gage is for accurate measurement of the walls of hollow cylindrical forms and the dial sheet gage is for sheet metal, paper, etc., pressure on a thumb button permitting insertion of the sheet between the two contacts. With release of the pressure the thickness is indicated on the dial. Thicknesses up to 0.150 in. in thousandths can be measured.

The new combination square is for carpenters and others not requiring the finer graduations and combines a marking gage, rule, square, miter, depth and height gage, level and plumb. A beveled-edge square known as the No. 55 is also offered. A double steel square having a 4-in. sliding block is similar to the Company's No. 14 square, but has a larger beam. An 18 in. vernier height gage with heavy base is also offered and is made with graduations in English, metric and both English and metric measures.

Standard end-measuring rods with rubber handles and with flat ends which are hardened, ground and lapped parallel, and a useful tool consisting of four small rules $\frac{1}{4}$, $\frac{3}{8}$, $\frac{1}{2}$ and 1 in. long, respectively, have been added to the line. A holder is provided into which the rules may be set at a convenient angle for easy reading. They are for accurate measuring of small recesses, shoulders, etc. A bench block for use in driving pins in round or flat work has also been added. The blade is a 3-in. disk, $1\frac{1}{2}$ in. high and has nine holes from $\frac{1}{8}$ to $\frac{3}{8}$ in., and also a V-groove for holding round work. A thickness gage for use in adjustment of automobile motor tappets and the gaging of slots, contains six leaves from 0.0015 to 0.015 in. thick which fold into a metal case on a screw stud, removable for replacing any of the leaves.

Other additions to the line include a protractor and depth gage, a nickel-plated metal case for 1-in. micrometers, a T-handle tap wrench; tape hooks for attachment to $\frac{1}{4}$ -in. or $\frac{3}{8}$ -in. steel tape and plumb bobs for attachment to steel tapes used for gaging oil or other liquids in tanks.

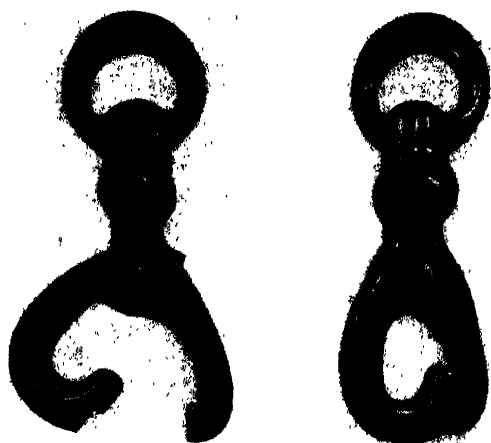
New High Record

The blast furnace of Weirton Steel Co., Weirton, W. Va., on March 15, established a new high record for one day's production of pig iron from one furnace when it tapped 845.6 gross tons of pig iron. This is the second record made in a week by this furnace which on March 9, produced 826.1 gross tons, thus surpassing the former production mark previously held by No. 1 furnace, Pittsburgh Steel Co., Monessen, Pa. In the first 15 days of March the furnace of Weirton Steel Co. produced 11,105.3 gross tons, an average of 740.35 gross tons per day.

Safety Hoist Hook

A hoist hook of the type shown in the illustration, intended to provide safer operation than the open hook commonly used in foundries, machine shops, steel construction work, mines, oil fields and railroads, is being marketed by the Frank W. Trabold Co., 30 Church Street, New York. It is known as the Yankee safety hook and made in five sizes, from 1 to 25 ton capacity.

It cannot be placed securely in the sling chain unless the hook is placed in a locked position, and cannot be released from the sling until the load is safely



The Hook Cannot Straighten Out or Unlock While Under Tension

landed in the position intended. It is to be noted that the hook cannot straighten out nor unlock while under tension and also cannot catch on any projection that it may hit in mid-air.

The component members are the hook, latch, shank and swivel. The swivel feature is for easy landing but the hook is also made without this member, for standard equipment. The hook is also furnished with straight shank for attachment to standard blocks or hoisting equipment. An elongated hole in the main-hook member permits raising that member sufficiently to allow the notched portion of the hook to clear the notched portion of the latch member only when the load is landed.

The body parts are drop forged from a high grade carbon steel, and Monel metal pivotal pins are incorporated, being non-corrosive and assuring high resistance to shearing strain.

Lake Shipping Hampered by LaFollette Act

Attention has been called to the burdens that have been placed on the lake shipping industry by the La Follette seamen's act in a report issued during the past week by the board of directors of the Cleveland Chamber of Commerce, which sharply criticises various provisions of that act. The report urged either the repeal of four sections of the LaFollette act or that the act be amended so that vessels on the Great Lakes be exempted from complying with provisions of these sections. The report states that the act has necessitated a material increase in the size of crews and wages. Before the passage of the act, 25 men were sufficient to handle a bulk freighter, but a crew of 33 is now required, while Canadian vessels use a crew of only 27 and pay lower wages. The passage of the act has caused 75 lake freighters to be transferred to Canadian registry, and the Canadian lake fleet has increased 35 per cent while the American fleet has gained only 1 per cent.

It is pointed out that not a passenger boat has been built for American Great Lakes service since the passage of the act. On the contrary, some boat lines have either curtailed their service or whole routes have been abandoned. The provisions of the act found particu-

larly objectionable are those limiting the number of passengers allowed on a boat, fixing the minimum size of crews, the length of the working day in port and the minimum percentage of able seamen. The report states that the requirements of the act increased navigation costs and freight rates.

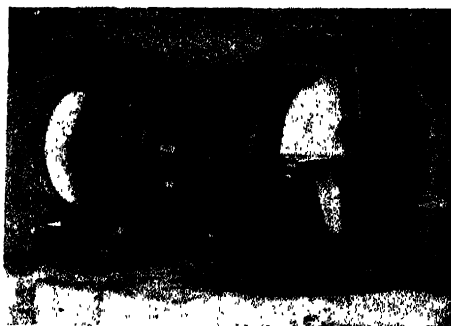
Rolled Zinc in 1921

The output of rolled zinc in the United States in 1921 fell off nearly one-half, as shown by reports made to the U. S. Geological Survey by producers. The notable feature of the year was the importation of large quantities of sheet zinc, for only a few tons had been imported each year since 1915. From April 1 to June 30, 1921, there was imported and entered for consumption 4245 tons of sheet zinc. In the first quarter also the imports were large, but during the last half of the year they were very small. At the close of the year the price of American sheets was less than that of the foreign. The output of rolled zinc in the United States was as follows in pounds:

	1920	1921
Sheet zinc not over 1 10 in. thick....	56,812,989	28,580,904
Boiler plate and sheets over 1 10 in. thick	3,950,489	2,545,755
Strip and ribbon zinc	45,701,062	29,673,527
Total rolled zinc.....	106,467,530	60,800,186

Grinder with Self-Contained Dust Exhaust

A grinder equipped with a self-contained fan for removing the dust has been brought out recently by Forbes & Myers, Worcester. This method of exhaust is claimed to be as effective as any for single machines where dust may be conducted directly outside and less expensive than installing a separate motor and fans for a single grinder. It has not sufficient power,



Grinder with Self-Contained Dust Exhaust

however, to carry dust through long pipes with many turns and is not intended to take the place of large exhaust systems.

In the illustration one end of the grinder is shown with tool rest and the other end without, the machine being furnished with both ends either way. The motor is of the induction type fully inclosed, for single, two or three-phase alternating current, and of ½ and ¾ hp. Hess-Bright bearings are used, which are also fully inclosed. The centrifugal fans, located between the bearings and the grinding wheels, blow the dust directly back through the exhaust pipe.

Rejects All Ship Bids

WASHINGTON, March 20.—The Shipping Board today rejected all bids received for the 1490 Shipping Board vessels recently announced for sale. Chairman Lasker said bids were received for about 100 ships and "there was not a serious bid in the whole lot." He said he was convinced there was no market for ships at this time in the United States, and probably there would not be any market until Congress decided the subsidy question now before it in the form of a bill.

Reduced Production Cost A Prime Need

What Measures May Be Used to Forecast Business Trends— How Expectations So Far in 1922 Have Been Fully Met

BY NATHANIEL R. WHITNEY, PH.D.*

AS we advance farther into the year, it becomes increasingly evident that the predictions of those who asserted, toward the close of last year, that the corner had been turned and that business was definitely on the up-grade were well founded. Although the betterment which was predicted is now visible in many directions, it is still impossible for many business men to observe signs of this improvement in their own business. It is clear, however, that a real change for the better has occurred, although the improvement is not evenly distributed.

After all, it requires a comparatively small change in the volume of business to convert depression into prosperity—the difference between a period of depression and a period of prosperity being estimated at 10 to 15 per cent in volume. Considerable industrial activity occurs even in periods of depression. Many of the ordinary processes of life are carried on as usual and it is from the savings of persons engaged in these lines of activity, and from the purchases made by such consumers that the foundation is laid for each new upward movement.

Increased Savings Accounts in Depression Period

This is strikingly indicated by the fact that, even in periods of depression when unemployment exists on a large scale, the number of savings accounts and the volume of savings deposits in the banks reach new high levels. The explanation is simple; the employed bend every energy to increase their savings as a measure of protection against the possibility of unemployment which may come upon them as upon their fellows almost any day. Gradually, as savings are thus made available and interest rates decline, business men are encouraged to resume activity. But they begin timidly and cautiously, and it requires considerable time after the turn has occurred before the improvement in conditions becomes marked. No one can say just how long will be the period of recuperation or convalescence in which we now are, but it is satisfying to know that the situation is better than it has been and that unless something unforeseen occurs it will continue to improve throughout the year.

There is ample justification for optimism, but it should be a conservative and reasoned optimism, which, while feeling confident that conditions are getting better, does not fail to take account of some of the obstacles in the path. One of the facts that cannot be over-emphasized is that those entrepreneurs who first succeed, and succeed best, in reducing their costs of production will be the ones who will reap the first and greatest benefit in the new industrial day which is dawning. The general level of prices is likely to decline for some years to come; a few commodities

now very low will advance, but many more will decline greatly. Hence, success must lie in the direction of reduced costs of production. This does not necessarily call for reduction in wage rates, though in some industries reductions may be justified, but it does call for increased efficiency on the part of employees and managers. The search for increased efficiency and lower costs of production will undoubtedly result in new

methods of organizing the production and distribution of commodities and will lead to the adoption of labor-saving and other cost-saving devices on a large scale.

Since the reduction in costs is mainly obtained by the effective use of machinery, it is probable that the machine-tool making plants and industries associated with them will feel the effects

of the business revival earlier than some of them now anticipate. American industrial genius, which is proverbial, has always manifested itself by a willingness to scrap equipment, regardless of its condition, if something which will make possible more effective production is available. The existence, therefore, of considerable numbers of machines does not mean necessarily that the machine-making industry must face a long period of depression.

Nor, paradoxically, will the increased use of cost-saving machinery mean greater unemployment for labor. Such laborers as are displaced by the machinery introduced will be employed either in the machine-making industries or in other industries which are stimulated by the prosperity in these and allied lines. On the other hand, those laborers who remain in their original employment will turn out a much larger product than was possible before because of the use of machinery. This will make possible not only the maintenance of existing wage scales but even an increase above the present level. The prosperity of these workmen will lead to demands for all sorts of commodities and thus will stimulate production in other lines until the slack which at first results from the introduction of labor-saving machinery is entirely taken up. There will then be increased demand for labor of all kinds. The new prosperity, thus based upon the more effective use of the factors of production, will be more far reaching and more firmly established than any that has gone before.

Evidence Used to Determine Currents of Business

The evidence upon which an attempt to determine the currents of business is based must vary with the particular purpose one has in view. For example, if we seek knowledge of current business conditions, we consult certain data. If, however, we desire information, not so much of existing conditions as of future developments, we turn to other sources. Much confusion arises in connection with attempts to determine business movements because the observer fails to dis-

*Professor of finance, college of engineering and commerce, University of Cincinnati.

tinguish between the kinds of information which may be regarded as anticipatory and those which may be considered as reflecting current conditions.

The writer suggests the possibility of grouping the various kinds of information under three main heads: (1) Financial data; (2) industrial or production data; and (3) commercial or trading information. It is suggested also that the fundamental importance of these three groups is in general indicated by the order in which they have been named. That is to say, if it be desired to make an estimate of probable business developments, much more valuable guidance can be secured from the study of facts concerning financial conditions than from those facts brought together under the other two heads. The industrial and commercial data indicate the *present* condition of business rather than its *future* prospects, although they do throw some light on the latter.

The general purpose of assembling information under the head of financial conditions is to ascertain so far as is possible the present and prospective state of the capital supply with a consideration of the demand for such capital. Obviously there can be no improvement in the industrial or commercial situation unless the funds available for industry are being accumulated in a *adequate* amount. Hence the kind of information to be considered under this head is that which shows the tendency of the capital supply either to increase or decrease. Significant information on this point can be obtained by considering the following topics:

- (1) Trend of savings bank deposits
- (2) Trend of bond prices
- (3) The discount rate for high grade commercial paper
- (4) The liquidation of loans
- (5) The volume of Federal reserve notes outstanding
- (6) The Federal reserve ratio of reserve to note issues and liability to depositors
- (7) New issues of securities contemplated
- (8) Government finance—expenditures, taxation, funding

Determining Industrial and Commercial Conditions

Industrial or production data furnish evidence as to the condition of industry at the present time. Such information is valuable not only for the purpose of providing some way of estimating existing industrial conditions but also because a knowledge of *present* industrial conditions will enable us to foretell *coming* commercial or trade conditions. This must be evident since the power to buy and sell rests upon the production of goods. Goods must be produced before they can be bought and sold, and the purchasing power of consumers depends in the last analysis upon the volume of goods they have produced. Their money wages which they spend merely represent an approximately equivalent value of the goods they produce. Hence activity of a commercial nature, buying and selling, shipping and speculating, must be preceded by betterment of the industrial situation. A great deal of information may be obtained which is useful for determining present industrial conditions. The most suggestive may be assembled under the following heads:

- (1) The extent of unemployment
- (2) Wage difficulties
- (3) The volume of production in such lines as (a) agriculture, (b) iron and steel, (c) coal, (d) oil, (e) lumber, and (f) railroad equipment
- (4) The consumption of water and electric power

- (5) The number of business failures and the amount of liabilities

The information concerning commercial conditions may well be ascertained from a study of the following topics:

- (1) The trend of general prices and a comparison with each other of prices of various groups of commodities
- (2) The volume of retail trade
- (3) Bank clearings
- (4) Stock market operations
- (5) Car loadings; idle cars
- (6) Foreign trade—exports, imports, and balance of trade; tariffs, and their effects
- (7) Foreign exchange rates; the economic situation of foreign countries

The general reasoning involved is that there must be improvement in underlying financial conditions, especially those relating to the capital supply, before there can be any improvement in industrial conditions; that there must be improvement in industrial conditions before there can be any permanent improvement in commercial conditions; and that when commercial conditions improve as the result of the financial and industrial betterment, the increased volume of buying and selling will in turn further strengthen the financial situation. The process is repeated until failure to come up to increasing requirements causes a halt in one of these stages and paves the way for the impairment of all. In this article effort is made to set forth in general terms the evidence upon which it is now frequently asserted that business conditions are improving. In a subsequent article the statistical verification of this claim will be presented in accordance with the theory and plan just outlined.

Notable Increase in Savings Deposits

The evidence of improved financial conditions since the beginning of the year is found, first, in the increase in savings bank deposits. The index for the volume of savings in 30 representative savings banks in the New York Federal reserve district is well above that of any previous period. Although a slight decline occurred between Jan. 10 and Feb. 10—a result of the withdrawals normally following the crediting of interest as of Jan. 1—the volume of deposits is still noticeably higher than at any preceding period.

The same trend is indicated by the reports for postal savings. The past few months have shown a gradually smaller decline in the volume of deposits and during February this was turned into an increase in deposits over withdrawals for the first month since January, 1921. This information is compiled from all sections of the country and hence indicates the reality of the improvements which have been reported in industrial conditions.

The trend of bond prices similarly shows an increase in the amount of capital available for industrial and commercial enterprises. During the last week of January, the Treasury offered a series of notes for the purpose of refunding some of its short-dated debt. The notes were heavily oversubscribed, although they bore interest at 4% per cent as compared with 5½ per cent on a similar issue last September, and 5% per cent on such an issue in June, 1921. New securities offered by corporations have been in large volume and have been eagerly taken up at lower rates in what is described as a phenomenally strong bond market. The supply of funds for investment is growing so rapidly that there is a strong investment demand not only for

bonds but for such high-grade preferred stocks as United States Steel, and even for well established dividend paying common stocks, such as American Telephone & Telegraph.

Other Significant Aspects of the Financial Situation

There has been reduction in the volume of credit required for commercial purposes, and the rate prevailing for high-grade commercial paper varies in different sections of the country from $4\frac{1}{2}$ to 5 per cent. Liquidation is going on steadily if not rapidly. The greatest progress recently has been made in the agricultural districts where the improved prices for farm products have encouraged the marketing of such commodities. There is still a large volume of frozen credit both in the industrial and agricultural sections of the country. On this account it would be extremely ill-advised to adopt any such proposal for the payment of a bonus as is represented by the scheme to give the soldiers some form of collateral which they could presumably use as a basis for loans from the banks. The banks should not and cannot take the Government's place in paying such a bonus. The reserve position of the Federal reserve system continues very strong. The latest ratio of total reserves to deposits and Federal reserve note liabilities combined is reported as 75.6 per cent.

One of the important financial factors that is retarding business recovery is the uncertainty as to governmental policies in regard to taxation, expenditures and funding. With nearly six billion dollars of public debt falling due in the next year and a half, it is important that expenditures which are not absolutely essential be eliminated, and that this economy be supplemented by wise measures of taxation. Unfortunately the Administration, so far as its policies can be judged by Congressional attitude, has given the business man no confidence that these fiscal problems will be handled wisely. The President and the Secretary of the Treasury undoubtedly entertain much sounder notions in these matters than do the Republican majority in Congress; but the best that they can do seems to be to put difficulties in the way of the enactment of unsound measures by this majority. The result is that little is accomplished.

Doing Business with Canada Handicapped

A good example of the harm that can be done by legislation adopted for political effect without regard to economic principles can be seen in the effect of the so-called "emergency tariff" upon the trade between the United States and Canada. During 1921 the total imports from Canada fell over \$200,000,000 as compared with 1920, while our exports to Canada decreased about \$400,000,000. Allowing for the decline in the price level, there was a decline in our exports to Canada and our imports from her of approximately 45 per cent. So long as we refuse to admit Canadian products except under the imposition of a high tariff, we are reducing the purchasing power of Canadians and the possibility of exporting to them.

However, it is not only from the immediate financial point of view that this legislation is harmful. The interference with the trade between the two countries has produced in Canada a strong reaction in favor of British products. The United States was for some time Canada's leading customer, but now since we are forced to keep down our purchases from her, and since England has displaced us as her best customer, the Canadians are buying much more heavily from the United Kingdom than formerly. The general advice in Canada is: "Buy in Great Britain whenever possible anything that can't be produced in Canada." Because of the hostility engendered against the United States in a business way, the Canadian government is making

an effort to secure closer relations with British industry. A book has recently been issued entitled, "Canada as a Field for British Branch Industries," and is being widely circulated in Great Britain. Progress toward business recovery would be very much hastened if legislation in regard to the tariff, the bonus, taxation, and the funding of domestic and foreign loans were intelligently disposed of.

Improvement in Employment

Industrial conditions show an uncertain trend, with some industries still in a much depressed condition and others in a very satisfactory position. The volume of unemployment which has been extraordinarily large for the past ten months is being reduced. The employment service for the Department of Labor in Washington reports that employment has increased in all industries except textiles. The basic industries—food, iron, steel and metal products, railroad repair shops and automobile plants—all show substantial increases in number of employed.

Out of 65 cities considered, increases in the number of employed were reported in 44 cities. The New York State Industrial Commission reported on March 12 that there was an increase in the number of employees in practically all industries in New York State. Throughout the steel manufacturing districts in Ohio reports of increases in operation have been recently of almost daily occurrence. From the automobile manufacturing centers of Ohio come reports of increased demand for cars and increased operation of plants. This may be merely seasonal, but in any event it offers employment in a period when the demand for laborers would otherwise be at a low ebb. In the near future the agricultural demand will make itself felt and thus further reduce the volume of unemployment.

Other Factors Affecting the Industrial Situation

Wage difficulties and other labor problems are still hampering production in some lines. Notable among these is the strike of the textile workers which has brought the cotton manufacturing industry in New England almost to a standstill. The threat of a coal strike on the first of April is likewise acting as a depressing influence. The consumption of power in industrial establishments indicates an increase in the activity of such plants, although the volume of production in most lines is still below normal. Among the most gratifying proofs of improvement in the industrial situation is the increased production in the iron and steel and railroad equipment industries. As earnings and new financing permit, the railroads are certain to come into the market with large orders for equipment of all kinds. The advance in the prices of the shares of steel and equipment companies indicates that shrewd observers of business conditions are convinced that railroad buying on a large scale will not be long postponed.

Commercial failures which were very high throughout 1921 and through January and the early part of February this year have shown a tendency to diminish. If this tendency is maintained for the next month or two it may be assumed that most of the weak concerns have been squeezed out and that thereafter little fear need be felt that failures will be on a scale large enough seriously to retard business growth.

Commercial Conditions Not Yet Satisfactory

In considering information relating to commercial conditions the showing is less satisfactory. The downward trend of prices generally seems to have been halted temporarily. While this makes for immediate stabilization, it postpones the ultimate adjustment which must be made on a lower basis. Some commodities, which were too low in comparison with others,

notably farm products, have registered an advance. This has engendered a more optimistic feeling in the agricultural regions and has brought about an improvement in those industries which are immediately dependent on agricultural buying, such as the mail order houses and the manufacturers of agricultural implements and supplies.

The index numbers for prices of various groups of commodities as computed by the Department of Labor still show wide variations between the prices of the various groups. Lumber and building materials, house furnishings, fuel and lighting, and clothing are still far out of line. The fact that resistance to an inevitable price decline works to the disadvantage of an industry is shown by the unsatisfactory position of the furniture trade. The index number for housefurnishings advanced farther above normal than that of any other group of commodities, and it has been held more persistently at its high level. As a result it has been reported that the annual midwinter clearance sales of furniture are very disappointing, and that this decline in the volume of furniture sales was largely responsible for the total decline in sales registered by the department stores during January and February. The monthly business summary of the Philadelphia reserve bank for the first of March designates both the demand for furniture and the collections for furniture sold as poor. The reports on retail sales in department stores for January, 1922, indicate a falling off as compared with January, 1921, of about 8 per cent in value, although if allowance be made for price declines it is probable that there was a small increase in the number of individual transactions.

Sales of securities on the stock market show considerable strength and activity both in the number of shares sold and in the gradual advance in prices.

A favorable exhibit which throws light on current activity is found in the increase in car loadings. Although an increase would normally not occur until March, this year it began several weeks earlier. The weekly car loadings in February averaged 800,000 cars. This is about six weeks in advance of the normal rate of loadings. Freight is being moved not only in increasing quantity, but also under lower operating costs than a year ago.

Bank clearings, as might be expected, are considerably below normal, for while underlying conditions are showing constant improvement, actual every-day transactions are still very much retarded.

Not only domestic trade, but also foreign trade, is relatively inactive. There has been a decline in the value of both exports and imports, but the rate of decline has been greater in exports than in imports. An interesting feature of our export business is the tremendous increase in the exportation of corn. Before the war corn was relatively unpopular as an export commodity, but in the seven months ended January, 1922, more than 90,000,000 bu. were exported. This is more than six times the volume exported a year before. Evidently large new markets are being developed for this grain. This, of course, improves the farmers' situation very considerably.

Another favorable indication from the commercial point of view is found in the rise of foreign exchange rates. There has been a marked advance in the price of sterling, and along with this has come improvement in most of the other currencies. Such improvement in the rates of foreign exchange not only increases the potential purchasing power of our foreign customers and stimulates our export business, but it suggests betterment in the internal economic condition of these countries.

There are other developments among the European countries which support the evidence of the exchanges. There have been since the first of the year important

reductions in the bank discount rate; in Norway the rate has been reduced from 6½ to 6 per cent, in Sweden the reduction has been from 5½ to 5 per cent, and the Bank of England recently announced the reduction of its rate from 5 to 4½ per cent. This last is the lowest rate which has prevailed in England since the week before the war began. There has recently been an announcement by the Chancellor of the Exchequer that the government intends to restore an unrestricted market for gold at the earliest possible date. Further evidence of improvement in the English economic situation is found in the upward movement of gilt-edged securities on the London exchange which has attained something in the nature of a boom. Treasury bonds are now selling several points above their original issue price. Bank of England stock, which last year fell to 163½, has advanced to 200. All the prior lien stock of the railroads has risen substantially.

Conditions in France are reported as very much better, and progress in readjustment is even reported from Germany. All in all, while much unsettlement still exists in the foreign situation, and a long road must still be traveled before we can count on selling goods to Europe on anything like the old terms, it is safe to say that each month has brought some improvement.

All the evidence indicates that conservative optimism is justified. Conditions are noticeably better than they were at the close of 1921, and those producers who can get their costs of production down to a level which will allow them to sell their output at gradually lowering prices will undoubtedly be able to close their books for 1922 with a gratifying profit.

Waste Material Dealers Hold Meeting and Dinner

The annual meeting of the National Association of Waste Material Dealers, New York, was held March 15, at the Hotel Astor. Frank C. Overton, Castle, Gottheil & Overton, New York, was re-elected president; Harry R. De Groat, of Philadelphia, first vice-president; James Rosenberg of New York, second vice-president; Fred Mayer of St. Louis, third vice-president. Charles M. Haskins is secretary of the association.

At the ninth annual banquet in the evening, the Rev. Percy Stickney Grant, rector Church of the Ascension, New York, the Hon. Carroll L. Beedy, congressman from Maine, and Willard Scott, Brookline, Mass., spoke. Dr. Grant pointed out the great necessity for better education as a cure for industrial unrest. Mr. Beedy's subject was "The Money Puzzle." He quoted the statistics covering United States indebtedness, European indebtedness, interest costs on these debts, proportion of the world's gold supply held by the United States prior to the war and now and the average value of paper before and since the war. Maintenance of the gold standard, he said, is to-day dependent upon Britain and America.

Prizes Offered for Foundry Devices

In October, 1920, a gift of \$1,000 to the American Foundrymen's Association was made by the S. Obermayer Co., the interest on which is to be awarded for devices which will aid foundries in their work. The devices for this year, in the shape of models or drawings, will be on exhibition at the annual convention of the association in Rochester, N. Y., during the week of June 5.

The contest is limited to foremen or other workers in foundries or in other departments of plants operated in connection with foundries. Particulars of the contest will be furnished by the secretary of the association, 140 South Dearborn Street, Chicago. The jig or other equipment entered in the contest shall not be patentable, but shall be such a device as can be constructed in any foundry and used in the production of castings, or in core making, molding, pouring or handling operations.

SHIPPING BOARD EQUIPMENT

Increased Demand Believed to Reflect Improved Business Conditions

WASHINGTON, March 21.—While from a spectacular point of view wrecking of the more than 100 large buildings used as storehouses, offices, etc., at the Harriman, Pa., headquarters of the United States Shipping Board Emergency Fleet Corporation has aroused current interest, from an industrial point of view the interest is of another character. This relates to the various uses to which the material being disposed of at the yard by the Emergency Fleet Corporation is being put. Large quantities of equipment already have been sold, but there still remains considerable to be disposed of. According to an announcement by W. P. Willetts, manager of sales, material sales division of the Emergency Fleet Corporation, with headquarters at Harriman, the generators which have been sold are being used by manufacturers, and the air compressors are being sold to large general contractors and tunnel builders. He said that one of the features of the wrecking of the yard will be the tearing down of the wooden ship runways, and the large steel cranes and craneways which formed the 12 shipways.

The work of salvaging lumber has started and the purchaser of the steel craneways is organizing a force of men preparatory to salvaging the steel. Approximately \$450,000 worth of materials have been disposed of within the last three months and a force of 100 laborers is engaged in tearing up the railroad tracks, dismantling the cranes and skidding the machinery, preparatory to its shipment.

Although the largest structures have not as yet been sold, Mr. Willetts thinks that they will be disposed of in the near future.

The plate and angle shop, in which at one time the major portion of the local fabricating work on 40 steel ships was done, has been dismantled and the machines have been removed and made ready for distribution to various localities in the United States. Some of the most desirable machinery is still awaiting purchasers. The locomotive cranes, 50 and 60-ton portal pier cranes, and shipway cranes, are rapidly being dismantled for removal and sale.

Among other equipment still to be liquidated are 10 and 15-ton gantry cranes; air compressors, steam-driven, with a capacity of 1950 and 5715 cu. ft. per min.; 100-lb. air compressors; tool steel, including carloads of hand tools; rivets; hammers, drills, heaters; eight Erie city boilers with mechanical safeguards and coal-handling apparatus; welding and cutting machines; electric testing machines and service equipment.

Mr. Willetts says that business conditions have shown a decided improvement and that buyers from all sections of the country, representing nearly every phase of industry, are purchasing equipment.

Cost of Living Slightly Higher

Monthly figures of the Bureau of Labor Statistics show the wholesale prices of all commodities during February to be 51 per cent above the average for 1913, compared with 48 per cent in January and 49 per cent in both December and November. Three of the nine individual groups showed a rise in January compared to December, these being farm products, with 10 points; food, etc., with 4 points, and miscellaneous, 4 points. Metals and housefurnishings showed decreases of 2 and 1 points, respectively.

Metals and metal products, which now stand at 15 per cent above the 1913 average, are far lower than any other group listed. This item is now 11 points below farm products, and more than 20 points below any of the others. The highest item on the list still continues to be housefurnishing goods, which, together with building materials, are more than double their 1913 prices.

Our table shows the figures for the two most recent months and for February, 1921, and the peak in 1920. It shows also the amount of liquidation, be-

tween the 1920 peak prices and the present, of the excess of the peak prices over the average of 1913. Metals have been liquidated to a greater extent than any other group.

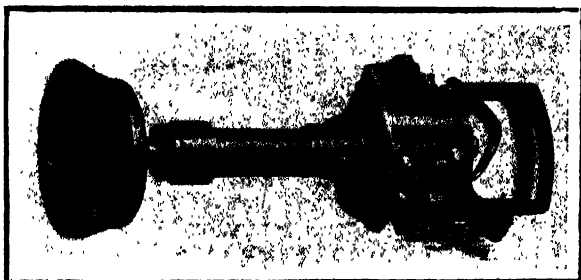
Index Numbers of Wholesale Prices, by Groups of Commodities
(1913 equals 100)

	1920 Peak	1921 Feb.	1922		Liqui- dation, Per Cent
			Jan.	Feb.	
Farm products	246	129	116	126	82.2
Food, etc.	287	150	134	138	79.7
Cloths and clothing....	356	198	183	183	67.6
Fuel and lighting.....	284	218	183	183	64.9
Metals and metal prod- ucts	195	146	117	115	84.2
Building materials	341	221	202	202	57.7
Chemicals and drugs...	222	178	159	159	51.6
House-furnishing goods.	371	277	214	213	58.8
Miscellaneous	247	180	146	150	66.0
All commodities	272	167	148	151	70.4

High-speed Wire Brush Cleaner

For cleaning metal surfaces the air-driven wire brush machine shown in the accompanying illustration, having an average free speed of 4200 r.p.m. at 90 lb. air pressure, has been added to the line of the Ingersoll-Rand Co., 11 Broadway, New York.

Among the uses for the machine may be mentioned the removal of paint, rust, dirt and scale from tanks, steel cars, structural and other steel. It may be also used for cleaning iron and steel castings. The wire brush, turning at the high speed, is said not only to clean faster but to be more durable in severe service than if revolving at only 2000 to 3000 r.p.m. As an ex-



High-Speed Wire Brush for Cleaning Metal Surfaces

ample of its performance it is claimed that on a six-weeks' test, the machine cleaned steel gondolas, each averaging 540 sq. ft. surface, in 3½ hr., and all-steel box cars, averaging 1400 sq. ft. surface each, in 7½ hr. It is further claimed that the brush removed not only all the rust but the old paint as well.

The machine is shown in the accompanying illustration. It is known as the Little David No. 601. The air motor is of the three-cylinder type used in the company's Little David portable grinder. Light weight has been attained by using an aluminum casing reinforced with cast-in steel brushings. The weight complete is 14 lb. and the length over all 17½ in. The diameter of the wire brush is 6 in.

Following announcement that the car repair work of the Western Maryland Railway, Baltimore, at the shops in Baltimore and Elkins, W. Va., had been abandoned and placed on contract, and also the announcement that the railroad's maintenance-of-way work had been placed in the hands of Dickson Construction & Repair Co., Youngstown, Ohio, the company has now announced that the shops at Hagerstown, Cumberland, Connellsville and Hanover have been placed under the control of the Youngstown company.

The National Carbon Co., 30 East Forty-second Street, New York, has issued an attractive booklet, "The Carbon Electrode," which gives data concerning the manufacture, use, handling, etc., of various kinds and sizes of electrodes for its different electric furnaces. The electrical phase arrangements of various types of furnaces are included in graphic form.

Iron and Steel Industries of Europe

Reports to the Government Show Much Irregularity, but Improvement in Some Countries, Particularly in England and Germany

WASHINGTON, March 21.—The iron and steel industries abroad show an irregular condition, according to reports received by the Department of Commerce. While, like the United States, none of them is operating on a normal basis, there are notable instances of improvement. These relate particularly to England and Germany.

Improvement in British iron and steel exports was pointed out in THE IRON AGE of last week. This is also a matter of comment this week in Commerce Reports. Using somewhat different lists of items than those covered by THE IRON AGE, based on Board of Trade figures, the Government publication says that British iron and steel exports in January amounted to 234,446 long tons, a gain over December, 1921, of 45,683 tons. British iron and steel imports in January totaled 85,223, as compared with 13,406 tons imported to the United States.

American manufacturers are showing considerable concern over the recovery of the British export market, as compared with progress made in the same direction by domestic producers. Exports of American iron and steel in January amounted to only 160,920 tons. The outstanding takings of British exports other than those of its dominions overseas, which represented by far the largest tonnage were: pig iron—Belgium and France, over 4500 tons each, and Italy, 10,800 tons; plates and black sheets under ½ in.—Japan, 2700 tons; galvanized, plain, and corrugated sheets—Argentina, 12,800 tons; Japan, 2100 tons, and the Dutch East Indies, 1400 tons; tin plates—Japan, 4300 tons; the Netherlands, 1900 tons; France, 1600 tons, and China (including Hongkong), 1200 tons; rails—Argentina, 4800 tons. Iron and steel imported into Great Britain in January totaled 85,223 tons, a decline of 28,453 tons from December's figure. Exports for the month exceeded imports by 149,223 tons.

The Industries of Germany

The iron and steel industries in Germany reported a brisk month in January, despite greatly increased transportation difficulties. Prices are soaring. No pig iron and steel production figures are published, as a matter of policy, but it is understood that the steel output in January slightly exceeded the estimated combined production of England, France and Belgium. The industry is in need of scrap metal, hitherto an important factor in its raw materials. Stocks of scrap are now low and unless supplies are obtained from Poland, there will be felt a serious pig iron shortage.

Coal prices were raised on March 1 by between 106 and 159 marks per ton, lignite briquettes by between 71 and 87 marks per ton; thus, the present minimum price of Ruhr pit coal is 600 marks per ton and of lignite briquettes, 200 marks per ton, including 20 per cent coal tax and 1.5 per cent turnover tax. The maximum prices of pig iron and steel effective for March are as follows:

Hematite pig iron.....	4,744 marks per metric ton
Ingots	5,320 marks per metric ton
Blooms	5,770 marks per metric ton
Sheet bars	6,085 marks per metric ton
Billets	5,945 marks per metric ton
Shapes	6,920 marks per metric ton
Hoops	7,750 marks per metric ton
Wire rods	7,515 marks per metric ton
Thin sheets	9,375 to 9,690 marks per metric ton
Medium sheets	8,910 marks per metric ton
Thick sheets	7,805 marks per metric ton

Slow Improvement in Belgium

The last quarter of 1921 in practically all lines of Belgian iron and steel marked a continuation of the slow general improvement which first appeared in August and September, according to a report to the

Department of Commerce by Acting Commercial Attache Cross. Between September and the end of December pig iron production increased 83 per cent, while the raw steel output practically doubled; the situation in rough castings is less favorable, with production figures stationary since July, 1921, in the neighborhood of 3300 tons monthly. Owing to some uncertainty felt as to the permanence of the revival, most plants have been slow to relight blast furnaces, with the result that only fourteen were in operation at the end of the year—five in Hainaut (Charleroi), four about Liege, and five scattering.

Despite this improvement, pig iron production in December was only 36 per cent of the 1913 monthly average and slightly under 80 per cent of the 1920 average.

Poor Business in Austria

Business was poor in most of the Austrian metal industries during the first half of 1921, but during the summer a more active demand began to make itself felt, and in the fall there was a real boom, according to a review of the year received by the Department of Commerce from Trade Commissioner Upson at Vienna. This was largely the result of the depreciation of the Austrian crown, but the fact that the competing German metal industry disposed of a large part of its goods at home and found a market for the rest in countries with a more stable currency also aided in the recovery of the Austrian indemnities. Czech competition has been excluded by the rise of the Czech crown.

Nevertheless, production still remains short of what it was in time of peace. Obstacles to a full capacity production are the diminished efficiency of the individual workmen and the eight-hour day. Efforts are therefore being made to induce the workmen to consent to longer hours. At the present time, all branches of the metal industry are doing a great deal of work for export, and with most of them it forms the greater part of their business. They are quite dependent on this export business, since they have to import a part of their raw materials and fuel and must pay for them in foreign currency at a high rate of exchange.

Depression in Sweden

At the meeting of the Swedish Iron Works Association, held during the last week of January, 1922, statistics of Sweden's output of iron and steel and its foreign trade therein for 1921 forwarded to the Department of Commerce by Commercial Attache Anderson at Copenhagen, show the extreme depression that has prevailed in this industry in Sweden during the past year. Production of pig iron in 1921 was 308,600, compared with a ten-year average of 642,700; of steel ingots, 219,100, compared with 601,400. On the whole, exports of iron and steel were only 29.3 per cent of the total for 1913, while imports, which amounted to 122,400 tons, as compared with 231,700 tons in 1913, were 52.3 per cent.

Conditions in Holland

The import trade in iron and steel in Holland during 1921 was unsatisfactory in nearly all lines, says Consul General George E. Anderson in a report to the Department of Commerce. The trade on the whole declined very materially from that of the years immediately preceding, and the decline told heavily against the United States. German competition has not been nearly so keen in most lines of imports into Holland as is generally supposed, but in iron and steel has been especially keen and effective.

The trade in general has declined as a result of depressed industrial conditions, particularly in the

shipbuilding and allied lines, which were the chief foundation for the very large trade in steel products during 1919 and 1920.

The well-established lead of German iron and steel makers in the Netherlands markets is made plain from official figures, but it was cut down somewhat during the latter part of 1921 when Dutch importers found they could not rely upon German deliveries and turned to the United States and other countries where they placed orders.

Better Times in Latin America

ERIE, Pa., March 21.—"A promising sun-rise glow of 'better times' is tinging the Latin American trade horizon. Most of the countries of this region have passed through the dark period of liquidation and are facing the 'dawning day' of business revival with renewed confidence," declared Dr. Julius Klein, director of the U. S. Bureau of Foreign and Domestic Commerce of the Department of Commerce, in a speech to-night before the Chamber of Commerce in this city.

Latin America will from now on present a steadily developing market for American products; significant evidence of its growing importance to us is found in the fact that our trade with that region to-day represents 18 per cent of our total trade with the world, against 13 per cent in the fiscal year 1913-14. Exports to Latin America from the United States during the calendar year 1921 amounted to over \$800,000,000, a gain of 165 per cent over the last normal pre-war year.

"This is certainly a striking example of the ability of America to hold its own," Dr. Klein declared, "especially in view of the fact that this increase has been achieved in the face of extremely unfavorable exchange rates, complicated by world-wide depression

and after fully two years have elapsed in which our old commercial rivals, the English, the German and the French manufacturers, have had time to enter into active competition against us. It means," the director asserted, "that in spite of a few noisy complaints our Latin American friends have learned to appreciate American quality and service, and that our business men have likewise learned that quality and service are the keys to commercial success the world over."

The importance of the Latin American markets in the eyes of official America is clearly indicated, said Dr. Klein, by the recent action of Congress in recommending a 70 per cent increase in the Commerce Department's appropriation for trade promotion work in that part of the world.

Referring to the subject of competition, the speaker dealt with the scare-head announcements of overwhelming German success in the markets of our Southern neighbors. He denied emphatically that Germany had even begun to reconquer these markets, much less drive American salesmen into the sea with prohibitively low price quotations. "Simple trade statistics answer this question to the satisfaction of most of our business men," the director said. "For the benefit of any skeptics on this point, the director declared that reports coming to the Department of Commerce indicate that our competitors are not only failing to dominate all of the business but that in some important lines of trade they have actually failed to make delivery on orders obtained. The strong German campaign which started in the Argentine, Brazil and Mexico, has suffered great checks through the inability of many German manufacturers to meet the promises of their salesmen as to deliveries and qualities, Dr. Klein added.

JURISDICTIONAL AWARDS

Action Taken By American Engineering Council —Features of Executive Board Meeting

The executive board of the American Engineering Council of the Federated American Engineering Societies met in Chicago, March 10. The committee on employment service reported a resolution "that the maintenance of an employment bureau by the council is not at this time advisable." After discussion, the council voted to discharge the committee and instructed the president to appoint a committee of five to consider the whole question and report to the board at its next meeting, which will be held at Pittsburgh in May.

The executive board received a report from Rudolph P. Miller, New York, its representative on the National Board of Jurisdictional Awards, stating that the United Brotherhood of Carpenters and Joiners of America has not been observing the decisions of the jurisdictional board and that the attitude of the carpenters was causing serious embarrassment to owners, architects, engineers, contractors and workmen in the building industry as well as being detrimental to the public interest. As a consequence of this report, the executive board adopted a resolution urging "that the members of the American Institute of Architects and of the F. A. E. S. insert in all specifications and contracts for building operations a stipulation that the decisions of the Jurisdictional Board shall be observed."

It was further resolved "that this resolution shall be enforced as expeditiously as possible, beginning with those localities in which the trouble appears to be the most acute and where action seems most urgent, and that all these signatories make special and united efforts toward securing general and complete compliance with all the decisions of the Jurisdictional Board." The resolution also recited "that as and when trouble in any locality is brought to the attention of any of the signatories such organization shall take the initiative in forming a general committee of representatives from all the signatories for the purpose of dealing with the situation in that locality."

One of the liveliest discussions of the meeting of the

executive board arose from a resolution presented by Philip N. Moore, St. Louis, "that the president of the F. A. E. S. be authorized to offer the Secretary of War the service of a committee of disinterested distinguished and skillful engineers, to be selected by a committee of its executive board, for the purpose of making a thorough investigation of the geological, engineering and manufacturing possibilities of the Muscle Shoals power project; this committee to serve without compensation, save for necessary expense." The resolution was voted down.

The Great Lakes-St. Lawrence Waterway project came before the board, which decided that at present it was undesirable to take any action.

The general question of international engineering federation was considered in many phases and provoked a discussion in which the constitutionality of a proposal to admit the Engineering Institute of Canada to membership in the Federation, if formal application should be made, was the subject of a lengthy debate. The board adopted a proposal put forward by E. S. Carman, Cleveland, for the appointment of a committee "to consider and report upon the affiliation of other engineering organizations than those within the United States with the F. A. E. S."

Secretary L. W. Wallace reported that the membership of the Associated Engineers of Spokane had so increased that the association was now entitled to a representative on the council, J. C. Ralston being the appointee. The Engineers Club of Columbus has appointed John R. Withrow as its representative upon the council.

A report from E. J. Prindle, chairman of the patents committee of the council, commended the publicity efforts of the Federation as a powerful factor in bringing about the success of the movement to reform conditions in the United States Patent Office.

The monthly statistical bulletin of the National Federation of Iron and Steel Manufacturers, Caxton House, Tothill Street, Westminster, London, S. W. 1, is now available for general circulation by subscription at 14s. per year. It contains iron and steel production and export data of the leading countries besides Great Britain.

Machine for Bending Tennis Racket Tubing

The bending of 7/16-in., 22-gage tubing to the shape required for metal tennis rackets is accomplished in two operations on the special machine developed for the purpose.

A straight tube is placed in the machine and bent around the form to the shape shown in Fig. 2. The bending is by means of two arms or cranks keyed to two vertical oscillating shafts which are driven through the worm gearing and a crank motion located underneath the table. The normal cycle of motions is bend, release and stop, the operator then removing the bent part and replacing with another tube.

After running through a lot of frames for the first operation, the bending tools are changed to those shown



Fig. 1, at Right, is a Full View of the Machine. Fig. 2, above, shows layout of bending tools for the first operation and the tube bent around the form which completes that operation

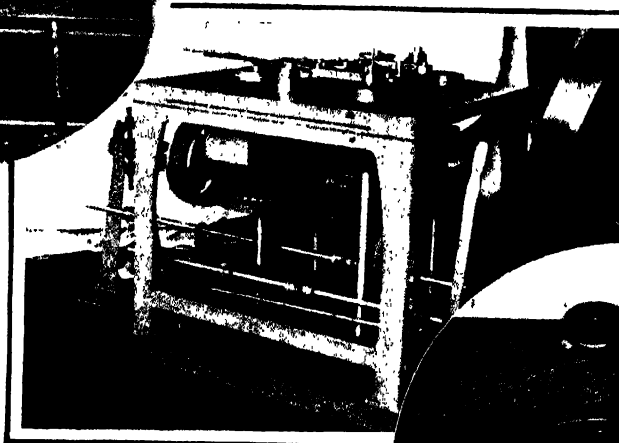


Fig. 3, Below, Shows Bending Tools Used in Second Operation. The frame is closed around the form, one leg passing under the clip, the other riding over the top, resulting in the finished shape as shown

in Fig. 3. It will be noted that the rollers on the end of the cranks are removed and links are connected to the studs midway in the crank arms. These links are attached at the opposite ends to another pair of swinging arms terminating in small rollers which engage the tube. The large rolls, mounted on the cranks in the previous operation, are used as locating stops in the second operation. They are positioned so that the partly bent frame is located by the rollers midway on the form in the center.

The second operation closes the frame around the form, one leg of the frame passing under the clip at the left while the other rides over the top, resulting in the finished shape shown in Fig. 3. It is necessary, of course, to bend the frame through a greater angle of curvature than actually needed in order to overcome the spring and to set the metal in shape.

The machine illustrated is being offered by the Davis-Bournonville Co., Jersey City, N. J. It is said to operate at the rate of 600 bends per hr., the drive shaft running at 300 r.p.m. When working to normal production the operator starts and stops the machine for each bend. When facility in handling the work has been acquired, however, and maximum output desired, the machine, it is said, can be operated without stopping to insert the tubes and remove the bent shapes, the production being in this manner raised to about 1000 bends per hr.

The H. H. Robertson Co., Pittsburgh and Ambridge, Pa., recently was presented the Rice safety award for a 100 per cent record in accident prevention during 1921. This company employed 124 men, working 250,000 hours last year, without a lost time accident.

Earnest Plea for Merchant Marine

WASHINGTON, March 21.—Pointing out that without American ships to carry American products to customers everywhere, trade of this country in time of emergency will again be at the mercy of foreign competitors and that at any moment domestic interests are liable to suffer disarrangement of internal economy and the piling up again of our surplus products along the highways and railroads and at the ports, as happened at the outbreak of the World War, Commissioner Meyer Lissner has issued a statement discussing legislation regarding merchant shipping. He makes a vigorous plea for the upbuilding of the American marine through legislation recommended by President Harding, which was based on a report of the Shipping Board Committee of experts, of which Mr. Lissner was chairman. Mr. Lissner is one of the Pacific Coast representatives on the board and in his statement he discusses in particular the effect of the proposed measures on Pacific Coast shipping and correlated industries.

Commissioner Lissner declares that the necessity for Government aid to merchant shipping arises out of the higher costs of ships under the American flag than under the flag of any of the other and principal maritime nations. This higher cost of American operation results largely from higher pay to American officers

and crew, higher subsistence costs, and higher fixed charges for interest, insurance and depreciation on "our admittedly higher ship values."

Welding Steel Ships

The success which has attended the building of a ship in which rivets were eliminated in favor of electric welding forecasts a radical change in steel structural methods, comments the London *Ironmonger*, March 4. In a paper on "Electric Welding Applied to Steel Construction, with Special Reference to Ships," recently read before the Institution of Mechanical Engineers, A. T. Wall recounted the successes achieved and difficulties encountered in the attempt to grapple with the many problems involved in the building of steel ships. The all-welded motor ship, Fullagar, the completion of which was largely due to the efforts of the late Sir George Carter, has demonstrated that an electrically welded ship can carry out successfully the work of a sea-going carrier. This ship has now been in service for 18 months, and has encountered heavy seas, even receiving a minor indent on her side, but the welding has not started.

RAIL 'FAILURES

Discussed by Railroad Engineers—Good Showing of 130-lb. Rails

The American Railway Engineering Association held its twenty-third annual convention at the Congress Hotel, Chicago, on March 14, 15 and 16. The total registration was 687 members and 172 guests, or a combined total of 859, as compared with an attendance of 815 last year. New members added during the year just closed totaled 129, bringing the entire membership up to 1960. Simultaneous with the convention an exhibition of railroad supplies and materials was held at the Coliseum, Chicago, under the auspices of the National Railway Appliances Association. There were 176 exhibits in the hall.

New officers of the engineering association for the ensuing year were elected as follows: President, J. L. Campbell, chief engineer, El Paso & Southwestern, El Paso, Texas; vice-president, G. J. Ray, chief engineer Delaware, Lackawanna & Western, Hoboken, N. J.; treasurer, George H. Bremner, consulting engineer, Chicago, and secretary, E. H. Fritch, Chicago.

The report of the committee on rails was read by G. J. Ray, chairman. Rail failure statistics included in this report showed a continuous decrease in failures from 1908 to 1914, when the low point was reached, and a gradual increase in failures from that time up to 1917. The "war-time" rollings and particularly the rails rolled in 1917 are not showing up so well, due probably to the unfavorable manufacturing conditions that prevailed when they were made and also to the lack of usual care in the track that the railroads were able to give them during that time. The statistics are as follows:

Average Failures Per 100 Track Miles					
Year Rolled	—Years Service—				
	0	1	2	3	5
1908	.....	.....	.....	.....	398.1
1909	.....	.....	.....	224.1	277.8
1910	.....	.....	124.0	152.7	198.5
1911	.....	.....	77.0	104.4	133.3
1912	.....	28.9	32.1	49.3	78.9
1913	2.0	12.5	25.8	44.8	69.5
1914	1.2	8.2	19.8	32.9	50.9
1915	0.7	8.9	19.0	34.2	53.0
1916	1.6	11.8	29.2	47.7	70.6
1917	5.3	21.6	38.9	66.0	.....
1918	1.6	8.9	27.6	.....	.....
1919	2.0	14.8	.....	.....	.....
1920	3.9	.....	.....	.....	.....

A recommended schedule for the inspection of steel rails was submitted for inclusion in the association's manual. Under this recommended practice inspection will be taken care of by a chief rail inspector, three or more assistant inspectors, a number of checkers and a chemist. The duties of each are outlined.

Piped Rather Than Segregated Ingots for Rails

In the discussion, Chairman Ray stated that the committee had paid particular attention to mill practice at various mills during the past year and as a result of these studies thought it best to prepare a new specification or to revise the old rail specification with a view to eliminating segregated steel so far as possible. He stated that a segregated rail is a dangerous rail compared with a piped rail, or a rail which has a natural lamination in the center due to the cavity in the top of the ingot. The committee is of the opinion that most of the trouble is due to split-head rails which are caused by bad segregation. Therefore, the new specification is being gotten up with the idea of producing an ingot which will contain what is known as piped steel, rather than segregated steel. Not that the railroads are looking for piped steel, but rather they wish to get away from segregated steel and want to give the manufacturer an opportunity to do that.

In touching on the same subject, C. W. Gennet, Jr., Robert W. Hunt & Co., Chicago, stated that experience has demonstrated repeatedly that the most constant cause of criticism of rails is the incessant fault found with the action of A or top rails in the track. It is plain that, until the mills generally adopt some method of casting hot-top and big-end-up ingots, the liability

of obtaining piped and segregated unhomogeneous steel in the top rail is so great as to require the adoption of more positive methods for combatting the difficulties.

Rail Metal A for Tie Plates, Etc.

Testing the top rail of each ingot is one method for protecting against the shipment of inferior metal. In lieu of such testing methods it has now been deemed practicable to provide for the disposition of the A rail metal by agreeing to its use in the form of hot worked tie plates. In fact, a new rail manufacturer, who has just entered the field, has provided facilities for the disposition into other products, including tie plates, of what would ordinarily be the A or top rail metal. It is hoped, Mr. Gennet said, that early in the future more mills may see their way clear to adapt themselves to such manufacture.

Good Records of 130-lb. Rails

W. C. Cushing of the Pennsylvania System indicated how the adoption of heavier rail sections was affecting failure records. He stated that it has been estimated that the 130-lb. rail on the Pennsylvania System outlasts the 100-lb. section by two and a half times and is worth 23 per cent more in reduced maintenance on heavy curvature districts. It has also been established that failures of 130-lb. rail on the Pennsylvania System are many times fewer than those of the 100-lb. section, notwithstanding the fact that they are located where the traffic and alinement conditions are the severest.

Government and Industry Co-operate in Standardization

At the request of Secretary of Commerce Hoover the American Engineering Standards Committee has designated A. A. Stevenson, the retiring chairman of the committee, to act as a special representative to work with the department in the co-operation between the department's division of simplified practice and the engineering standards committee. The work of the division of simplified practice was organized in the latter part of 1921. More than a hundred national organizations are participating through representatives officially designated by them.

The American Engineering Standards Committee is maintained jointly by 29 national organizations, including five departments of the Federal Government, nine national engineering societies and 15 national industrial associations. There are now similar national industrial standardizing bodies in thirteen foreign countries, all but one of which were formed during or since the war. Of these the British and the German work is the most extensive, but active and important work is going forward in other countries.

Mr. Stevenson, who is a past president of the American Society for Testing Materials and has had a most extensive experience in standardization work, is vice-president in charge of manufacture, of the Standard Steel Works Co., which is a subsidiary of the Baldwin Locomotive Works.

Started on Open Shop Basis

The Wheeling Steel Corporation has succeeded in starting up some of its sheet mills at its Beach Bottom, W. Va., works on an open shop basis after a shut-down of about nine months. This company declined to renew its agreement with the Amalgamated Association of Iron, Steel and Tin Workers in June, 1921. Efforts made to keep the Beach Bottom mills in operation on an open shop basis were unsuccessful and, business being poor, it was decided to shut down the mills. Some trouble marked the resumption, but since the first night the situation has been quiet. At the Yorkville, Ohio, works of the company, where the company is operating on an open shop basis, eight of the 24 hot mills now are on.

The Lindstrom Tool Co., Bridgeport, Conn., recently employed 150 additional hands in its toy manufacturing department, and will shortly put on 100 more, owing to several large orders recently received.

BETTER PLANT OPERATIONS

Improved Bank and Labor Conditions in Youngstown—Production Increased Moderately

YOUNGSTOWN, March 21.—Improved sentiment is unquestionably spreading in this center among iron and steel executives and banking interests. Production is being accelerated in a moderate way. The Youngstown Sheet & Tube Co. has blown in "D" blast furnace in its East Youngstown group, giving it three active stacks out of six, and increasing the total number of operating furnaces in the Mahoning Valley to 13, of 26. Finishing mills are averaging 55 per cent, with units devoted to the lighter products on a larger scale. Heavy steel production is still restricted.

But for the coal strike threat, additional stacks would be blown in. The Struthers Furnace Co., Cleveland, operating a merchant furnace at Struthers, Mahoning county, is preparing to start production as soon as unsettlement arising from the coal situation disappears. Both the Republic Iron & Steel Co. and the Brier Hill Steel Co. will likely blow in additional furnaces when this situation is cleared up. The former has two furnaces pouring and the latter one.

The Newton Steel Co., operating an electrically-driven sheet plant consisting of eight stands of roughing mills and eight stands of finishing mills at New Falls, Trumbull county, is contemplating an addition of six mills. This company has been in exceptionally good operating position for the past six months, fully 90 per cent of its output consisting of deep drawn stock which has proven acceptable as automobile body material. Its capacity is occupied fully 45 days ahead. No decision has yet been reached, however, to proceed with the additional capacity, but if demand warrants and business conditions continue to improve, the units may be installed this year.

New Orders Being Received

Consumers are not yet placing future tonnages with any degree of freedom, but mills are able to operate on week-to-week business with assurance that new orders will replace those being rolled. An indication of the situation is found in the fact that a recent appraisal of unfilled tonnage of the Sharon Steel Hoop Co., Sharon, Pa., showed no orders in excess of 100 tons, in a total volume of 16,000 tons. An independent at Youngstown, with 28,000 tons of unfilled orders at the close of last week, reports most of the business in small lots, for which prompt shipment is desired.

An encouraging feature of the local situation is the increase in commercial bank deposits, which gained \$1,581,441, to \$42,321,118, during the 10-week period from Dec. 31 to March 10. Another significant factor is the seeking of loans due to enlarged demands for working capital by interests which had largely liquidated their bank indebtedness at the close of the year. Withdrawals from savings accounts at this time are insignificant as compared with the demand last summer and fall.

Bank statements are regarded as very satisfactory in view of withdrawals before March 10 for industrial payrolls and the recent payments of income, real and personal property taxes. A combined banking institution with close connections with the major steel groups in the Valley, reports liquidation of loans during the past ten weeks aggregating \$1,500,000.

"One of the encouraging features of the current situation is that stocks of steel supplies in hands of consumers are largely exhausted," states an independent executive. "Buying is in small lots, but is sufficient in the aggregate to give producers a fair tonnage volume. A larger volume of buying from regular sources is to be expected in view of these conditions.

No More Shrinkage of Inventories

"Further loss due to shrinkage of inventories is unlikely in this district, as Valley plants have made generous allowances for such depreciation. The earning situation will likewise improve as schedules ex-

pand, thus proportionately reducing overhead costs per ton."

Another executive states: "Liquidation is ended for the time being and we are trending upward. A definite turn has undoubtedly been reached in the market. Problems remain to be solved, of course, but never at any time, even when business was considered good, was the steel industry wholly free from troublesome factors."

The A. M. Byers Co., Pittsburgh, is planning to suspend its Mattie blast-furnace at Girard, Ohio, during the next three weeks, owing to accumulation of iron. By that time its ore yard will have been cleaned up and the company is buying additional tonnage. It will continue to operate its puddle furnaces at Girard on piled iron.

Sheet & Tube Company Operations

The Youngstown Sheet & Tube Co. has seven pipe mills on the active list, almost double its recent operating rate, while the Republic Iron & Steel Co. has four pipe furnaces fired. Valley sheet mill capacity is occupied to the extent of about 60 per cent. The Trumbull Steel Co. is operating all departments of its Trumbull and Liberty plants virtually at normal on tin plate, sheets and strips. The Falcon Tin Plate Co. is operating its recently acquired Canton property at 75 per cent, as compared with a recent schedule averaging 60 per cent. Following a suspension of several weeks, the Mahoning Valley Steel Co. resumed this week at its Niles plant, with six mills scheduled to roll tonnages covered by mixed orders for black and galvanized sheets.

Three merchant bar mills are being operated by the Republic company, chiefly on light bar business. Secondary steel establishments, such as the Truscon Steel Co. and the General Fireproofing Co., are expanding operations to meet improved requirements for their products.

In the Shenango Valley employment conditions are appreciably improved, due to enlargement in operations at the plants of the Carnegie Steel Co. and the American Sheet & Tin Plate Co. The latter interest is operating 62 of 100 hot mills at its Farrell and New Castle works.

Sales executives in the two Valleys do not regard current buying activity as a "flash-in-the-pan" movement, but one backed by sustaining influences.

Stabilization of wire products prices has stimulated buying in this division and has been responsible for enlarging active capacity to 75 per cent in this district, as compared with a level of 50 per cent, which was maintained for some time previous. Wire nails spread from \$2.40 to \$2.50 per base keg, while plain wire is generally held at \$2.25.

The Barney & Berry Co., Springfield, Mass., skates, etc., a subsidiary of the Winchester Co., New Haven, Conn., is gradually increasing its output and by May is expected to reach its capacity of 1500 to 1800 pairs of skates per day. Its roller skate season is about to close. The manufacture of bicycles has been temporarily abandoned.

The Franklin Automobile Co., Syracuse, N. Y., manufacturer of the Franklin motor car, has requested data from the Chamber of Commerce of Youngstown, Ohio, regarding available industrial sites. The company is considering erection of an additional plant for production of a lower priced automobile.

Supt. A. L. Cromlish of the Farrell, Pa., plant of the Carnegie Steel Co., announces that orders have been received to operate eight additional open hearth furnaces. Bricklayers, structural steel workers and laborers have been called to work.

The Singer Mfg. Co., Bridgeport, Conn., is operating its plants on a five days per week basis, starting March 20. The company had a three days per week run for over a year. A fifteen per cent cut in wages also went into effect last Monday.

GERMAN SMELTING ENGINEERS

Annual Meeting Discusses Change from Bessemer to Open-Hearth Process, Exports and Armor Plate

(Special Correspondence)

At a recent meeting of the Society of German Smelting Works Engineers, held at Düsseldorf, the president, Dr. Vögler, in reviewing the trend of developments in the German iron and steel industry since the war, resented the charge by the Ministry of Traffic and Transportation as to the piling up of profits by the industry during the war. The injustice and inaccuracy of this charge were strikingly shown, according to Dr. Vögler, by the fact that foreign debts incurred by the industry one year after the conclusion of war were exceeding the aggregate share capital of the works.

More Open-Hearth Steel Being Made

In the course of his address, Dr. Vögler touched upon the change in iron and steel production since the war. Germany's pig iron production in 1913 amounted to 19,300,000 tons, of which total 12,900,000 tons was produced in the territories now forming the German nation. Of the 18,900,000 tons of steel produced before the war, approximately 56 per cent was basic Bessemer steel and 40 per cent open-hearth steel. The output of works located in what now constitutes German territory amounted to 15,300,000 tons, with the ratio of basic to open hearth steel output about 47 to 48, or both processes had an almost equal share in steel production.

During the war, however, and even more so during the post-bellum period, this ratio has undergone considerable change to the detriment of the basic process whose percentage of the total output had receded to 34 per cent in 1920, with open-hearth steel comprising 60 per cent. Compared with pre-war production output of basic steel had therefore not reached 30 per cent of the 1913 figure.

Continuing, Dr. Vögler pointed to the serious aspect of the economic side of this change, for owing to the decline in basic steel production Germany was no longer a large exporter of phosphates but had become a buyer in the world's phosphate markets to the disadvantage of domestic agricultural interests.

Steel Export Movement

Turning to the export business, Dr. Vögler* said that in view of the aforementioned figures, which clearly revealed the extent of decline in steel production, he could not understand all the talk about Germany flooding the world with iron and steel products. Exports amounted to about 6,500,000 tons in 1913 as compared with only 1,700,000 tons in 1920, and the best figures for 1921 were slightly above 150,000 tons per month. Exports had thus reached only 26 per cent of the pre-war figure—a fact which was giving ample food for reflection.

[NOTE.—Dr. Vögler is obviously juggling with figures, which is a comparatively easy matter in view of the elasticity of the term "iron and steel products." According to the German official statistics, exports "iron and iron alloys and wares thereof" (which, course, includes steel), amounted to 1,750,601 tons in 1920, while the respective figures for the period May to October are given as follows: May, 129,847 tons; June, 162,297 tons; July, 177,773 tons; August, 240,071 tons; September, 225,331 tons, and October, 246,115 tons. These figures do not include machinery, electrical supplies, and vehicles.]

German Armor Plate

Then Dr. Ehrensberger, the Krupp armor expert,* read a paper on the history of armor plate production in Germany. The author gave a detailed survey of the early history of the process and the different stages of development. Production of the English compound plate, which was introduced in 1880 by the Dillingen

Hüttenwerke, was taken up by Krupp's in 1890. Collaboration by the Krupp and Dillingen works resulted in the production of a soft nickel steel plate in 1892 which equalled in efficiency a wrought iron plate 16 per cent thicker. In the same year, Krupp's succeeded in turning out a plate made of half hard nickel steel whose quality was improved upon by hardening in oil and subsequent annealing.

The first gas-carburized and water-hardened armor plate was produced in 1893 and exhibited at the World's Exposition at Chicago. This nickel steel plate was substituted in 1894, however, by a nickel-chrome steel plate, the so-called Krupp plate, whose efficiency equalled that of a wrought iron plate three times the thickness and possessing an incomparable toughness. This plate, which has been introduced by all navies and is still in use to-day, is produced in the basic open-hearth furnace from nickel-chrome steel having a carbon content of 0.35 per cent, a nickel content of 4 per cent and a chrome content of 1.75 per cent.

William B. Pollock Co. Resumes

The William B. Pollock Co., important fabricating interest of Youngstown, Ohio, will commence operations April 1 on a 50 per cent basis, working off a variety of business. The company has received orders for iron and cinder ladles, boiler drums and miscellaneous equipment, in addition to a contract from the Delaware River Steel Co., Chester, Pa., to replace its blast furnace. On business now on the books, the Pollock company's capacity will be engaged at 50 per cent for fully four months, states a sales executive.

The contract with the Delaware River Steel Co. provides for replacement of its stack from the foundations up, with exception of the stoves. Fabrication will be done at the Youngstown plant of the Pollock company, and the material then shipped to the site at Chester, Pa., where it will be erected by the Pollock interest's organization. Plate stock for the furnace has been largely purchased.

When completed, the furnace will have a capacity of 350 tons. The Delaware River Steel Co. is a merchant iron interest, consuming foreign ores largely and producing foundry grades of iron for the eastern trade. A distinctive feature of the new installation will be two Mullen dry gas cleaners and washers.

Sweden's Steel Industry in 1921

The year 1921 was the worst on record in the Swedish iron and steel industry, as most of the works were idle for the greater part of the year. Of 133 blast furnaces only 22, of 201 Lancashire hearths only 37, and of 80 open-hearth furnaces only 15 were working at the end of the year, according to the London *Ironmonger*. The pig iron produced was 308,600 tons, equal to 42 per cent of the average output before the war, and the exports, which in 1913 were 502,000 tons, last year only reached 147,000 tons. The domestic consumption was insignificant, owing to foreign competition, in spite of reductions of from 35 to 50 per cent in the Swedish prices. The shipments of northern iron ore from Narvik were well maintained, but those from Lulea were practically stopped, owing to the chaos in the Upper Silesian industry. The principal takers of the Narvik ores were the German Westphalian and Rhine works, which during the great part of 1921 worked at high pressure and absorbed over 3,000,000 tons of ore.

Wilton R. Olds, George E. Ingraham and A. J. Littlejohn have purchased the interest of Charles H. Wood in the C. H. Wood Co., dealer in machinery, tools and factory supplies, Syracuse, N. Y. The three men were elected directors at a recent meeting. Mr. Olds was elected president and general manager; Mr. Littlejohn vice-president, and Mr. Ingraham secretary and treasurer. Mr. Olds has been vice-president and manager of the company for a number of years, and previous to that he was connected with the Burkans & Black Co., wholesale hardware dealer.

EUROPEAN FOUNDRY PRACTICE

New German Method to Desulphurize Cast Iron —Using Old Sand—Coke Gas Producers

Dr. Richard Moldenke was the guest at the March meeting of the New England Foundrymen's Association, held Wednesday, March 8, at the Exchange Club, Boston. The subject of his address was "Recent Developments in European Foundry Practice."

Most of the new developments, of which he talked, concerned those in Germany, and were the direct result of the war. Certain things were concealed during his inspection of various plants and processes and since then German interests have not been able to patent their processes in this country; consequently, Doctor Moldenke was frank to state he was not in a position to explain in detail some of the things he discussed.

For instance, the Germans had discovered a new process for desulphurizing cupola iron. The metal is run from the cupola into a ladle and the slag removed. The contents of a package, about the size of a cigarette box, are then thrown into the ladle, which the metal absorbs in about two and one-half minutes. The original sulphur content of the iron is reduced about one-half if the slag is removed. The contents of the

package are in powdered form. Doctor Moldenke said it might be potash, or possibly potash plus some ferro-alloy. Whatever it is, it is cheap, and affords a method of securing better castings in this country by the small foundry owner who cannot afford an electric furnace, or the expense of large percentage pig iron cupola charges, the two other methods of reducing sulphur.

In Doctor Moldenke's opinion the Germans have not progressed as far as we have with the electric furnace. Great progress has been made in Germany, however, in methods of handling molding sands. By regrounding, etc., they are able to use such sands many times and, in so doing, produce finer castings than they did before the war. He also touched on a new type of gas producer used in steel mills. This producer is practically a small blast furnace, 10 ft. high and 7 ft. in diameter. These producers are charged with coke and 2-lb. air pressure is supplied by centrifugal blowers. No steam is employed. Each charge produces, besides gas and slag, a small amount of 12 per cent manganese pig iron, which, it is claimed, pays for the cost of operation of the gas producer.

About 120 members of the association attended the meeting. E. H. Ballard, president, presided. He announced a committee has been appointed to prepare a question box to be brought up at future meetings, and that electric furnaces and non-ferrous metals will be the subjects at forthcoming meetings.

Better Co-ordination of Cost and Production Methods Advocated

That in the majority of factories the relation of cost accounting to production methods is not what it should be was an opinion expressed by Horace G. Crockett, supervising industrial engineer, Scovell, Wellington & Co., New York, at a meeting of the Society of Industrial Engineers, New York chapter, held in the Engineering Societies Building, March 14.

In Mr. Crockett's talk which was on the relation of cost accounting to production methods, he pointed out that in many factories where excellent production control is maintained the cost system utterly fails to reflect conditions. In other plants elaborate cost systems have been built up on an entirely wrong foundation of production methods. "On the one hand we have an excellent production system," he said, "but the management is without any good measuring device with which to determine what it actually accomplishes for them. In the other case we have a good cost system which balances beautifully and ties in with the general books, but tells little or nothing except the net profits at the end of the month."

One of the chief causes for this discord between cost and production in many factories is a lack of understanding or appreciation on the part of the various individuals of the other man's job, Mr. Crockett said. The production engineer is inclined to think that if he follows standards of time and quantity very closely, the dollars take care of themselves. Production managers have been inclined also to look upon cost accounting as a necessary evil, to be performed by a good clerk and that the whole aim and object of a cost system is to determine the cost of the article sold.

"We have come to realize," he said, "that that is not by any means the sole function of a cost accounting system. The title cost accounting in itself is somewhat misleading, and perhaps factory accounting would be better. The value of a cost system is in direct ratio to the information that it supplies, not only about the cost of products, but the cost of every activity of importance in the factory, and provided that information is presented in the way it can be used best by the men responsible for reducing costs, decreasing expenses and maintaining efficient control."

Topical questions discussed by Mr. Crockett included: How much do your foremen know about your costs—not only costs of product, but costs of operating their departments, subdivided according to the activities they control and measured according to proper standards? He pointed out that in many plants the foreman never sees cost or expense figures, although

he is the man who must see that standards are realized and results accomplished. In this connection he emphasized again the necessity of the cost accountant's giving consideration to the information that he should be supplying. "Many cost accountants seems to think that the factory is organized to supply them with certain figures, so that they can close their books at a certain time of the month," he said. "They do not realize that their most important function is the kind of information that they give back to the manufacturing executives."

Another topical question taken up was: Was your cost system built up from the factory or down from the office? It should be built up from the factory, he said.

Money or profit is the motive behind the manufacturing activity, he continued, and in the last analysis it is the figure that appears at the bottom of the profit and loss statement as the net profit from operations that tells the story. The executive controlling the business is interested in dollars and cents of profit and he is going to start investigations and enforce economies accordingly as the final net profit figure is favorable or otherwise. The production engineer must realize that while it is true that if you set proper standards of time and quantity you can measure your performance by the degree you approach those standards in time and quantity, and without the aid of dollars and cents, you must have that additional information if you are to know which particular product or operation needs attention.

L. B. Dorr, general auditor, Robt. H. Ingersoll & Brothers, New York, addressed the meeting on merchandise inventory control, explaining in detail the physical double-entry accounting operated by his company. Joseph Mayer, National Industrial Conference Board, and president of the New York chapter, presided.

The Carbon Limestone Co., Youngstown, Ohio, is now shipping flux-stone for blast furnaces in the Valleys at the rate of 35,000 tons a month. During the low point in the industrial depression, shipments had virtually ceased for a time owing to reduced blast furnace operation. In 1921 the company shipped 30,000 tons of agricultural limestone, but shipments are now at the annual rate of 50,000 tons.

F. E. Carnick and others have organized the Valley Steel Co. at Youngstown, Ohio, which will take over the business of Carnick Bros., dealers in scrap metals and iron and steel products. The old organization of Carnick Bros. remains with the new interest.

TRADE ORGANIZATIONS

Objects of Conference to Be Held April 12 with Secretary Hoover

WASHINGTON, March 21.—Representatives of national trade organizations will hold a conference in Washington on April 12 with Secretary of Commerce Hoover to discuss methods of co-operation between the Department of Commerce and associations concerning statistical information. In order to make another trip to Washington unnecessary, the National Association of Manufacturers has called a meeting to be held in Washington on April 11 of manufacturers and others interested in the subject of the production and use of industrial motion pictures as an aid to American industry. The association is co-operating with the department, with regard to both subjects and will supply him with a preliminary print of the results of its questionnaire directed to trade associations. This print will be made available to Secretary Hoover for use in connection with the meeting of April 12.

The purposes of the conference with representatives of trade associations have been announced by Secretary Hoover as follows:

Securing a list of trade associations that will furnish voluntarily to the Department of Commerce the classes of statistical information outlined in the correspondence between the Department of Commerce and the Department of Justice, published on Feb. 16.

Discussing and considering means and methods that may be best adapted for collecting and forwarding to the Secretary of Commerce, for dissemination, the classes of statistical information outlined in the correspondence referred to, including the forms of reports that will be most suitable, for associations that are willing to furnish such statistical information.

Discussion of the manner in which such reports of the statistical officer of the associations are to be filed with the Department of Commerce, and the manner and method of distributing the information to the members of the associations and to the public.

Tentative Program for Foundrymen's Convention.

A tentative program for the annual convention and exhibition of the American Foundrymen's Association in Rochester, N. Y., June 5 to 9, is announced as follows:

Monday, June 5

Morning: Opening of exhibits.

Afternoon: Joint general session of A. F. A. and Institute of Metals Division, A. I. M. E. Address of welcome, response, etc.

Tuesday, June 6

Morning: Gray iron session.

Afternoon: Steel and non-ferrous sessions.

Wednesday, June 7

Morning: Steel and non-ferrous sessions.

Afternoon: Industrial relations session.

Evening: Annual banquet.

Thursday, June 8

Morning: General session, molding sand symposium.

Afternoon: Special entertainment features.

Friday, June 9

Morning: Malleable session; final business session, 5 P. M. close of exhibits

Committee Chairmen of American Foundrymen

The chairmen of the important committees of the American Foundrymen's Association are announced as follows:

Papers: Robert M. Kennedy, 909 West California Street, Urbana, Ill.

Convention and Exhibits: W. R. Bean, Eastern Malleable Iron Co., Naugatuck, Conn.

Awards: G. H. Clamer, Ajax Metal Co., Philadelphia.

Promotion and Membership: Alfred E. Howell, Somerville Stove Works, Somerville, N. J.

Nominating: Benjamin D. Fuller, Defiance Paper Co., Niagara Falls, N. Y.

Foundry Costs: J. Roy Tanner, Pittsburgh Valve, Foundry & Construction Co., Pittsburgh.

Safety and Sanitation: Benjamin D. Fuller, Defiance Paper Co., Niagara Falls, N. Y.

Industrial Education and Training of Apprentices: C. B. Connelley, Department of Labor and Industry, Harrisburg, Pa.

Steel Foundry Standards: W. A. Janssen, American Steel Foundries, Chicago.

Standard Pattern Practice: Vaughan Reid, City Pattern Works, Detroit.

Advisory to U. S. Bureau of Standards: Richard Moldenke, Watchung, N. J.

April Meetings of Steel Electrical Engineers

Scheduled meetings in April for the Association of Iron and Steel Electrical Engineers include the following:

April 10, Cleveland, topic: "General Use and Abuse of Flexible Steel Ropes in Steel Mills."

April 15, Pittsburgh, topic: "Selective Switching, Including Overload and Reverse Relays and the Interconnecting of Large Power Plants."

April 18, Philadelphia, topic: "Wireless Telegraphy, Telephony and Radio Control."

April 22, Pittsburgh, topic: "Heating Furnaces."

Some time during the month an inspection trip will be made to Wheeling, W. Va.

COMING MEETINGS

April

National Federation of Construction Industries. April 3, 4 and 5. National conference, Drake Hotel, Chicago. Association headquarters, Drexel Building, Philadelphia.

National Metal Trades Association. April 19 and 20. Annual meeting, Hotel Astor, New York. Secretary, Louis W. Fischer, Peoples Gas Building, Chicago.

American Gear Manufacturers' Association. April 20, 21 and 22. Annual meeting, Hotel Lafayette, Buffalo. Secretary, F. D. Hamlin, 4401 Germantown Avenue, Philadelphia.

American Supply and Machinery Manufacturers' Association and Southern Supply & Machinery Dealers' Association. Joint Meeting, April 24 to 26, Birmingham. F. D. Mitchell, 233 Broadway, New York, is secretary of the American association and A. M. Smith, Smith-Courtney Co., Richmond, Va., is secretary of the Southern association.

National Machine Tool Builders' Association. April 25 and 26. Spring convention, Hotel Traymore, Atlantic City, N. J. General manager, E. F. DuBrul, 817 Provident Bank Building, Cincinnati. **Society of Industrial Engineers.** April 26 to 28. Spring meeting, Hotel Statler, Detroit. George C. Dent, business manager, 327 S. La Salle Street, Chicago.

American Electrochemical Society. April 27 to 29. Spring meeting, Baltimore. Acting secretary, Dr. Colin G. Fink, 110 Park Avenue, New York.

May

Iron and Steel Institute. May 4 and 5. Annual Meeting. Quarters of Institution of Civil Engineers, London, England. Secretary, George C. Lloyd, 28 Victoria Street, S. W., London.

The National Supply and Machinery Dealers' Association. May 8, 9 and 10. Seventeenth annual convention, Marlborough-Blenheim Hotel, Atlantic City. Secretary, T. James Fernley, 505 Arch Street, Philadelphia.

American Society of Mechanical Engineers. May 8 to 10. Spring meeting, Atlanta, Ga. Secretary, Calvin W. Rice, 29 West Thirty-ninth Street, New York.

National Association of Manufacturers. May 8, 9 and 10. Annual Convention, Waldorf-Astoria Hotel, New York. General offices, 50 Church Street, New York.

National Foreign Trade Council. May 10 to 12. Convention Hall, Philadelphia. Secretary, O. K. Davis, 1 Hanover Square, New York.

National Sheet Metal Contractors' Association. May 15 to 19. Convention and exposition, Cadle Tabernacle, Indianapolis.

National Association of Purchasing Agents. May 15 to 20. Annual convention and exposition, Exposition Park, Rochester, N. Y. Secretary, H. R. Heydon, 19 Park Place, New York.

American Iron, Steel & Heavy Hardware Association. May 22 to 25. Annual meeting, Hotel Washington, Washington. Secretary, A. H. Chamberlain, Marbridge Building, New York.

American Society for Steel Treating. May 25 and 26. Sectional meeting, Pittsburgh. Secretary, W. H. Eisenman, 4600 Prospect Avenue, Cleveland.

CONTENTS

March 23, 1922

Polishing of Metals an Art in Itself	777
Lack of Standards Attributed to Lack of Appreciation of What the Problem Means—Major Importance of the Lowly Glue Pot	
Fluorspar in Open-Hearth Practice	783
Effective Agent in Removing Sulphur from the Steel—Action on the Slag and Furnace Lining—Some Old Ideas Altered	
Trade Aspects of Non-Ferrous Metals	787
The Manufacturer's Point of View Brought Out at Institute of Metals—British Specification Problems—Training Men for Management	
Development of Continuous Rolling Mills	791
Fundamental Conditions Affecting Design—Application to Specific Products and Specific Problems—Co-relation of Units	
Reduced Production Cost a Prime Need	796
What Measures May Be Used to Forecast Business Trends—How Expectations So Far in 1922 Have Been Fully Met	
Iron and Steel Industries of Europe	801
Reports to the Government Show Much Irregularity, but Improvement in Some Countries, Particularly in England and Germany	
Lowest Production Rate in Steel Corporation's History	815
Average for Year 1921 was 47.5 Per Cent of Capacity—Heavy Cost of Transportation an Important Factor in Causing Deficit	
Molding Sand Investigation.....	781
Electric Steam Generator.....	782
Air Reduction Sales Co. and Davis-Bour-	
nonville Co. Merge.....	782
Rack-Cutting Attachment for Heavy Mil-	
ler	785
Association Meetings.....	785, 799, 808, 817
Angle Fixture with Perforated Plate....	785
Electric Runabout Crane Truck.....	786
New Form of Lock-Nut.....	786
Novel Rolling-Mill Belt Drive.....	786
Efficiency of Labor in Germany.....	788
Canadian Iron and Steel Output in Jan-	
uary	788
Storing of Steel Bars.....	789
New Etching Medium for Chromium and	
Tungsten Steels	790
New Small Tools and Gages.....	794
Blast Furnace Record.....	794
Safety Hoist Hook.....	795
Lake Shipping Hampered by LaFollette	
Act	795
Rolled Zinc in 1921.....	795
Grinder with Self-Contained Dust Exhaust	
.....	795
Prizes for Foundry Devices.....	799
Shipping Board Equipment.....	800
Cost of Living Slightly Higher.....	800
High-Speed Wire Brush Cleaner.....	800
American Engineering Council Meeting...	802
Machine for Bending Tennis Racket Tub-	
ing	803
Plea for Merchant Marine.....	803
Welding Steel Ships.....	803
Labor Notes	804, 814
Rail Failures	804
Government and Industry Co-operate in	
Standardization	804
Better Plant Operations.....	805
German Smelting Engineers Meeting....	806
Sweden's Steel Industry in 1921.....	806
Foreign Trade Notes.....	802, 806, 813, 814
European Foundry Practice.....	807
Cost and Production Methods Discussed..	807
Trade Organizations to Confer with Mr.	
Hoover	808
Editorials	810
The Lack of Invention—World Move-	
ment in Steel—Liquidation of Metal	
Prices—The Bituminous Coal Strike	
Correspondence	812
Mexican Trade Going to Europe	
Improvement in Pickling.....	813
Machinery Consolidation	814
Coal Strike Situation	814
Senate Working on Tariff.....	817
Basing Point Hearing	828
The New Spanish Tariff.....	832
Ore Rate Controversy.....	827, 833
February Fabricated Steel Business....	834
Rehearing Asked in Hardwood Case....	834
Industrial Finances	835
Trade Changes	836
Iron and Steel Markets	818
Comparison of Prices	819
Prices Finished Iron and Steel f.o.b. Pittsburgh	831
Personal Notes	832
Obituary Notes	833
Non-Ferrous Metal Market	834
Machinery Markets and News of the Works	837-
New York Jobbers' Prices	846

ESTABLISHED 1855

THE IRON AGE

EDITORS:

A. I. FINDLEY

WILLIAM W. MACON

GEORGE SMART

CHARLES S. HAUR, *Advertising Manager*

Member of the Audit Bureau of Circulations and of
Associated Business Papers, Inc.

Published every Thursday by the IRON AGE PUBLISHING CO., 239 West 39th Street, New York

F. J. Frank, *President*

PRINTED IN U. S. A.

George H. Griffiths, *Secretary*

Owned by the United Publishers Corporation, 243 West 39th Street, New York. H. M. Sweetland, *Treas.*, Charles G. Phillips, *Vice-Pres.*, A. C. Pearson, *Treas.*, F. J. Frank, *Secy.*

BRANCH OFFICES: Chicago: Old Building. Pittsburgh: Park Building. Boston: 410 Unity Building. Philadelphia: 1120 14-2 Widener Building. Cleveland: Guardian Building.

Detroit: 317 West Fort St. Cincinnati: Mercantile Library Bldg. Buffalo: Elliott Square Building. Washington: 816 Fifteenth St., N. W. San Francisco: 320 Market St. London, Eng.: 11 Haymarket, S.W.1.

Subscription Price: United States and Possessions, Mexico, Cuba, Shanghai, \$6.00; Canada, \$8.50; Foreign, \$12.00 per year. Single copy 50 cents.

Entered as second class matter, June 18, 1879, at the Post Office at New York, New York, under the Act of March 3, 1879.

The Lack of Invention

In the readjustment that has already been under way for a year and a half we are being faced with a number of unpleasant truths. The surpluses built up in years of apparently large profits are found to be partly fictitious. We cannot receive individually more of this world's goods in proportion to the service we render; in other words, the war did not automatically furnish us a higher standard of living. We cannot sell goods to nations that are unable in their turn to sell. There are various other unpleasant truths.

Some of these truths that are almost staring us out of countenance are closely associated with illusions that sprang up during the war. As to the "higher standard of living," for illustration. Before the war, no one would have been considered safely at large if he had proposed: "Let us have a great war, killing many people, and destroying a great deal of property, and wasting much time. Then each of us will be able to get more goods for the amount of work we do." Yet during the war just such a belief took shape. The unpleasant truth facing many people now is that this was an illusion.

Likewise during the war there sprang up a belief that after the war there would be a great period of construction throughout the world, and that this construction work would make everybody prosperous. That was an illusion. One misconception that fostered it was that prosperity results from construction, the truth being that construction results from prosperity. The prosperity is due to what may be called in a broad sense "savings." Using the words in the most general way, we save and invest the savings. In a narrow sense, a man saves money and then invests the money, but in the broadest sense a people can save, in money, in materials and in time and effort, and use the surplus created in the production of permanent facilities or wealth.

One of the ways in which mankind has saved in the past has been by invention. The cotton gin, the harvester, the sewing machine, the linotype, innumerable inventions, all resulted in the saving of time, and the time saved has been used in various ways; thus we have become better off, we have progressed or prospered.

Added to the unpleasant truths already gener-

ally recognized that we must now face is the fact that the past eight years have been particularly bare of inventions enabling us to save. There has been some progress, but not much. Three great new things that we have are the automobile, the cinema and the wireless. Each has effected a saving, but very little compared with the time and energy we spend on them. Each represents in a large degree a luxury or pastime. They do not help us to do things more expeditiously or more easily to an extent that enables us as a nation to save.

A good point about new inventions is that they effect so promptly an improvement in business. It is not necessary to wait until the savings they promise have accumulated, for business to improve. As soon as the merit of a new idea is recognized capital is invited, facilities for employing the invention are created and materials are bought. Relief is afforded from the condition of some industries being overbuilt. As a rule in all the past some things have been overbuilt while others have been underbuilt. There are overbuilt industries now, but with the usual supply of new inventions we should have also underbuilt industries, and thus the situation would be relieved. What we must and will do is to invent, bring out new things that will make a market for themselves.

While the value of iron and steel shares is not always an indication of business conditions at the time, the trend in securities is often significant. A compilation made in Great Britain shows that in the case of six iron and coal companies, nine iron, steel and engineering companies and 24 iron and steel companies, the average of market values of the 39 stocks at the peak on March 31, 1920, was 163.9 per cent of the par value. After that date the decline was steady, with one exception, until on Feb. 14, 1922, the market average was 79. In the case of the 24 iron and steel companies, the peak was 148 on March 31, 1920, and the low point on Feb. 14, this year, was 73.8. At the really critical period in the British steel industry, in the second quarter of last year, when operations had virtually ceased because of the coal strike, the percentage figure was 89.6 on June 30, 1921. Despite a marked revival in the industry up to the present time, par-

ticularly with January exports exceeding those of any other country, the stock market index is at the lowest point in over two years.

World Movement in Steel

Some striking changes are shown by an analysis of the iron and steel export statistics of the leading producing nations for 1921, which recently have been made complete. The figures for last year, compared with those for 1913 and 1920, are as follows in thousands of gross tons:

	1913	1920	1921
United Kingdom	4,969	3,251	1,700
United States	2,892	4,706	5,180
France	578	895	1,525
Belgium	1,546	892	904
Germany	*6,203	1,723	†1,607
Total	16,188	11,467	7,916

*Luxemburg included. †Eight months, May to December.

The first fact that stands out is that in 1921 the total movement of 7,916,000 tons was about 70 per cent of the exports in 1920, despite the world-wide depression. Compared with the iron and steel production in the same countries the difference is marked, because the 1921 pig iron and steel output was only 53 per cent and the steel output 56 per cent of the 1920 figures. The conclusion is that a liquidation in stocks took place last year which was world wide.

A second striking feature of these data is the pronounced rôle of France. Not only did that country exceed in 1921 its sales in 1920 but they easily surpassed the pre-war record in 1913 by nearly threefold. France is also the only country whose exports last year not only suffered no diminution as the year progressed but also exceeded the pre-war record. With the acquisition of German capacity, France has been compelled to find new outlets in foreign trade.

One important development is not shown in the above table, and that is that at the close of the year Germany was leading all other countries in iron and steel exports, with Great Britain, France, the United States and Belgium following in the order named—a marked reversal of the position obtaining early in the year.

The volume of international trade in steel last year was less than 49 per cent of what it was in the year before the war, and it is likely to be some years before these countries will equal or exceed combined exports of over 16,000,000 tons. Even in the boom of 1920, the total was far from reaching 1913 proportions. When world demand again approaches the pre-war scale the old alinement need not be expected, but whether the United States can improve on third position will depend on the right settlement of some questions of national policy in which the outcome is none too clear at this writing.

As was to be expected, the personnel of a Washington local organization aiming at establishing the metric system in this country is largely, if not wholly, made up of those who have no real stake in the change. The translator who has to convert metric units into those of the English system would like, of course, to be relieved of the job, but he has no machinery, jigs, fixtures or equipment to scrap. Pro-metric advocates try periodically to gain the

limelight but they find it hard to arouse sustained interest outside of industrial circles; and it is in the outside fields that they must get adherents, those who do not know the other side of the question. So long as these missionaries for the metric system remain with us, so long will it be necessary to maintain educational bureaus to controvert the plausible arguments addressed to the man who can sign his name to a petition with entire immunity from the heavy loss a metric law would visit upon industry.

Liquidation of Metal Prices

Since the peak was reached in April, 1920, the prices of metals and metal products, reported monthly by the Bureau of Labor Statistics, have fallen steadily, with three insignificant interruptions, from an index of 195 to 115. In other words, while these prices were 95 per cent above the 1913 average, two years ago, they are now only 15 per cent above that average and are, incidentally, much nearer to the 1913 figures than any other of the nine groups reported upon by the bureau. Only in July and August of 1920 and in October of 1921 was an advance recorded in this group above the previous month, these advances being respectively 1, 2 and 1 points.

No other group in the entire list can show in the same measure the steady decrease in price recorded by the metals group. All of the others have had their marked ups as well as downs, and the only ones which have been comparable with metals in their ratio of liquidation have shown substantial increases over low points reached last June. Thus, farm products stand now at 126 as compared with 116 in January and 113 last June and food products stand now at 138, as compared with 134 in January and 132 last June.

Much has been said, in Congress and out, of the plight of the farmer. His prices, after being considerably higher than those of metals, fell in October, 1920, for the first time below the metal figures. They kept consistently below the metal figures until last September, subsequently having been both above and below, due to fluctuations month by month. They are now 11 points higher than metals, while last June they were 19 points under metals. This shows a 30-point change between metals and farm products, the metals taking the lower prices.

In liquidation of prices from the 1920 peak, metals have lost 84.2 per cent of the excess of that peak over the 1913 average. Farm products, figured in a similar manner, have liquidated 82.2 per cent; food, 79.7 per cent. All commodities averaged show a liquidation of 70.4 per cent, but none of the separate groups, except the three mentioned, shows so much liquidation as 70 per cent.

It will be evident that the drop in metal prices has been brought about largely by the steady drop in pig iron and finished steel, as indicated week by week by THE IRON AGE composites, and partly by the drop in copper and other non-ferrous metals, which began long before steel started to drop, and in which prices have lately shown signs of stiffening. Steel and iron of course are the

dominant factors in the metal and metal products groups, hence the steady down grade of the index for that group is a reflection, largely, of the status of the iron and steel market.

The Bituminous Coal Strike

The small chance there may have been of the walkout at the bituminous coal mines being averted seems to have disappeared when representatives of District No. 5, United Mine Workers, failed to accept the proposal of the operators of the Pittsburgh district that a wage agreement conference be held last Monday. The United Mine Workers remains firm in its stand that it will not negotiate anything with the operators except a national agreement, while the operators are equally firm that they will enter into no negotiations looking toward a national agreement. In most districts, if not all, the operators are willing to negotiate with the men in their respective districts.

The desire of the United Mine Workers for a national agreement is a natural one, but as wage agreements are usually made a national agreement means a national scale. That is the case, for instance, with the scales of the Amalgamated Association, which prescribe wages for a sheet mill, tin mill or iron mill irrespective of its location. With carpenters, printers, and other workers having national organizations, scale agreements are made by local and not national conferences. The practice in determining bituminous coal wage scales has been unique, in that agreements have been reached between the United Mine Workers and a certain group of operators, viz., those in the so-called "central competitive field," Pennsylvania, Ohio, Indiana and Illinois. Scales for other districts were derived from this basic scale, the operators concerned having had no voice in determining the basic scale.

While the breaking up of the central competitive field, through the operators of Ohio and Pennsylvania last December refusing to continue the arrangement, has appeared to be the chief cause of the failure of the usual system to operate, the fact is that the operators of other districts are strongly opposed to the system. Some of them have expressed to Secretary of Labor Davis their opinion of the system in vigorous language.

The failure of the machinery to produce a conference is, however, really only an incident. If the four-State conference had been held, there would have been a disagreement. If scale rates could have been agreed upon, which is very doubtful, the parties certainly would have split on the check-off. The operators are absolutely opposed to continuance of the check-off, while the officials of the United Mine Workers cannot see a prosperous future for themselves without it.

The miners cannot view the check-off in exactly the same spirit as their officials, since the money involved in the check-off is money that the miners pay, while it is money the officials receive. Naturally that makes a difference.

The prospective suspension is different from many that have preceded it, in that the objective is plainly a reduction in the cost of coal to the consumer. In not a few suspensions in the past the outcome was an advance in the market price of

coal, whereby the operators became willing to grant the miners higher rates than seemed feasible before April 1.

The weekly reports of coal production indicate that the country is well stocked, for the increase in production since the beginning of the year has been much greater than would be accounted for by any conceivable increase in consumption. Production has risen to 11,058,000 tons in the week ended March 11, against an average in the closing weeks of the old year of scarcely more than 7,000,000 tons a week, when domestic requirements were heavier than of late. Rarely if ever has a prospective mining suspension been so well advertised long in advance. Separate evidence of the large stocks held by consumers is seen in the softening of coal prices within the past two or three weeks.

Demand from Japan was an important factor in American iron and steel exports during the war. The movement continued in 1919 and 1920 when the monthly averages of exports to Japan were 56,900 and 56,400 tons. Following the Japanese financial crash there was a marked falling off to only 25,600 tons per month in the first half of 1921, with an average for the last half of 31,500 tons per month. November and December last year showed a recovery to nearly the rate of 1920, exports in the two months being 52,900 tons and 56,400 tons respectively. In fact, apart from these shipments to Japan our total iron and steel exports in those months would have been only 70,000 tons and 73,600 tons, or on a parity with those of Belgium, which in 1921 were 75,300 tons per month.

CORRESPONDENCE

Mexican Trade Going to Europe

To the Editor: It is deplorable the way American manufacturers and exporters are letting Europe get away with Mexican business. It is quite true that some American firms are getting business from the Tampico-Tuxpam oil fields and also some business from mines. But the bulk of the machinery, hardware and iron and steel trade is now going to Europe. It is going to take a long time for Americans to get these customers back, if ever, and if any effort is going to be made toward this end, it will have to be put forth now without waiting on recognition.

I recently made a hurried business trip into northern Mexico and I found importers of German, English, Spanish and French goods of all kinds taking advantage of the situation, and while they work they are praying that our Government will continue to delay indefinitely extending recognition to the present Mexican Government.

The average representative of American manufacturers who visits Mexico gets his information mostly at foreign club sessions and directly from parties interested in keeping a status quo as far as America and Mexico are concerned. Unfortunately, these representatives do not always speak the language of the country and thus are handicapped further in their investigations. Another unfortunate feature is that some representatives of our own Government make reports that are quite as indiscriminating.

The bugaboo of long-time credits necessary to do business in Mexico is constantly held up before the American exporter. Few manufacturers and exporters, except those who have trusted representatives on the ground, realize that this much advertised handicap is being overcome by European firms whose bank bal-

ances (especially since the war) do not seem to justify extending long credits.

The ordinary way by which European companies overcome this handicap is to add enough to the price so that an attractive discount can be given on any paper accepted by the seller. Contrary to the usual belief, the money stringency in most parts of Mexico is no worse now than it is in the United States, and many times a Mexican firm will discount its own paper. Then, too, the banks in different localities do not hesitate to discount paper of merchants and others having good standing, especially at the attractive rates offered.

While the average American is in the dumps about losing European trade, he is overlooking a market right

at his door, and is letting his foreign competitor get firmly established in a market that rightfully belongs to the United States.

This is not an argument for recognition of Mexico, but is simply a statement of facts. If American business sits back and waits for formal recognition much longer, trade with Mexico will dwindle to a point that will include only those things that cannot be purchased in Europe. Our exports to Mexico, even during the ten years' revolution, have run large figures, as consular reports will show. Shall we sit down and calmly look on, without an effort to save what business we have down there?

CHARLES L. SMITH.

El Paso, Tex., March 15, 1922.

IMPROVEMENT IN PICKLING

New Compound Developed to Retard Acid Attack on Sound Metal

BY GEORGE W. EMLÉN, JR.*

ONE department of almost every steel plant that everyone avoids like the plague is the pickling house. Clouds of evil-smelling steam and poisonous gases make it an excellent place to stay away from. This probably accounts for the fact that there is less scientific knowledge of pickling problems than of those of other important departments of the steel industry. It is curious to contemplate that, in some of the most carefully supervised steel mills in this country, the pickling process is left more or less to haphazard and its operation often entrusted to the care of ignorant men, in a way that would be considered extremely slipshod in any other of the major operations.

This condition leads to more than one grave result. In the first place, the fact that workmen may be forced to breathe in an atmosphere that is heavy with acid-laden steam needs no comment. The presence of these acid fumes and steam works untold damage to hoists, cranes and other incidental metal work necessary to the pickling operation.

Economy in the use of acid is another feature that would seem to be strangely overlooked. It is a well-accepted theory in many steel plants that high temperatures speed up the pickling operation, but it is an absolute fact that the steam caused by such temperatures carries with it a considerable volume of free acid which not only does damage to surrounding objects, but is carried off and lost. Moreover, there are methods of greatly prolonging the potency of the pickling bath which we shall take up later. Too often the strength of the bath is guessed at after a considerable amount of metal has gone through, with the result that it frequently is considered exhausted when there may be a large proportion of effective acid still available. Sometimes the pickler judges of the bath's condition by feel, taste or appearance, any one of which may be misleading.

Acid Attack on Metal

Another troublesome but little understood condition is acid attack on the sound metal. The object of pickling, as we all know, is to remove oxide scale. This removal is brought about by acid attack on the metal itself and the evolution of hydrogen gas, brought about by acid-metal contact, causes the scale to flake off. Unfortunately, as the layer of scale is seldom evenly distributed on the steel, it follows that good, clean metal is subject to acid attack, while an adjacent portion is being cleaned. Blisters, brittleness, stains, after-sweating and other evils are the result of prolonged acid attack on metal, not to mention an actual loss of weight of the steel itself, which will run to impressive figures after many thousand tons have been pickled.

English and German steel makers have stolen a march on us when it comes to pickling. An organic compound known as "piclette" has been invented which, when added in minute proportions to the acid, seems to have the effect of practically eliminating the

evolution of hydrogen in the pickling bath. It follows that the acid breaks up with far less rapidity than usual, with the result that about 50 per cent more metal can be cleaned in a given bath. It seems that acid so treated with piclette removes the scale without attacking the underlying steel to anything like the usual degree. Hence there is a uniformly better surface on the steel after pickling; blisters, brittleness, after-sweating, etc., are done away with and there are practically no bad fumes given off from the bath.

Working Method

Naturally, no one need suppose that a small dose of piclette will immediately end all his pickling troubles. Like anything else, it has to be handled with intelligence and by following definite rules. The quality of the steel pickled has a good deal to do with the results obtained. In general, however, the following directions apply: It must be added to the raw acid before dilution in the proportion of 0.10 to 0.15 per cent—say about 3 lb. per ton of acid. The temperature of the bath must be kept at about 140 deg. Fahr. Piclette breaks up under higher temperatures, and slows up the action of the bath if a much lower temperature be employed. A fairly strong solution of acid with water is preferred and, where higher temperatures have been the practice, a stronger solution will compensate for any loss of speed caused by lowering the temperature, and the presence of piclette will still effect an economy.

Exhaustive experiments carried out by J. E. Stead, D.Sc., D.Met., F.R.S., etc., have proved the foregoing statements; and the wide use of piclette in England and on the Continent is a further indorsement of its success.

The figures given above are based on the use of 60-deg. Baumé sulphuric or 17-deg. hydrochloric acid, but piclette may, of course, be adapted to different acid strengths. In fact, the whole subject of pickling is one which deserves considerably more study than has been generally given to it, and if such research be accompanied by an intelligent investigation of the new compound, there should certainly be important advances made in our knowledge of the subject. Specific reports on the application of piclette should be available before long, as the compound has now been introduced into a number of steel mills in this country.

German Ferroalloy Prices Advance Sharply

The renewed weakness in the mark exchange has had a striking influence on values of ferroalloys in Germany, says the *Metal Bulletin*, London, March 10. The market had been quiet for some time, but the rise in foreign exchanges has brought in a brisk—and at times almost panicky—demand for all descriptions. Ferrosilicon, 45 per cent, has risen to 11,000m. per 1000 kilos, while 75 per cent registered a rapid advance to 20,000m. and over; buyers at about 24,000m. now appear to be unsuccessful in obtaining material. Meanwhile, 90 per cent alloy is not offered freely, not so much because a shortage exists, as in expectation of higher prices; the present value is nominal at 30,000m. Ferrochrome, which had been weak, has undergone a revival, present quotations being: Maximum 1 per cent carbon, 105m.; 2 per cent, 90m.; 2 to 4 per cent, 76m., and 4 to 6 per cent, 60m. per kilo.

*Manager Piclette Dept., Matthew Addy Co., Philadelphia.

MACHINERY CONSOLIDATION

Seven Machine Tool Companies and Other Interests Included in Merger Plans

A merger of a number of machine tool manufacturing companies, which has been under negotiation for some months, is likely to be consummated in the near future. Announcement may be made in the coming week of the completion of the new organization, as it is understood that only matters of detail remain to be arranged. Seven companies whose names have been commonly mentioned in connection with the consolidation are the Betts Machine Co., Rochester, N. Y.; the Colburn Machine Tool Co., Cleveland; the Newton Machine Tool Works, Philadelphia; the Modern Grinder Mfg. Co., Erie, Pa.; the Carlton Machine Tool Co., Cincinnati; the Lodge & Shipley Machine Tool Co., Cincinnati, and the Hilles & Jones Co., Wilmington, Del.

Though manufacturing a fairly complete line of machine tools for all purposes, the new company will be particularly strong in shop equipment for railroads.

The capitalization generally named in connection with the plans of the syndicate points to the inclusion in the new corporation of important companies outside of the seven named above.

Efforts to Prevent Coal Strike Not Exhausted

WASHINGTON, March 21.—Announcement was made this afternoon at the White House that the Government has not entirely ceased its efforts to prevent a strike of union bituminous coal miners on April 1. It is evident, however, that the Administration has only slight hope of bringing about a conference between operators and miners and of forestalling the strike. The little hope there was became even less with receipt of the report from New York that Philip Murray, international vice-president of the United Mine Workers of America, said the order for suspension of work in both the anthracite and bituminous union mines throughout the country would be issued later in the day. Federal court indictments which charged operators and union miners with conspiring to fix coal prices and damage non-union coal mines are held by operators as the reason for refusal to meet the miners.

President Lewis of the Mine Workers announced here yesterday that the policy to be followed by the bituminous miners when work is suspended on April 1 will be formulated at a conference to be held in Cleveland on Friday of the present week. The conference will be attended by 116 men who are members of the general policy committee of the miners' union, it was stated, and who will have full authority to conduct the affairs of the union during the strike.

Error Claimed by Attorneys for Federal Trade Commission

WASHINGTON, March 21.—Assignments of error constituting the basis of appeal in the Claire Furnace Co. cost reporting case were filed yesterday with the Supreme Court of the District of Columbia by Attorneys William T. Chantland and Jesse C. Adkins of the Federal Trade Commission. Efforts will be made to have briefs prepared at an early date in order to present the case before the Court of Appeals and possibly a decision before summer vacation begins.

Boston Molders' Strike

As a result of the failure of union molders and foundry owners of greater Boston to come to an agreement on a new wage schedule, the employees of eight or nine Greater Boston foundries failed to report for work on March 15 and, since then have remained out. The total number of men out on strike is approximately 175.

FAR EAST STILL ACTIVE

Rails and Bars Pending—South America Buys—Caucasian Manganese Ore Imported

NEW YORK, March 21.—The upward trend of Japanese buying continues strong, although it is still largely confined to government and private purchasing of rails, private buying of mild steel bars and some small black sheet business. With the approach of spring activity, there is a slight increase in inquiries for light gage black sheets, which, it is generally believed, will later approach a considerable volume. Government purchases for the railroads exhibit no tendency to decrease at present, but the recent stiffening of prices quoted on export rails will probably exert a deterrent effect upon continued placing of heavy tonnages with American mills. About 2000 tons of bridge material was recently placed by the Imperial Government through a large Japanese export house and there is another government tender, which closed March 20, in Tokio, calling for a small tonnage of mild steel square bars for making railroad spikes.

Among the railroad inquiries either pending or not yet reported awarded are 21 miles of 60-lb. rails for the Kongosa electric railroad, to be shipped c.i.f. Corea, and about 3000 tons of 75-lb. rails for the Tokaido Tetsudo K. K. Recent bar purchases have been small in proportion to the large number of inquiries of size that are in the market. One Japanese house has closed two orders, one of 555 tons, the other of 435 tons for $\frac{3}{4}$, $\frac{1}{2}$, $\frac{3}{8}$ and 1-in. steel bars and also about 800 tons of light gage black sheets.

There has been an active interest on the Pacific coast, particularly among lumber interests, in the purchase of Belgian and French rails. While a few have been bought, a number of the inquiries figured on during the past few months have not developed into orders. The recent report of a 25,000 ton purchase of Belgian rails by railroad interests on the Pacific coast can not be confirmed. A recent quotation, made on 60-lb. rails of Belgian origin, was \$40, c.i.f. San Francisco.

South American markets are improving, some activity being noted in black and galvanized sheets and No. 14 to No. 20 gage plain wire for redrawing cold. The present trade is largely confined to Argentine purchasers, although some business is reported from Rio de Janeiro, Brazil.

Increasing imports of manganese ores are indicated. One New York importer recently closed with an eastern furnace for 50,000 tons of 52 per cent manganese ore from the Caucasus to be shipped from Poti, Georgia. While the present market price of this ore delivered Atlantic port is probably not less than 25c. per unit, this contract is understood to have been made at 24½c. per unit. Only recently have shipments of this ore been possible and for some time it has been quoted above Brazilian manganese ore.

To Manufacture Doxford Diesel Engines at Chester

Arrangements have been made for the manufacture in this country of internal combustion engines of the opposed piston type. William Doxford & Sons, Ltd., Sunderland, England, have arranged with the Sun Shipbuilding Co., Chester, Pa., for uniting the interests of the American Junkers patents with the Doxford patents, which have been the basis of the developments forming the Doxford opposed piston two cycle engine, built by the British firm.

The Sun Shipbuilding Co. has secured the license for America and its possessions of the Junkers patents. An immediate start is to be made at the Chester works on the construction of a four-cylinder, 3000-h.p. single screw installation, being a duplicate of the Doxford manufacture, two of which engines are already at sea in the motor ships Yngaren and Dominion Miller.

The Standard Steel & Bearings, Inc., Plainville, Conn., has increased its working forces slightly because of better business.

Lowest Rate in Corporation's History

Average for Year 1921 Was 47.5 Per Cent of Capacity, as
Shown by Annual Report—Heavy Cost of Transportation an Important Factor in Causing Deficit

THE twentieth annual report of the United States Steel Corporation for the year ended Dec. 31, 1921 is notable for the brevity of the comments of Chairman Gary upon the remarkable reversal of conditions in 1921 as compared with 1920. His general remarks were as follows:

"The marked decrease in the demand for iron and steel products which developed in the midsummer of

operations and the exercise of rigid economies. A number of elements in the cost of producing steel show little, if any, recession from wartime figures, notably that of railroad transportation, which on basis of existing rate conditions averages in the case of the subsidiary companies upwards of 40 per cent of the total cost of producing steel. At the close of the year the prices prevailing for some products were below the

Comparative Income Account

For the Fiscal Years Ending Dec. 31, 1921 and 1920.

	1921	1920	+ Increase — Decrease
Earnings—Before charging interest on bonds and mortgages of subsidiary companies:			
First quarter	\$34,342,006.44	\$44,212,019.49	— \$9,870,013.05
Second quarter	23,911,321.99	45,268,551.34	— 21,356,629.35
Third quarter	20,916,498.75	50,145,301.18	— 29,228,802.43
Fourth quarter	21,620,852.32	45,469,487.27	— 23,848,634.95
Total for year	*\$100,791,279.50	*\$185,095,359.28	— \$84,304,079.78
Less, interest on outstanding bonds and mortgages of the subsidiary companies	8,065,221.58	8,408,460.87	— 343,239.29
Balance of earnings	\$92,726,057.92	\$176,686,898.41	— \$83,960,840.49
Less, charges and allowances for depletion and depreciation applied as follows, viz.:			
To depreciation and replacement funds and sinking funds on bonds of subsidiary companies	27,905,045.44	38,245,601.92	— 10,340,556.48
To sinking funds on U. S. Steel Corporation bonds	8,863,180.35	8,438,762.40	+ 424,417.95
Net income in the year	\$55,957,832.13	\$130,002,534.09	— \$74,044,701.96
Deduct:			
Interest on U. S. Steel Corporation bonds outstanding	19,679,582.49	20,105,559.58	— 425,977.09
Premium paid on bonds redeemed, viz.:			
On subsidiary companies' bonds	27,835.57	118,104.19	— 90,268.62
On U. S. Steel Corporation bonds	719,626.39	717,228.49	+ 2,397.90
Balance	\$35,530,787.68	\$109,061,641.83	— \$73,530,854.15
Add: Net balance of sundry charges and credits, including adjustments of various accounts	1,086,229.51	632,585.81	+ 453,643.70
	\$36,617,017.19	\$109,694,227.64	— \$73,077,210.45
Dividends on U. S. Steel Corporation stocks, viz.			
Preferred, 7 per cent	25,219,677.00	25,219,677.00	—
Common, 5 per cent	25,415,125.00	25,415,125.00	—
Surplus net income	†\$14,017,784.81	\$59,059,425.64	— \$73,077,210.45
Less, appropriated from surplus net income on account of expenditures made on authorized appropriations for additional property and construction		30,000,000.00	— 30,000,000.00
Balance	†\$14,017,784.81	\$29,059,425.64	— \$43,077,210.45

*Balance of earnings after making allowances for estimated amount of Federal income and excess profits taxes.
†Deficit provided from undivided surplus.

1920, continued until the early fall of 1921, when there was some improvement. As stated in the annual report for last year, the subsidiary companies carried forward into 1921 a substantial tonnage of orders for steel products. This enabled them to operate at an average of somewhat over 70 per cent of capacity during the first quarter. The degree of operations dropped in succeeding months and reached the low point for the year in July, when the output was only about 29 per cent. The average production for the entire year in rolled and other finished products for sale was 47.5 per cent of capacity, the lowest ratio of production to capacity in any year since the organization of the Corporation. Concurrently with the decrease in demand for steel products there were marked declines in the prices obtained for nearly all classes of the same. These price reductions as a rule exceeded the decreases it was possible to effect in the cost of production through the reduction in unit prices of factors entering into cost of

cost of production. Since the beginning of 1922, and to the date of writing this report, the new orders received have been equal to about one-half the total capacity of the plants of the subsidiary companies."

Volume of Business

The volume of business done by all companies during the year, as represented by their combined gross sales and earnings, equaled the sum of \$986,749,719, as compared with a total of \$1,755,477,025 in the preceding year.

This amount represents the gross value of the commercial transactions conducted by the several subsidiary companies, and includes sales made between the subsidiary companies and the gross receipts of the transportation companies for services rendered both to subsidiary companies and to the public.

The earnings for the year resulting from the above gross business represent the combined profits accruing

to the several corporate interests on the respective sales and services rendered, each of which is in itself a complete commercial transaction.

Capital Expenditures

The expenditures made by the Corporation and the subsidiary companies during the year for the acquisition of additional property, new plants, extensions and improvements, including net stripping and development

Production for Two Years

Products	1921 Ton	1920 Tons	Decrease Tons	Per Cent
Iron ore mined				
In the Lake Superior region				
Mesabi and Vermilion ranges	12,065,330	20,875,695	8,810,365	42.2
Gogebic, Menominee and Marquette ranges	2,415,802	3,587,937	1,172,135	32.7
In the Southern region				
Tennessee Coal Iron & R. R. Co.'s mines	1,911,490	2,557,377	645,887	24.1
Total	16,422,682	27,021,009	10,598,327	39.2
Limestone quarried	4,607,486	5,981,022	1,373,536	23.0
For use in the manufacture of coke	14,546,103	24,384,925	9,838,822	40.3
For steam, gas and all other purposes	7,081,836	6,443,409	638,427	9.9
Total	21,627,939	30,828,331	9,200,395	29.8
Coke manufactured				
In bee hive ovens	1,698,178	6,125,032	4,426,854	72.3
In by-product ovens	8,127,086	10,083,079	1,955,993	19.4
Total	9,825,264	16,208,111	6,382,847	39.4
Blast furnace production				
Pig iron	8,547,199	11,352,617	2,805,418	40.4
Spiegel, ferromanganese and ferro-silicon	131,063	180,029	48,966	27.2
Total	8,678,262	11,532,646	2,854,384	40.3
Steel ingot production				
Bessemer ingots	2,950,897	5,492,897	2,542,000	45.4
Open-hearth ingots	8,015,450	13,875,063	5,859,613	42.2
Total	10,966,347	19,277,960	8,311,613	43.1
Polled and other finished steel products for sale				
Steel rails (heavy and light tee and girder)	1,480,049	1,490,616	10,567	.7
Blooms, billets, slabs, sheet and tinplate bars	409,767	1,023,762	613,995	60.0
Plates	723,355	1,759,263	1,035,908	58.9
Heavy structural shapes	439,762	1,040,619	600,857	57.7
Merchant bars, hoops, skelp, light shapes, etc.	1,125,961	2,846,686	1,720,725	60.4
Tubing and pipe	984,285	1,429,691	445,406	31.2
Wire rods	88,232	354,968	266,736	65.4
Wire and wire products	915,651	1,757,141	841,490	47.9
Sheets (black and galvanized) and tinplates	1,024,542	1,610,531	585,989	36.4
Finished structural work	272,621	416,469	143,848	34.5
Angle splice bars and all other rail joints	198,397	235,913	37,516	15.9
Spikes, bolts, nuts and rivets	60,291	93,464	33,173	35.5
Axles	22,567	97,145	74,578	76.8
Steel car wheels	35,101	73,819	38,718	52.4
Sundry steel and iron products	79,753	98,415	18,662	19.0
Total	7,860,334	14,228,502	6,368,168	44.8
Miscellaneous products				
Zinc	33,426	63,077	29,651	47.0
Sulphate of iron	24,499	40,291	15,792	39.2
Fertilizer — "Duple basic phosphate"	14,528	14,683	155	1.1
Fertilizer — Sulphate of ammonia	117,496	133,798	16,302	12.2
Ammonia (as liquor)	3,620	5,383	1,763	32.9
Benzol products	113,354	119,109	5,755	4.8
Universal Portland cement	12,499,000	11,960,000	539,000	4.5

*Increase over 1920

expense at mines, equalled the net sum of \$70,091,866, classified generally as follows:

For manufacturing properties	\$36,868,523
For coal and coke properties	9,074,692
For ore properties, including net additional expenditures for mine stripping and development	7,894,414
For railroads and lake docks	3,938,853
For ocean steamers, built by our own subsidiaries	8,216,091
For housing facilities for employees, including improvements of town sites and establishing necessary public utilities in connection therewith, less credits for sales of houses to employees	3,362,276
For purchase of additional interests in limestone properties and development of same	2,276,656
For sundry properties, including natural gas lines, development of gas properties, extension of water supply systems, etc.	447,443
	\$71,978,448
Less: Credit for write-off to depreciation and replacement reserves of the original cost of improvements and equipment dismantled, etc.	1,886,582
Balance of expenditure in the year	\$70,091,866

Employees and Pay Rolls

The average number of employees in the service of all companies during the year, and the total salaries and wages paid in comparison with corresponding results for the preceding year were as follows:

Employees of	1921 Number	1920 Number	1919 Number
Manufacturing properties	133,963	200,991	188,550
Coal and coke properties	22,451	25,889	24,595
Iron ore properties	11,183	11,517	12,425
Transportation properties	20,010	24,843	23,132
Miscellaneous properties	4,093	4,305	3,404
Total	191,700	267,345	252,106
Total salaries and wages paid	\$332,887,505	\$581,556,925	\$479,548,040
Average earnings per employee per day during 1921:			
All employees, exclusive of general administrative and selling force	\$5.61	\$6.96	\$6.12
Total employees, including general administrative and selling force	\$5.73	\$7.00	\$6.17

Miscellaneous

Accident Prevention—The total expended by the Corporation and the subsidiary companies during the

Inventories

	Dec. 31, 1921	Dec. 31, 1920
Ores—Iron, manganese and zinc	\$84,725,188	\$79,430,633
Limestone, fluxes and refractories	4,440,739	6,021,870
Coal, coke and other fuel	13,054,195	10,587,353
Pig iron, scrap, ferromanganese and spiegel	18,869,057	19,544,070
Pig tin, lead, spelter, copper, nickel, aluminum, and dross and skimmings	7,714,557	11,980,704
Rolls, molds, stools, annealing boxes, etc.	13,123,821	15,788,150
Ingots—Steel	1,673,879	2,541,799
Blooms, billets, slabs, sheet and tinplate bars, etc.	22,782,298	20,542,256
Wire rods	1,363,220	1,880,580
Skelp	1,785,049	2,391,445
Finished products	56,599,607	68,146,896
Manufacturing supplies, stores and sundry items not otherwise classified	37,050,148	57,807,450
Mining supplies and stores (for ore and coal properties)	7,291,199	9,914,547
Railroad supplies and stores	7,953,241	10,481,924
Merchandise of supply companies	1,363,816	1,880,723
Material, labor and expense locked up in uncompleted bridge, structural and other contract work	\$1,850,115	
Less bills rendered on account	825,583	
Stocks abroad and on consignment	1,024,532	9,501,058
Material in transit	17,260,930	15,621,850
	4,239,093	9,240,079
Total	\$302,214,624	\$353,363,497
Less, inventory reserve	60,710,255	95,000,000
Balance	\$241,504,369	\$258,363,497

year for safety work was \$1,061,685, compared with an outlay of \$1,420,456 in the preceding year. The average number of accidents of all kinds per 100 em-

ployees in 1921 showed a decrease of 19.6 per cent compared with the previous year. The previously established low record for serious and fatal accidents was maintained. In comparison with the record in 1906, this class of accidents per 100 employees in 1921 was 53.2 per cent less than in the former year.

Accident Relief—The disbursements made by the subsidiary companies during the year for work accidents (including accruals not yet actually payable under State compensation laws) was \$4,409,211, compared with an outlay of \$5,634,263 in 1920. Of the total disbursed in 1921, upwards of 90 per cent of the same was paid or is payable directly to the injured employees or their families.

Sanitation—The expenditures made during 1921, in providing modern sanitary facilities throughout the

WORKING ON THE TARIFF

Rates Tentatively Agreed Upon May Be Changed by Senate Committee

Washington, March 21—Differences of opinion as to rates of duties and the composition of the free list still remain to be worked out in connection with a number of items in the permanent tariff bill and in consequence it still is being considered by the Senate Committee on Finance. It is understood that even where many duties have been determined upon they have been named tentatively only while the administrative features that have been the subject of considerable discussion have been proposed but not definitely prepared.

Most of the steel schedule is said to have been closed

Foreign and Domestic Shipments

	1921 Tons	1920 Tons	Decrease or Increase Tons	Per Cent
Domestic Shipments				
Rolled steel and other finished products.....	6,832,038	12,155,213	5,323,205	45.1 Dec.
Pig iron, ingots, ferromanganese and scrap.....	142,715	341,563	198,848	58.2 Dec.
Iron ore, coal and coke.....	618,729	1,212,811	594,082	49.0 Dec.
Sundry materials and by-products.....	103,261	175,735	72,470	41.2 Dec.
Total tons all kinds of materials, except cement.....	7,696,747	14,183,352	6,486,605	45.7 Dec.
Universal Portland cement (bbl.).....	12,211,285	11,380,260	831,025	7.3 Inc.
Export Shipments				
Rolled steel and other finished products.....	1,126,795	1,645,461	518,669	31.5 Dec.
Pig iron and scrap.....	978	6,979	6,001	86.0 Dec.
Sundry materials and by-products.....	89,384	55,657	24,727	44.4 Inc.
Total tons all kinds of materials.....	1,298,157	1,708,100	499,943	29.3 Dec.
Aggregate tonnage of rolled steel and other finished products shipped to both domestic and export trade.....	7,958,833	14,098,707	6,139,874	43.5 Dec.
Total value of business (covering all of above shipments, including cement and completed steamships delivered and other business not measured by the ton unit)				
Domestic (not including intercompany sales).....	\$563,093,812	\$1,014,533,500	\$450,641,688	47.5 Dec.
Export.....	92,313,756	147,905,101	55,591,618	37.6 Dec.
Total.....	\$655,407,568	\$1,212,438,601	\$556,237,336	46.3 Dec.

plants, mines and departments, for the health and comfort of the employees, totaled \$3,615,150, compared with an outlay of \$4,227,263 in the previous year. At the close of the year there were in and about the plants and works 1989 comfort stations with adequate toilet facilities, including 21,814 washing faucets and basins, 3741 showers and 144,003 lockers, also 3979 sanitary drinking fountains.

Housing and Welfare—In addition to the capital expenditures made during the year for additional housing facilities for employees and development of town sites in connection therewith, previously mentioned in this report, the subsidiary companies had at the close of 1921 advanced or loaned to employees the net sum of \$8,479,031 on contracts or mortgages, carrying interest at 5 per cent and payable in installments over a long period of years, to assist them in the construction or purchase of homes under the Corporation's home-owning plan. The efforts of the subsidiary companies in general welfare and educational work for their employees and their families have been consistently continued.

Pittsburgh Foundrymen's Association

Louis L. Vayda, Bacharach Industrial Instrument Co., Pittsburgh, was the speaker at the regular monthly meeting of the Pittsburgh Foundrymen's Association at the General Forbes Hotel last evening, giving an interesting talk on the blast meter, a product of his company for recording the velocity and volume of air passing through the intake into the combustion chamber of the cupola. The association was asked to indorse the standard pig iron contract which is being advocated by the National Association of Purchasing Agents, but deferred action pending the report by a committee which will study the contract and report at the April meeting of the association.

tentatively, with the hope that it may be permanently left as it is for reporting to the Senate, but there still are some products upon which the committee has not reached an agreement. The principal ones relate to manganese ore and ferromanganese, according to reports, and it is said the committee will vote on these items tomorrow.

Manganese ore had already been placed on the free list, according to a well-informed source, but protests are said to have followed the report that this had been done and to have had the effect of bringing the subject up again. The disposition of ferromanganese had not been decided upon even tentatively, it is said, but consideration has been given to the fixing of a duty of 1c. per pound on this ferroalloy, although steel makers are known to consider this duty entirely too high, and want it placed on the free list, or only a nominal duty fixed. The Fordney bill carries a duty of 1c. per pound of metallic manganese on manganese ore and a duty of 2 1/5c. per pound on ferromanganese when containing in excess of 1 per cent of carbon and 2 1/5c. per pound and 28 per cent ad valorem when containing less than 1 per cent of carbon.

Administrative Features

The administrative features are the source of a great deal of conflict of opinion, and as is well known, Chairman Fordney of the House Committee on Ways and Means has said that he would not accept any bill from the Senate that did not carry the American valuation plan. There are those on the Senate Committee on Finance who oppose this principle, but are ready to accept it in order to prevent an impasse with the House, if possible.

Accordingly, the Senate Committee has tentatively adopted the American valuation plan direct, together with a proposal to base duties on the American wholesale selling price.

Iron and Steel Markets

FURTHER IMPROVEMENT

Increased Buying of Steel and Larger Production

Stiffening in Prices of Heavy Products—New Construction Expanding

The improvement in the steel trade, both in demand and in rate of operation, has gone farther in the past week. The situation as to prices is stronger, though the 1.50c. basis on plates, structural shapes and bars, for which more large producers are holding, is not established thus far by important transactions. The week has seen the closing of considerable business on which lower quotations were out.

Reports of an expected announcement of the 1.50c. price by the Steel Corporation have not been borne out, price announcements from that source having been out of vogue for some time.

The percentage of active capacity for the entire industry is evidently close to 60. Current production of ingots in the Pittsburgh, Youngstown and Wheeling districts is put at 60 to 65 per cent of capacity.

The Carnegie Steel Co., which has reached a 65 per cent operation, is preparing to blow in six additional blast furnaces in the next 10 days, bringing the number up to 35 out of 59. The starting up of the company's Farrell, Pa., steel plant, which has been shut down nearly a year, leaves only three of its steel works idle, these being high cost plants.

Sentiment is divided as to the basis and the continuance of the present increased demand for steel. With almost no forward buying, the large call for quick delivery indicates the scant stocks of manufacturing consumers. But conditions in dependent industries still present many variations.

New construction, railroad and automobile activities figure more largely in the market. Detroit motor car works are busier. Ford requirements for April amount to 10,000 to 15,000 tons of bars, wire and sheets.

The nearness of the coal strike has made little impression on the finished steel market. Reserves of bituminous coal, at 60,000,000 tons, are estimated at eight weeks' supply and output of non-union mines has reached 60 per cent of total requirements in recent weeks.

Tie plates figure largely in railroad negotiations. Including 2500 tons for the Missouri Pacific, 5000 tons for the Northern Pacific and 2000 tons for the Illinois Central, the total is fully 12,000 tons. Some 343 passenger service cars have been inquired for, of which 250 are for the Pennsylvania, and 50 electric cars have been bought by the Southern Pacific.

A 5000-ton order for 16-lb. rails for Japan will be rolled at a western Pennsylvania mill.

Fabricated steel lettings of the week, taking in only the sizable bridge and building projects, exceed 40,000 tons, though for all of February, according to the records of the Bridge Builders

and Structural Society, the total was 78,700 tons. March promises to be the largest month in structural steel in over 20 months. To the pending list of structural business was added over 20,000 tons, and round lots of reinforcing bars are under inquiry.

Effective March 20, an advance of \$2 per ton was made by several Central Western producers of sheet bars and billets. Sheet mill operations have increased rather more rapidly than the supply of sheet bars.

The pig iron market is showing greater firmness in prices. This is due in part to uncertainty as to what effect the expected strike of coal miners will have on prices of coke, and in part to increased foundry melt. Buying in the East and the Central West has amounted to a considerable tonnage, made up to a large extent of moderate orders for early delivery. Eastern Pennsylvania and Buffalo furnaces have taken much of the new business, but furnaces along the lakes have also had their full share.

The first large contract for manganese ore from the Caucasus since the war involves the sale of 50,000 tons to an Eastern producer of ferromanganese. For 52 per cent ore the basis was 24½c. per unit.

At Chicago a situation has developed in which some sellers of heavy melting steel have paid higher prices, in covering short sales, than were paid by steel mills. The highest price paid by a mill there was \$12.75, whereas dealers have bought at as high as \$13.25.

Early announcement is looked for of an important consolidation in the machinery trade in which seven machine tool companies will be included with other large interests.

Pittsburgh

PITTSBURGH, March 21.

Further effect of the recent price stabilizing movement in steel products has been felt in the past week, which has been marked by a heavy volume of orders and a substantial increase in the activities of the plants in this and adjacent district. The Carnegie Steel Co. last week operated around 65 per cent of its capacity, one important unit having turned out full theoretic capacity production of ingots and this week's indications point to an even higher percentage. There has been substantial increase in the operations of the American Sheet & Tin Plate Co. and the other subsidiaries have at least maintained the recent rate. Valley steel makers have added both to steel works and finishing mill activities and there also has been some gain with the leading independents in the Wheeling district. Not much change has taken place in independent plant activities here in Pittsburgh, but the recent rate, which was high, is fully maintained. A conservative estimate of current production of ingots in the Pittsburgh, Youngstown and Wheeling districts is between 60 and 65 per cent of capacity.

There is still a considerable divergence of opinion as to whether the present activity is the beginning of a sustained buying movement or is merely a bulge. Some assert that this is the beginning of an active market, but others are not certain, pointing out the almost complete absence of forward buying and the fact that buyers still are refraining from building up stocks at current prices. On the other hand, the fact

A Comparison of Prices

Advances Over the Previous Week in Heavy Type, Declines in Italics

At date, one week, one month, and one year previous

For Early Delivery

Pig Iron, Per Gross Ton:	Mar. 21, 1922	Mar. 14, 1922	Feb. 21, 1922	Mar. 22, 1921
No. 2X, Philadelphia...	\$21.96	\$21.96	\$21.34	\$27.26
No. 2, Valley furnace...	19.00	19.00	18.75	25.00
No. 2, Southern, Cin'tit...	19.50	19.50	20.00	29.50
No. 2, Birmingham, Ala.†	15.00	15.00	15.50	25.00
No. 2 foundry, Chicago*	20.00	20.00	20.00	25.00
Basic, del'd, eastern Pa...	20.50	19.84	19.84	25.00
Basic, Valley furnace...	18.00	18.00	17.75	23.00
Val. Bessemer, del. 1" bgh.	21.46	21.46	24.46	26.96
Malleable, Chicago*	20.00	20.00	20.00	25.50
Malleable, Valley...	19.00	19.00	19.00	25.00
Gray forge, Pittsburgh...	20.71	20.71	20.71	25.96
L. S. charcoal, Chicago...	26.00	26.00	30.50	38.50
Ferrumanganese, seaboard	62.50	62.50	62.50	90.00

Rails, Billets, etc., Per Gross Ton:

	Mar. 21, 1922	Mar. 14, 1922	Feb. 21, 1922	Mar. 22, 1921
O-h. rails, heavy, at mill	\$40.00	\$40.00	\$40.00	\$47.00
Bess. billets, Pittsburgh...	28.00	28.00	28.00	38.50
O-h. billets, Pittsburgh...	28.00	28.00	28.00	38.50
O-h. sheet bars, 1" gh.	29.00	29.00	29.00	38.50
Forging billets, base, 1" gh.	32.00	32.00	32.00	43.50
O-h. billets, Phila...	33.74	33.74	33.74	44.24
Wire rods, Pittsburgh...	36.00	36.00	35.00	52.00
Skelp, gr. steel, 1" gh, lb.	1.40	1.40	1.50	2.35
Light rails at mill...	1.40	1.40	1.40	2.35

Finished Iron and Steel,

Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Iron bars, Philadelphia...	1.74	1.71	1.76	2.45
Iron bars, Chicago...	1.40	1.55	1.55	2.60
Steel bars, Pittsburgh...	1.40	1.40	1.40	2.00
Steel bars, Chicago...	1.40	1.50	1.50	2.38
Steel bars, New York...	1.78	1.78	1.78	2.38
Tank plates, Pittsburgh...	1.40	1.40	1.40	2.00
Tank plates, Chicago...	1.40	1.50	1.50	2.38
Tank plates, New York...	1.78	1.78	1.78	2.38
Beams, Pittsburgh...	1.40	1.40	1.40	2.10
Beams, Chicago...	1.40	1.50	1.50	2.48
Beams, New York...	1.78	1.78	1.78	2.48
Steel hoops, Pittsburgh...	1.80	1.80	1.80	2.80

*The average switching charge for delivery to foundries in the Chicago district is 70c. per ton.

†Silicon, 1.75 to 2.25. ‡Silicon, 2.25 to 2.75.

The prices in the above table are for domestic delivery and do not necessarily apply to export business.

Sheets, Nails and Wire,	Mar. 21, 1922	Mar. 14, 1922	Feb. 21, 1922	Mar. 22, 1921
Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Sheets, black, No. 28, 1" gh.	3.00	3.00	3.00	3.85
Sheets, galv., No. 28, 1" gh.	4.00	4.00	4.00	5.00
Sheets, blue an'd, 9 & 10	2.25	2.25	2.25	3.00
Wire nails, Pittsburgh...	2.40	2.40	2.40	3.00
Plain wire, Pittsburgh...	2.25	2.25	2.15	3.00
Barbed wire, galv., 1" gh.	3.05	3.05	3.05	3.85
Tin plate, 100-lb. box, 1" gh.	\$4.60	\$4.60	\$4.75	\$7.00

Old Material, Per Gross Ton:

	Mar. 21, 1922	Mar. 14, 1922	Feb. 21, 1922	Mar. 22, 1921
Carwheels, Chicago...	\$17.00	\$16.50	\$15.00	\$14.50
Carwheels, Philadelphia...	16.00	16.00	15.00	18.00
Heavy steel scrap, 1" gh.	15.00	15.00	11.00	14.00
Heavy steel scrap, Phila...	15.50	12.50	12.00	13.00
Heavy steel scrap, Chgo	12.50	12.50	11.50	12.00
No. 1 cast, Pittsburgh...	15.75	15.75	16.00	21.00
No. 1 cast, Philadelphia...	17.25	17.25	16.50	19.00
No. 1 cast, Chgo (net ton)	14.25	14.25	13.50	11.00
No. 1 Rlt. wrot, Phila...	15.50	15.50	14.50	17.00
No. 1 Rlt. wrot, Chgo (net)	11.75	11.25	10.50	11.00

Coke, Connellsville,

Per Net Ton at Oven:	Mar. 21, 1922	Mar. 14, 1922	Feb. 21, 1922	Mar. 22, 1921
Furnace coke, prompt...	\$3.25	\$3.25	\$3.25	\$4.25
Poundry coke, prompt...	4.25	4.25	4.00	5.50

Metals,

Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Lake copper, New York...	13.00	13.00	13.00	12.12 1/2
Electrolytic copper, ref'y.	12.75	12.75	12.75	11.87 1/2
Zinc, St. Louis...	4.72 1/2	4.65	4.50	4.70
Zinc, New York...	5.07 1/2	5.00	4.85	5.20
Lead, St. Louis...	4.42 1/2	4.40	4.40	4.00
Lead, New York...	4.70	4.70	4.70	4.00
Tin, (Straits), N. Y.	29.12 1/2	29.00	29.62 1/2	28.50
Antimony (Asiatic), N. Y.	4.20	4.20	4.40	5.25

Composite Price, March 21, 1922, Finished Steel, 2.019c. Per Lb.

Based on prices of steel bars, beams, tank plates, plain wire, open-hearth rails, black pipe and black sheets	Mar. 14, 1922, 2.019c Feb. 21, 1922, 2.005c Mar. 22, 1921, 2.757c 10-year pre-war average, 1.689c
These products constitute 88 per cent of the United States output of finished steel	

Composite Price, March 21, 1922, Pig Iron, \$18.38 Per Gross Ton

Based on average of basic and foundry irons, the basic being Valley quotation, the foundry an average of Chicago, Philadelphia and Birmingham	Mar. 14, 1922, \$18.38 Feb. 21, 1922, 18.35 Mar. 22, 1921, 24.38 10-year pre-war average, 15.72
---	--

that all of the independent companies have swung into line at 1.40c. Pittsburgh for plates, shapes and bars, is taken to mean that these companies have built up a substantial back log at the old basis. Some support is lent the belief in a continued betterment in business by the fact that the Carnegie Steel Co. is actively making ready to put on six additional blast furnaces in the next week or so. These include one Isabella, one Duquesne, one Carrie, one Ohio, and two Farrell, Pa., furnaces. These additions will bring the total number of active Carnegie furnaces to 35 out of a total of 59 and it is hardly conceivable that the company would take this step unless satisfied that good business is ahead. The starting up of the Farrell, Pa., works of this company, which has been down for about a year, will leave only three of its steel works idle, these being high-cost plants.

Although practically all makers of plates, shapes and bars now are holding to 1.50c., Pittsburgh, the great bulk of the tonnage which has been booked in the past week has been at the lower prices previously

quoted and only a very small and really unimportant part of the business has been entered at the new price. Sheet prices are firmly maintained and an advance of \$2 a ton just announced in sheet bars may possibly be followed by an advance in sheets. In the minor products, betterment in business has not been accompanied by any appreciable stiffening in prices. Indeed, it is commented upon that in the face of a higher market for hot-rolled bars, prices of cold-finished steel bars have actually weakened slightly.

The recently established price of \$18, Valley furnace, for basic iron has been strengthened by another sale of 1500 tons at that price.

Scrap dealers short of the steel works grades have been paying stiff prices in covering them, but there has been no advance in the prices offered by melters.

The close proximity of the coal strike is without effect upon the fuel market. It is estimated that present reserve stocks of bituminous coal throughout the country are fully 60,000,000 tons and on the basis of recent consumption this is sufficient to last about eight

weeks. The idea that a suspension of union mine operations will not have a serious effect is strengthened by the fact that non-union mines lately have shown ability to produce up to 5,000,000 tons a week.

Pig Iron.—The best demand continues to be for foundry iron of which we note one purchase for April shipment by a sanitary ware manufacturer of about 4000 tons of No. 2 and No. 2X. The plain No. 2 iron was bought at \$19, furnace, but makers seem to have waived the differential on No. 2X, most of which was also bought at \$19. There is a pretty steady demand for small tonnages of foundry iron from local foundries and if the sales are bunched with reservations which makers have made for regular customers, the business of the past few weeks would reach fairly heavy proportions. However, reservations cannot well be considered sales until the shipping instructions are received and this sort of business constitutes the greater part of the tonnage. We note another sale of basic iron at \$18, Valley furnace, this being of 1500 tons to a Pittsburgh district steel maker and more firmly establishes the market at \$18. There is very little interest in Bessemer iron, the largest inquiry being for 250 tons for the Pittsburgh plant of the American Steel Foundries. This grade of iron is still available at \$19, Johnstown, but Valley makers are holding to \$19.50, and claim to be making small sales at this figure.

We quote Valley furnace, the freight rate for delivery to the Cleveland or Pittsburgh district being \$1.95 per gross ton

Pig iron	\$18.00
Bessemer	19.50
Gray, large	18.75
No. 2 foundry	19.00
No. 2 foundry	18.75
Malleable	19.00

Ferrolloys.—The attention of the trade is directed toward Washington because of the probability of early action on the tariff. It is understood that the schedules to be reported out by the Senate Finance Committee will show several downward revisions in the ferrolloys rates as compared with those originally proposed. Manganese ore, it is said, will be restored to the free list and a duty of \$5 per ton be set up on ferromanganese. This is in line with the demands of the steel makers and is likely to meet opposition from the manganese ore interests, who are said to have allied themselves with the magnesite producers in a combined effort to force favorable action on both products. The rates on ferrosilicon to be reported call for a reduction of 1/2c. per unit from the original rates on 8 to 20 per cent to 2c.; of 3/4c. in 20 to 60 per cent to 2c. and of 1/5c. in 60 to 80 per cent to 3c. Market conditions here show little change. Two Middle Western steel makers recently were buyers of ferromanganese, one taking 800 tons at the full price and the other 1000 tons. The latter sale, however, was not clear cut, having been fastened on to an old contract carrying a much higher price than now prevails. The price remains at \$62.50 Atlantic seaboard for American and English 80 per cent material, but there are intimations of an early advance to \$65 on domestic material, it being claimed that on to-day's costs the latter price is justified. The Lackawanna Steel Co. inquiry for 1200 tons is reported to be still open. Spiegeleisen prices are weaker, 19 to 21 per cent being quoted at \$27.50 to \$30 furnace, according to the size of the order and 16 to 19 per cent from \$26.50 to \$29. We note a sale of 14 to 19 per cent material at \$24.25 furnace, to a central Ohio steel maker, the delivered price being about \$31. This was a cleanup sale by the maker. Interest in 50 per cent ferrosilicon is small. This material still is available at \$55 delivered this and nearby districts.

We quote 78 to 82 per cent ferromanganese, \$62.50 c.i.f. Atlantic seaboard for domestic and English. Average 20 per cent spiegeleisen, \$27.50 to \$30 furnace; 16 to 19 per cent, \$26.50 to \$29 furnace; 50 per cent ferrosilicon, domestic, \$55 to \$60 furnace, freight allowed. Bessemer ferrosilicon is quoted f.o.b. Jackson and New Straitsville, Ohio, furnaces as follows: 10 per cent, \$36.50; 11 per cent, \$39.80; 12 per cent, \$43.10; 13 per cent, \$47.10; 14 per cent, \$52.10; silvery iron, 6 per cent, \$25; 7 per cent, \$26; 8 per cent, \$27.50; 9 per cent, \$29.50; 10 per cent, \$31.50; 11 per cent, \$34; 12 per cent, \$36.50. The present freight rate from Jackson to New Straitsville, Ohio, into the Pittsburgh district is \$4.06 per gross ton.

Billets, Sheet Bars and Slabs.—Effective yesterday, several of the larger producers announced a horizontal advance of \$2 per ton. Sheet bars and small billets

now are quoted at \$31, Pittsburgh and Youngstown, and slabs and large billets at \$30. On forging billets, the Carnegie Steel Co., for some time, has been quoting \$35 and its new price accordingly is \$37. The independent quotation, which has been \$32, goes to \$34. These prices have not yet found much basis in sales and for the present must be regarded as maximum rather than minimum prices. Most recent business in sheet bars has been at \$29, Pittsburgh or Youngstown, with freight equalized to destination. It is reported that a fair sized tonnage of small billets recently was sold at \$28, Youngstown, and small tonnages of large billets have changed hands at \$28, Pittsburgh. Sheet mill operations have increased a little more rapidly than the production of sheet bars, and several makers are short of bars. Preparations for a resumption at the Farrell, Pa., works of the Carnegie Steel Co. are dictated largely by the sheet bar requirements of Shenango Valley plants of the American Sheet & Tin Plate Co., which hitherto have been drawing supplies from Pittsburgh district plants. The change in the source of supplies will mean a considerable saving in freight charges of the American Sheet & Tin Plate Co.

We quote 4 x 4-in. soft Bessemer and open-hearth billets at \$28 to \$30; 2 x 2-in. billets, \$29 to \$31; Bessemer and open-hearth sheet bars, \$29 to \$31; slabs, \$28 to \$30; forging billets, ordinary carbons, \$32 to \$37, all f.o.b. Youngstown or

Wire Rods.—Reports of business at less than \$36, Pittsburgh, do not find verification among makers in this district, all of whom insist that \$36 is the minimum quotation and that they are refusing business at less. Although a fair tonnage is being moved, all makers say there is room for much improvement. Prices given on page 831.

Steel Skelp.—The attempt to put steel pipe skelp to 1.50c. is not meeting with much success. There has not been much tangible improvement in tubular goods prices and buyers regard 1.40c. as about as high as they should go. There has not been enough business passing, unless inter-company business among the Steel Corporation subsidiaries be included, to really establish the market.

Wire Products.—There is a fairly good run of orders for early delivery, but still an almost complete lack of advance buying. Quoted prices are firmly adhered to by all makers and there are no intimations of an immediate change, but buyers are not yet convinced that this is the time to build up their stocks beyond a point indicated by the demands upon them. Mill operations are on a fairly high rate in this and nearby districts, the average being between 60 to 65 per cent of capacity, taking in rod mill and finishing mill capacity. There is some evidence of stocking by manufacturers.

We quote wire nails at \$2.40 base per keg, Pittsburgh, and bright basic and Bessemer wire at \$2.25 base per 100 lb., Pittsburgh.

Iron and Steel Pipe.—Demand for merchant pipe in both steel and wrought iron is steady and fairly satisfactory in the aggregate, but large individual purchases are conspicuously lacking, buyers showing a marked inclination against anticipating their needs. Jobbers' stocks are reported to be low but this does not forecast a pinch in the supply later, because makers generally are not committed very far ahead, and most of them are producing somewhat more tonnage than is called for on current orders. The price situation is steadier, due to less anxiety for business. Most of the large line pipe inquiries which were before the trade recently were closed. The largest open inquiry now up is that of the Southern Carbon Co. for 88 miles of 12-in. pipe for a gas line from Monroe to Alexandria, La. Card discounts are given on page 831.

Sheets.—Orders calling for early delivery are numerous and reach a very satisfactory total and moreover are coming from all but one or two of the consuming industries. Bookings by the American Sheet & Tin Plate Co. actually are in excess of its capacity and its schedule for this week calls for the operation of 85 per cent of its sheet mills, as compared with 75 per cent, the recent average. Independent companies also are getting more business, as is evident from the fact that about 65 per cent of the sheet mills of the country are in operation. The one unfavorable feature of the business from the standpoint of manufacturers is that buyers still evince little or no interest

in their future requirements, and that the great bulk of current orders calls for early delivery. Stocks in second hands are admittedly small but buyers do not appear to be convinced that this is the time to stock up. There continues to be remarkably firm adherence to the regular quotations of 3c. base for black, and 4c. base for galvanized, while 2.25c. base for blue annealed is much better established by sales than it was early in the year. Prices are given on page 831.

Tin Plate.—New business is of rather unimportant proportions, although some have noted improvement in this direction in the past week or so, but specifications against contracts continue to pour in freely and there is still a very dull engagement of independent capacity. The American Sheet & Tin Plate Co., which has been lagging behind independents in the matter of plant operations, is among those which have had an increase in new business and this week will operate more than 70 per cent of its tin mills, as against its recent average of around 65 per cent. Some of the smaller units which have not much of a backlog are reported to be shading prices occasionally, but as a general rule, \$4.60 per base box, Pittsburgh, is minimum on production tin plate.

We quote standard production coke tin plate, \$4.60 per base box f.o.b. Pittsburgh for carload lots.

Cold-Finished Steel Bars and Shafting.—One of the anomalies of the situation is that in the face of a firmer market in hot-rolled bars, prices of cold-finished bars have grown slightly weaker. Hitherto, makers of the latter have been endeavoring to hold the market on a basis of 1.90c. Pittsburgh, but have admitted that concessions were being made occasionally. Now, however, the market has definitely settled to a minimum of 1.80c. as a quotation and even less than that has been done in the Cleveland district, where a fair-sized tonnage recently was taken at about 1.75c. Makers quite generally report business as better, but those who buy their hot-rolled bars complain that there is no profit at current prices. Ground shafting is unchanged at 2.25c. base, mill, for carload lots.

Boiler Tubes.—Business gradually is improving, but evidently all makers are not sharing alike and competition is sharp enough to keep prices low and easy. It is reported that some 2-in. 11-gage seamless tubes recently were sold at a lower price than iron tubes of like dimensions. Card discounts are given on page 831.

Rivets.—Business unquestionably is better now than it has been before in several months, but the improvement does not extend to prices, which generally are favorable to buyers. Leading makers are quoting heavy rivets at \$2.10 to \$2.20 base per 100-lb., Pittsburgh, and are booking a fair number of contracts at these prices. It is admitted, however, that these prices are not minimums on current business, some bolt makers having gone as low as \$1.90 to secure orders for early delivery, evidently with an idea of helping plant operations. Prices and discounts given on page 831.

Fluorspar.—Producers generally are quoting \$16, f.o.b. mines, for washed gravel fluorspar, 80 per cent calcium fluoride and not over 6 per cent silica, but a steel works interest which recently inquired for 200 tons of 85 per cent reports having had a quotation of \$14.75. The freight from Illinois and Kentucky mines to Pittsburgh is \$6 per ton.

Iron and Steel Bars.—An eastern producer has notified the local office not to accept any more steel bar business at less than 1.50c. This action put all the independent companies on a base of 1.50c., Pittsburgh, but so far only small sales have been made at this price, the great bulk of the booking having been entered against protective quotations of less. Evidently the Carnegie Steel Co. is heavily booked on steel bars because the two largest bar making units have been running practically full for the past week. New business in reinforcing bars made from new billets, carrying a price of less than 1.50c., is not easily placed and these bars, rolled from old rails, are firmly held at 1.40c. We note no change in iron bars.

We quote steel bars rolled from billets at 1.40c. to 1.50c.; reinforcing bars, rolled from billets, 1.40c. to 1.50c. base; reinforcing bars, rolled from old rails, 1.30c. to 1.40c.; refined iron bars, 3c. to \$2.10c. in carloads, f.o.b. mill, Pittsburgh.

Structural Material.—Fabricating shops in this district are not especially well engaged and demands for plain material from them are extremely light. The only important structural awards announced here are 500 tons of steel for bridges for the Nashville, Chattanooga & St. Louis Railroad taken by the American Bridge Co., and 1400 tons taken by the McClintic-Marshall Co. for the new club house of the Indianapolis Athletic Club. The common asking price on structural beams now is 1.50c., but most of the recent bookings have been at \$1 to \$3 per ton less and it is understood that protection still is out at low quotations against much tonnage. Prices are given on page 831.

Plates.—Some tonnage carrying less than to-day's price has been driven in by the recent advance, but the new quotation as yet has not found much basis in sales. There are intimations that some of the Valley car builders are figuring on substantial inquiries and that orders will be placed in the near future.

We quote sheared plates, 1/4 in. and heavier, tank quality, at 1.40c. to 1.50c. f.o.b. Pittsburgh.

Hoops and Bands.—The effort still is being made to restore 1.90c., Pittsburgh, as the price on both hoops and bands, and some business is being taken in hoops at that figure. Business generally is better than it was recently, but the improvement as yet has not embraced prices. The quotable range on hoops, based on sales, still is 1.80c. to 1.90c. and on bands from 1.75c. to 1.90c.

Coke and Coal.—There is no special change in the coke market. Spot tonnages of furnace grade still are moving at from \$3.25 to \$3.50 per net ton oven, with spot foundry coke \$1 per ton higher. The fact that the coal market has not developed more strength makes it impossible for coke producers to put up prices and while the general asking price on furnace grade is \$3.50, sales at that figure are few and usually for brands of high reputation. The foundries seem to have fortified themselves against a shortage in the event of a strike by the union coal miners and purchases for stock are not as large and urgent as they were recently. Mine run steam coal is quotable at \$2 to \$2.25 for union coal and \$1.50 to \$1.75 for non-union for spot shipment. Mine run by-product coal takes a range of from \$1.65 to \$2, while mine run gas coal is quoted at \$2.15 for non-union and \$2.40 for union coal.

Old Material.—High prices still are being paid for steel works grades by dealers short against sales, but melters are slow to follow advances thus established, and the market, based on what is being paid by consumers, is not quotably higher than it was a week ago. Heavy melting steel has been sold at \$16 and even \$16.25 delivered Pittsburgh district plants, but those to whom the material is being shipped deny having paid more than \$15.50 and their current offering price is \$15. Possibly if some of the mills were in the market for round tonnages, they would not be able to buy at less than \$16, but the trouble is that they are out of the market, and furthermore are strongly against paying any advance.

We quote for delivery to consumers' mills in the Pittsburgh and other districts taking the Pittsburgh freight rate, as follows:

Heavy melting steel, Steubenville, Follansbee, Brackenridge, Monessen, Midland and Pittsburgh.....	\$15.00 to \$15.50
No. 1 cast, cupola size.....	15.75 to 16.25
Re-rolling mills, Newarrie and Cumberland, Ohio; Cumberland, Md.; Huntington, W. Va., and Franklin, Pa.....	15.00 to 15.50
Compressed sheet steel.....	13.00 to 13.50
Bundled sheets, slides and ends.....	12.00 to 12.50
Railroad knuckles and couplers.....	15.50 to 16.00
Railroad coil and leaf springs.....	15.50 to 16.00
Low phosphorus standard bloom and billet ends.....	17.50 to 18.00
Low phosphorus plates and other grades.....	17.00 to 17.50
Railroad malleable.....	13.50 to 14.00
Iron car axles.....	23.00 to 24.00
Locomotive axles, steel.....	21.00 to 22.00
Steel car axles.....	15.50 to 16.00
Cast iron wheels.....	15.50 to 16.00
Roller steel wheels.....	15.50 to 16.00
Machine shop turnings.....	10.50 to 11.00
Sheet bar drop ends.....	15.00 to 16.00
Heavy steel axle turnings.....	12.50 to 13.00
Short shoveling turnings.....	12.00 to 12.50
Heavy breakable cast.....	15.00 to 15.50
Stove plate.....	12.50 to 13.00
Cast iron borings.....	12.00 to 12.50
No. 1 railroad wrought.....	12.50 to 13.00

Chicago

CHICAGO, March 21.

The steel market shows increasing strength. The leading interest has just closed the biggest week's sales in nearly a year, and its operations have again advanced to a higher plane, its present steel output being 69 per cent of ingot capacity. The Inland Steel Co. continues to operate at 60 per cent. Prompt delivery is no longer so readily obtainable on plates, shapes and bars and the prices of these commodities are now definitely at a minimum of 1.60c., Chicago.

Structural business is considerably more active and railroad purchases of track supplies and other materials are liberal. For a new ore dock at Superior, Wis., requiring nearly 12,000 tons of fabricated steel, the Great Northern has already bought the reinforcing bars, amounting to 1400 tons, from a Buffalo mill. By arranging to use its own boats to ship the material, the mill was able to name a delivered price which Chicago producers were unable to meet. It is reported that a quotation of 1.45c. delivered was named, but confirmation is lacking. In all of the current market activity there is little indication that the motive for buying is precautionary. It is known that the mills and furnaces are well supplied with fuel and that unless the railroads are crippled, deliveries of steel and iron are not likely to be interrupted. Even in the coke market the threatened coal strike has frightened few buyers into making large purchases.

Pig Iron.—While buying is lacking in spectacular features, the aggregate of current purchases is substantial and the leading merchant reports that shipments from furnaces are steadily increasing. Prominent among current inquiries may be mentioned 1000 tons of foundry wanted by the Crane Co., Chicago, 500 tons of foundry asked for by the Arcade Mfg. Co., Freeport, Ill., and 2100 tons of Southern foundry desired for April to September delivery by the Rundle Mfg. Co., Milwaukee. A north Chicago foundry has bought 700 tons of foundry at the ruling local furnace price and a local sanitary manufacturing company has placed 500 tons of foundry with the Southern furnace making water and rail shipments. A Kalamazoo melter is reported to have closed for 500 tons of foundry at \$14.75, base Birmingham, or 25c. under the ruling price of furnaces shipping all rail. A local company is inquiring for several hundred tons of low phosphorus and standard Bessemer for delivery at an Eastern plant. The recent reduction in the price of charcoal iron gives that iron an advantage of about \$1 a ton delivered in the Twin Cities over Chicago coke iron, and puts it in a competitive position with coke iron at Muskegon and other Michigan cities. It is reported that one result of the reduction was the placing of an order for 20,000 tons of charcoal by a large railroad car and carwheel manufacturer.

Quotations on Northern foundry, high phosphorus malleable and basic irons are f.o.b. local furnace and do not include a switching charge averaging 70c. per ton. Other prices are for iron delivered at consumers' yards, or when so indicated, f.o.b. furnace other than local.

Lake Superior charcoal, averaging sil. 1.50, delivered at Chicago.....	\$26.00
Northern coke, No. 1, sil. 2.25 to 2.75	20.50
Northern coke, foundry, No. 2, sil. 1.75 to 2.25.....	20.00
Northern high phos.....	20.00
Southern foundry, sil. 1.75 to 2.25.....	\$20.77 to 21.67
Malleable, not over 2.25 sil.....	20.00
Basic.....	20.00
Low phos., Valley furnace, sil. 1 to 2 per cent copper free.....	30.00
Silvery, sil. 8 per cent.....	\$22.82

Ferroalloys.—The market presents no new developments.

We quote 78 to 82 per cent ferromanganese, \$70.00, delivered; 50 per cent ferroallicon, \$58 to \$57.50, delivered; spiegelisen, 16 to 18 per cent, \$40.10, delivered.

Railroad Equipment.—The Chicago, Milwaukee & St. Paul is expected to close for 1000 box cars to-day or to-morrow. The Northwestern has added 300 ballast cars and 50 10,000-gal. tank cars to its previous inquiry, making a total of 3100 cars. The Chicago & Eastern Illinois is inquiring for five Pacific type loco-

motives. The Pennsylvania is in the market for 250 passenger service cars.

Cast Iron Pipe.—Milwaukee has awarded 1350 tons of four to 16-in. to the Clamorgan Pipe & Foundry Co., Lynchburg, Va., at \$42.20, delivered or the equivalent of \$32.47, Birmingham. It has also let 145 tons of special castings to the American Cast Iron Pipe Co. at \$85 a ton. The same city will take bids March 29 on 5620 tons of 54-in. and 150 tons of specials and 1130 tons of 36-in. and 80 tons of specials. James B. Clow & Sons were the successful bidders on 1500 tons for Toledo and 300 tons for Elyria, Ohio. Pending business includes:

Lima, Ohio, 2000 tons, 4 to 20-in., March 21.
Duluth, Minn., 1000 tons, 4 to 12-in., March 24.
Kewaunee, Ill., 17,260 ft. of 6-in., April 3.
Park Ridge, Ill., 530 tons, let to contractor.

We quote per net ton, f.o.b. Chicago, as follows: Water pipe, 4-in., \$46.10 to \$47.10; 6-in. and above, \$42.10 to \$43.10; class A and gas pipe, \$3 extra.

Bars.—The fact that all of the bar mills of the Illinois and Inland Steel companies are running double turn and no buyer now entering the market can be sure of delivery earlier than four to six weeks indicates the improved position of mild steel bars. Buying during the past week has been brisker than for over a year and it is evident that orders are not merely for replenishment purposes but in some cases cover anticipated seasonal requirements. Business is coming from widely distributed sources, farm implement makers alone being notable for their lack of buying. Even the implement industry, however, is in a more optimistic mood and is making some purchases here and there to round out existing stocks of material. Mill prices on soft steel bars have stiffened and are now not lower than 1.60c., Chicago. In the reinforcing field, business is growing more active as the building season draws near. The Corrugated Bar Co. will furnish 300 tons for the Morrell Packing Co., Ottumwa, Iowa. The Concrete Steel Co. has the contract for 300 tons for the Admiral Hotel, Chicago. Pending business includes the Bankers' Life and Central Life insurance buildings, Des Moines, Iowa, 500 tons each; the Chicago, Burlington & Quincy Freight House, Chicago, 800 tons; a theatre at Fort Wayne, Ind., 250 tons; the Illinois Central Railroad, Chicago, 150 tons; and a sewage disposal plant, Lima, Ohio, 100 tons. Warehouse prices on deformed steel bars range from 1.75c. to 2c., Chicago. Bar iron has been generally advanced to 1.60c., Chicago, and a fair tonnage has been placed at that price. While mill bookings are not yet all that might be desired, the tendency seems to be towards gradual improvement. Hard steel bar prices remain unchanged, with buying somewhat better.

Mill prices are: Mild steel bars, 1.60c., Chicago; common bar iron, 1.60c., Chicago; rail carbon, 1.50c., mill or Chicago.

Jobbers quote 2.28c. for steel bars out of warehouse. The warehouse quotation on cold-rolled steel bars and shafting is 3.40c. for rounds and 3.90c. for flats, squares and hexagons. Jobbers quote hard and medium deformed steel bars at 1.90c. base. Deformed bars, 1.75c. to 2c. Hoops, 3.13c. Bands, 2.88c.

Sheets.—Prices are firm and business is increasing. The resistance of buyers is commencing to disappear as prices of plates, shapes and bars grow firmer and the restoration of the normal differentials between those products and sheets seems less remote.

Mill quotations are 3c. for No. 28 black, 2.25c. for No. 10 blue annealed and 4c. for No. 28 galvanized, all being Pittsburgh prices, subject to a freight rate to Chicago of 88c. per 100 lb.

Jobbers quote: Chicago delivery out of stock, No. 10 blue annealed, 3.38c.; No. 28 black, 4.15c.; No. 28 galvanized, 5.15c.

Wire Products.—Jobbers are buying nails and wire oftener and more liberally, although even yet a hesitancy to lay in stocks is evident. Prices are firm, however, and that caution may soon give way to a general endeavor to cover ahead at present levels is predicted in some quarters. Wire rods are also stiffening, the soft spots in the market noted a week ago having disappeared and a minimum of \$28, Pittsburgh,

being the present ruling price. For mill prices, see finished iron and steel f.o.b. Pittsburgh, page 831.

We quote warehouse prices f.o.b. Chicago: No. 9 and heavier black annealed wire, \$2.85 per 100 lb.; No. 9 and heavier bright basic wire, \$3 per 100 lb.; common wire nails, \$3 per 100 lb.; cement coated nails, \$2.50 per keg.

Rails and Track Supplies.—There is no abatement in the demand for track materials. The Northern Pacific is in the market for 5,000 tons of tie plates and is also expected to buy spikes and bolts. The Illinois Central is inquiring for 2000 tons of tie plates. While prices of bolts and spikes are still weak, tie plates appear to be strengthening with \$35 per net ton more generally named as a minimum quotation. New rail business is light, but specifications against contracts are coming in at a satisfactory rate.

Standard Bessemer and open hearth rails, \$40; light rails rolled from new steel, 1.50c. to 1.60c., f.o.b. makers' mills.

Standard railroad spikes, 2c. to 2.10c., Pittsburgh; track bolts with square nuts, 3.05c. to 3.10c., Pittsburgh; tie plates, steel and iron, 1.65c. to 1.75c., f.o.b. mill; angle bars, 2.40c., f.o.b. mill.

Bolts and Nuts.—Business is steadily, though slowly, improving, and prices are tending to stiffen, particularly in quotations on second quarter business. There is a more general tendency to adhere to the discounts on page 831. Quoting f.o.b. works on the products manufactured in the West and f.o.b. Pittsburgh, on commodities made largely in the East. Reports from the automobile industry are more encouraging every week, several manufacturers now being on a 100 per cent operating basis while others average between 70 and 75 per cent.

Jobbers quote structural rivets, 3c.; boiler rivets, 3.10c.; machine bolts up to $\frac{1}{2}$ x 4 in., 60, 10 and 10 per cent off; larger sizes, 60 to 10 off; carriage bolts up to $\frac{1}{2}$ x 6 in., 60 and 10 off; larger sizes, 55 and 5 off; hot pressed nuts, square and hexagon tapped, \$3.75 off; blank nuts, \$4 off; coach or lag screws, gimlet points, square heads, 85 and 5 per cent off. Quantity extras are unchanged.

Plates.—One of the best indications of the growing strength of the market was the placing of liberal orders for plates, shapes and bars by the jobbing interests. The warehouses have a reputation for buying at the bottom on the eve of an advance and in the opinion of many keen observers they did not err in their judgment on this occasion. Certain it is that the immediate effect of this concentration of buying has been to bring the prices of all producers up to a minimum of 1.60c., Chicago, on these products. Specifications for plates continue to be received from car builders in steady volume and orders from all sources are more numerous.

The mill quotation is 1.60c. Chicago. Jobbers quote 2.38c. for plates out of stock.

Warehouse Prices.—The reductions in plates, shapes and bars announced by local jobbers last week were particularly interesting because they constituted a recognition of the abandonment of the Pittsburgh base. This fact is clearly brought to light through the adoption of increased extras for 3/16-in. plates, 84-in. and 96-in. wide, sizes not rolled in the Chicago district. These extras have been advanced to 45c. for 84-in. and 75c. for 96-in. plate, the advances being necessary to cover the freight from the Pittsburgh district.

Structural Material.—Interest is centered in the Great Northern ore dock at Superior, requiring 11,850 tons, as was noted in THE IRON AGE a week ago. The same railroad is in the market for 750 tons of structural steel for bridge reinforcement. While these inquiries are conspicuous because of the large tonnage involved, the market in general shows healthy improvement, both lettings and inquiries being on the increase. Mill bookings are steadily accumulating, so that plain material is no longer readily available for prompt delivery and unless the sizes desired happen to fit in with current rolling schedules, shipment earlier than four to six weeks cannot be counted on. At the same time plain material prices have stiffened and are now quoted at a minimum of 1.60c., Chicago. Recent fabricating lettings include:

Chicago, Rock Island & Pacific Railway, bridge over Sylvan Slough, Rock Island, Ill., 1662 tons, to Fort Pitt Bridge Co.

Biltmore Hotel, Los Angeles, Cal., 5250 tons, to Llewellyn Iron Works.

Standard Oil Co., storage tank, Muskegon, Mich., 268 tons, to American Bridge Co.

University of Iowa, addition to grandstands, Iowa City, 445 tons, to American Bridge Co.

Indiana & Michigan Electric Co., power house addition, South Bend, Ind., 208 tons, to Elkhart Bridge & Iron Co.

Bridge over East Cadron Creek, Conway, Ark., 114 tons, to Midland Bridge Co.

Majestic Theatre, Houston, Tex., 1000 tons, to Virginia Bridge & Iron Co.

United Verde Copper Co., smelter and mill building, Arizona, 2200 tons, to Kansas City Structural Steel Co.

Furniture Exhibit Building, Chicago, 900 tons, to Duffin Iron Works.

Rhineland Paper Co., finishing room, Rhineland, Wis., 100 tons, to Worden Allen Co.

Milwaukee Electric Railway & Light Co., addition Kinnickinnic Avenue Garage and Service Station, 100 tons, to Worden Allen Co.

Pending business includes:

Guaranty Building, Indianapolis, 600 tons, bids in.

Randolph Hotel, Chicago, 6000 tons.

Masonic Temple, Aurora, Ill., 300 tons, bids in.

Federal Reserve Bank, Minneapolis, superstructure, 900 tons, bids to be asked soon.

Bridge over Panana River, Nenana, Alaska, 2883 tons.

The mill quotation on plain material is 1.60c., Chicago. Jobbers quote 2.38c. for plain material out of warehouse.

Old Material.—The steady improvement in finished steel business, together with recent heavy purchases of scrap by local steel mills, has materially strengthened the old material market. Speculative buying by dealers in anticipation of further advances is again becoming a feature of the local trade. In a number of instances sellers have paid higher prices for material than consumers have paid. In some cases they were forced to do so because they were caught short, but on the whole a bullish atmosphere pervades the market and dealers are showing a tendency to bid prices up in competition with each other. The highest price for heavy melting thus far reported as having been paid by a mill is \$12.75, delivered, yet dealers have bought at as high as \$13.25. While consumers are growing more cautious as dealers' asking prices advance, some moderate consumptive purchases of certain grades have been made at higher prices. This is notably true of some iron mill grades and to a lesser extent of cast and malleable grades. At the moment the future course of the market is uncertain. Whether, as the dealers expect, consumers will continue to pay advancing prices, or whether the market will be stimulated to a point where a reaction will occur, remains to be seen. Railroad lists include the Chicago and Alton, 600 tons; the Rock Island, 3000 tons, and the Chicago Great Western, 560.

We quote delivery in consumers' yards, Chicago and vicinity, all freight and transfer charges paid, as follows:

Per Gross Ton		
Iron rails	.....	\$17.00 to \$17.50
Relaying rails	.....	20.00 to 25.00
Cast iron car wheels	.....	17.00 to 17.50
Roller or forged steel car wheels	.....	14.50 to 15.00
Steel rails, rerolling	.....	13.75 to 14.00
Steel rails, less than 3 ft.	.....	13.75 to 14.00
Heavy melting steel	.....	12.50 to 12.75
Frogs, switches and guards cut apart	.....	12.50 to 12.75
Shoveling steel	.....	11.75 to 12.25
Low phos., heavy melting steel	.....	14.50 to 15.00
Drop forge flashings	.....	8.50 to 9.00
Rhydraulic compressed sheet	.....	8.50 to 9.00
Axle turnings	.....	8.50 to 9.00

Per Net Ton		
Iron angles and splice bars	.....	15.00 to 15.50
Steel angle bars	.....	12.25 to 12.50
Iron arch bars and transoms	.....	16.50 to 17.00
Iron car axles	.....	20.00 to 20.50
Steel car axles	.....	13.75 to 14.25
No. 1 busheling	.....	9.50 to 10.00
No. 2 busheling	.....	6.25 to 6.75
Cut forge	.....	11.50 to 11.75
Pipes and flues	.....	8.00 to 8.50
No. 1 railroad wrought	.....	11.75 to 12.00
No. 2 railroad wrought	.....	11.50 to 11.75
Steel knuckles and couplers	.....	13.00 to 13.50
Coil springs	.....	13.50 to 13.75
No. 1 machinery cast	.....	14.25 to 14.75
No. 1 railroad cast	.....	13.50 to 14.00
Low phos. punchings	.....	11.50 to 12.00
Locomotive tires, smooth	.....	11.00 to 11.50
Machine shop turnings	.....	5.75 to 6.25
Cast borings	.....	7.25 to 7.75
Stove plate	.....	13.00 to 13.50
Grate bars	.....	11.50 to 12.00
Brake shoes	.....	11.50 to 12.00
Railroad malleable	.....	12.50 to 13.00
Agricultural malleable	.....	12.50 to 13.00

Philadelphia

PHILADELPHIA, March 21.

All branches of the iron and steel industry show improvement both as regards volume of business and prices. A conspicuous feature of the week is the betterment in steel plant operations. The Cambria works of the Midvale Steel & Ordnance Co. at Johnstown, Pa., is now on a 75 per cent schedule. The Bethlehem Steel Co. plants are doing practically as well. The Pencoyd works of the American Bridge Co. is operating at 50 per cent or better. Most of the smaller independent mills in the East are turning out about one-third of their normal output.

In steel prices the market has improved to the extent that 1.40c., Pittsburgh, now clearly appears to be the bottom on plates, shapes and bars, the only exception being that some business was booked in the past week at lower prices on which commitments had been made prior to the price advance. The leading interest is understood to be quoting its regular trade 1.40c., Pittsburgh, on plates, shapes and bars, but has quoted 1.50c. on some inquiries. One independent mill is offering concrete reinforcing bars made from new steel at 1.40c., Pittsburgh, but otherwise all of the independents seem to be adhering firmly to 1.50c. on all three products.

Pig iron is firmer and some furnaces are considering an advance of 50c. a ton, which would make No. 2 plain iron \$20.50, furnace. The scrap market is also considerably firmer.

The coal strike set for April 1 is not seriously affecting the market as yet, for the reason that large consumers have plenty of coal in stock for at least 60 to 90 days' operation. The railroads are also well supplied. An indication of the calm with which the situation is being met industrially is the softening in the price of bituminous coal and the falling off in demand. Large soft coal users have offered only \$2.30 a ton this week, which is declared to be less than the cost of mining.

Pig Iron.—A much improved tone exists in the pig iron market. Eastern Pennsylvania furnaces have booked substantial tonnages within the past 10 days, mostly in the New York and New England districts, and are not concerned about further selling until the coke situation becomes clarified. Furnace coke is strong at \$3.50, Connellsville, and because of this high price some of the Eastern furnaces have not contracted for second quarter. If the coal strike should develop further strength in coke prices, it is possible that at least two or three furnaces in this district will go out of blast rather than attempt to operate under higher cost conditions. It is stated that it is now costing eastern Pennsylvania furnaces from \$19.50 to \$23 a ton to make foundry iron. After many weeks of inactivity in basic iron, prospects for business appear more encouraging. One sale of 1000 tons has been made and a Harrisburg steel plant is in the market for 3000 tons or more. Two other steel companies are expected to need iron shortly. Since the last sale, which was at \$19, furnace, the views of sellers have changed, and it appears unlikely that basic iron could now be bought below \$19.50 to \$20, furnace. The inquiry for foundry iron continues fairly good. A radiator company which buys in New York is inquiring for 3000 tons for second quarter and a plumbing goods manufacturer at Trenton, N. J., wants 1500 tons for delivery beginning May 15. Another inquiry of a confidential character calls for 2000 tons. There are numerous small inquiries forming a substantial aggregate.

The following quotations are, with the exception of those on low phosphorus iron, for delivery at Philadelphia, and include freight rates varying from 84 cents to \$1.54 per gross ton:

East. Pa. No. 2 plain, 1.75 to 2.25 sil.	\$20.74 to \$20.84
East. Pa. No. 2X, 2.25 to 2.75 sil.	21.24 to 21.34
Virginia No. 2 plain, 1.75 to 2.25 sil.	26.24 to 26.74
Virginia No. 2X, 2.25 to 2.75 sil.	27.24 to 27.74
Basic delivery eastern Pa.	20.50 to 21.00
Gray forge	20.50 to 21.00
Malleable	22.50 to 24.00
Standard low phos. (f.o.b. furnace)	30.00
Copper bearing low phos. (f.o.b. furnace)	28.00

Ferroalloys.—There is no change in the ferroman-

ganese situation except that increased activity at steel plants has resulted in a slightly better demand, but orders are confined to small lots. Domestic and imported alloy are quoted uniformly at \$62.50, Atlantic seaboard.

Rails.—The Chesapeake & Ohio Railroad distribution of rails for 1922 delivery has been announced as follows: Inland Steel Co., 9000 tons; Illinois Steel Co., 7000 tons; Bethlehem Steel Co., 1000 tons. For its subsidiary road, the Hocking Valley, the Chesapeake & Ohio placed 3000 tons with the Lackawanna Steel Co. The Cambria works at Johnstown, Pa., will roll 5000 tons of 16-lb. rails for shipment to Japan. Inquiries for lots of 500 to 1000 tons of rails from street railroad companies have been received within the past week.

Semi-Finished Steel.—Open hearth rerolling billets at \$28 and forging billets at \$32, Pittsburgh, are still obtainable, though small lots are sometimes sold \$1 a ton higher. Sheet bars have been sold for shipment to an Eastern mill at \$29, Youngstown.

Plates.—Eastern mills are quoting uniformly on the basis of 1.50c., Pittsburgh, for sheared and universal plates, and the only quotations below that figure appear to come from the leading interest, which quotes 1.40c. to its regular trade. While much of the business closed within the past week has brought only about 1.35c., Pittsburgh, sales have been made only where protection had been given prior to the recent advance. Orders for small lots have been booked at 1.50c., but in no case has the quantity exceeded 200 tons, so far as reported. Bids on 2000 to 4000 70-ton steel freight cars for the Norfolk & Western Railroad will be opened this week. More locomotive work is in prospect. The Baltimore & Ohio and the Southern Railway are reported to be inquiring for a few engines each. We quote plates at 1.40c. to 1.50c. base, Pittsburgh.

Structural Material.—Small orders for plain material have been booked at 1.50c., Pittsburgh, by independent mills, but shapes are still obtainable at 1.40c. A good deal of structural work is being figured on. Two apartment houses will require about 1000 to 1200 tons each. A new terminal and ferry slips for the Philadelphia & Reading Railroad at Camden, costing \$2,500,000, will require considerable steel, though actual tonnages have not been specified. Port development work at Norfolk, Va., including piers and a grain elevator, will also bring steel inquiries into the market shortly. The American Bridge Co. was low bidder on the first section of the new Public Ledger Building, requiring 1200 tons. We quote plain material at 1.40c. to 1.50c., Pittsburgh.

Old Material.—The Bethlehem Steel Co. is buying steel scrap, paying \$13.50 delivered Bethlehem and \$14 at Steelton. The Cambria Steel Co., which has been a consistent buyer for two or three weeks, paying up to \$14.25 delivered for steel scrap, dropped out of the market late last week, causing a momentary sagging in prices, but the demands of the Bethlehem Steel Co. this week brought increased strength. Turnings are in demand and scarce. We quote for delivery at consuming points in this district as follows:

We quote for delivery at consuming points in this district as follows:

No. 1 heavy melting steel	\$13.50 to \$14.00
Scrap rails	13.50 to 14.00
Steel rails, rerolling	15.00 to 15.50
No. 1 low phos., heavy 0.04 and under	18.00 to 18.00
Cast iron car wheels	16.00 to 16.50
No. 1 railroad wrought	15.50 to 16.00
No. 1 yard wrought	13.50 to 14.00
No. 1 forge fire	16.00 to 16.50
Bundled sheets (for steel works)	10.00 to 10.50
No. 1 busheling	12.50 to 12.50
No. 2 busheling	10.00 to 11.00
Turnings (short shoveling grade for blast furnace use)	11.00 to 11.25
Mixed borings and turnings (for blast furnace use)	11.00 to 11.25
Machine-shop turnings (for rolling mill and steel works use)	12.00 to 12.50
Heavy axle turnings (or equivalent)	12.00 to 12.50
Cast borings (for steel works and rolling mills)	12.00 to 12.50
Cast borings (for chemical plants)	15.00 to 16.00
No. 1 cast	17.25 to 17.75
Railroad grate bars	14.00 to 15.00
Stove plate (for steel plant use)	14.00 to 14.50
Railroad malleable	13.00 to 13.50
Wrought iron and soft steel pipes and tubes (new specifications)	12.00 to 12.50
Shafting	12.00 to 12.00

New York

NEW YORK, March 21.

Pig Iron.—The purchase of 5000 tons by a cast iron pipe interest, referred to in these columns last week, has been confirmed and other sales foot up from 5000 to 6000 tons, mostly foundry grades for early delivery, but including one lot of 500 tons of malleable, which was sold at \$18, Buffalo. Pending inquiries include one from Trenton, N. J., for 1500 tons, delivery over three months beginning May 15, equally divided among No. 1, No. 2X and No. 2 plain. Several other inquiries ranging from 1000 to 2000 tons are pending, but nearly all the new orders and inquiries are for small tonnages. Buyers are showing more interest and the general condition in the market is more satisfactory than it has been recently.

We quote delivered in the New York district as follows, having added to furnace prices \$2.52 freight from eastern Pennsylvania, \$5.46 from Buffalo and \$6.16 from Virginia:

East. Pa. No. 1 fdy., sil.	2.75 to 3.25	\$22.52 to \$23.02
East. Pa. No. 2X fdy., sil.	2.25 to 2.75	22.02 to 22.52
East. Pa. No. 2 fdy., sil.	1.75 to 2.25	21.52 to 22.02
Buffalo, sil.	1.75 to 2.25	23.46 to 23.71
No. 2 Virginia, sil.	1.75 to 2.25	28.16

Ferroalloys.—The market for ferromanganese is moderately active and sales of from 1500 to 2000 tons are reported to have been made with all selling agencies participating. There are still fair quantities before the market which have not been placed and there is more interest than in some weeks. In the spiegeleisen market there have been sales of carload lots at prevailing prices and there have appeared tentative inquiries for large amounts which have not yet developed into orders. In manganese ore there is a little more inquiry, but no business is reported and quotations are nominally unchanged. The 50 per cent ferrosilicon market is fairly active, due largely to the increased production of steel, and a fair business has been done both for early delivery and on contract at prevailing quotations. There is also more interest in ferrochromium and moderate sales have been made. Quotations follow:

Ferroalloys

Ferromanganese, domestic, seaboard, per ton	\$62.50
Ferromanganese, British, seaboard, per ton	\$62.50
Spiegeleisen, 16 to 19 per cent, furnace, per ton	\$29.00
Spiegeleisen, 20 per cent, furnace, per ton	\$30.00
Ferrosilicon, 50 per cent, delivered, per ton	\$55.00 to \$60.00
Ferrotungsten, per lb. of contained metal	.40c. to .50c.
Ferrochromium, domestic, 6 to 8 per cent carbon, 60 to 70 per cent Cr., per lb. Cr., delivered	13c. to 14c.
Ferrovanadium, per lb. of contained vanadium	\$4.00

Ores

Manganese ore, foreign, per unit, seaboard	.25c. to .26c.
Tungsten ore, per unit, in 60 per cent concentrates	\$2.00 up
Chrome ore, 40 to 45 per cent Cr ₂ O ₃ , crude, per net ton, Atlantic seaboard	\$18.00 to \$20.00
Chrome ore, 45 to 50 per cent Cr ₂ O ₃ , crude, per net ton, Atlantic seaboard	\$19.00 to \$21.00
Molybdenum ore, 85 per cent concentrates, per lb. of MoS ₃ , New York	45c.

Finished Iron and Steel.—Fresh developments in the local steel market have been few since independent steel company advances took their prices on plates, shapes and bars to 1.50c., Pittsburgh. So far as can be learned practically all of them are adhering to this quotation, but the leading interest is said still to be accepting orders for the heavy products at 1.40c., Pittsburgh. Most of the business closed within the past week has been at prices ranging from 1.35c. to 1.40c., Pittsburgh, the lower price having been accepted where protection had been given prior to the advance. Small orders are being booked at 1.50c., but nothing larger than a carload is reported at this figure. Some companies which are quoting 1.50c. on soft steel bars will accept 1.40c. on bars for concrete reinforcing. Export prices are slightly firmer, but are not within several dollars a ton of the minimum domestic prices. Plates, shapes and bars have been sold for export within the week at 1.35c., Pittsburgh, or less. In competition with foreign mills, it is stated that it is necessary for American mills to go as low as 1.30c., Pittsburgh, on some business to be in the running. Low prices are still heard on tin plate, both for domestic and export trade. The domestic price is nominally \$4.60 per 100 lb. base box, Pittsburgh, but occasional reports of a \$4.50 price are still heard. Wire products and sheets continue fairly firm. In view of the present price situation

interest attaches to the public opening of bids on 3000 tons of bars, shapes and plates and additional lots of track supplies by the New York Central Railroad on Wednesday of this week. The Newport News Dry Dock & Shipbuilding Co. is reported to have placed 700 tons of plates and a few hundred tons of shapes through its New York office for the reconditioning of the steamship Leviathan. A current export inquiry is for 22,000 boxes of tin plate for the Nippon Oil Co. of Japan. Welsh mills, it is stated here, are able to undersell American mills on a c. i. f. basis if the recent advance in the export tin plate price is maintained, and it becomes a question whether buyers in the Far East are willing to pay a slight premium for American plate. The Sinclair Consolidated Oil Corporation has placed 12 oil tanks, requiring 3100 tons of steel, with the Graver Corporation, Chicago. This lot is an addition to the 10 bought from the Chicago Bridge & Iron Works, reported two weeks ago. Structural projects continue in fairly good volume. Some of the new inquiries follow:

Lehigh Valley Railroad, 400 tons, for eight bridges.
Building for the Talbot Mills, Billerica, Mass., 800 tons.
Store for the Edward Malley Co., New Haven, Conn., 750 tons.
Bridge for the Seaboard Air Line, 250 tons
Buildings for the Mount Hope Finishing Co., North Dighton, Mass., 300 tons.
Department store at Scranton, Pa., 1000 tons.
Chemistry laboratory for Tufts College, Somerville, Mass., 500 tons.
Municipal gas plant at Albany, N. Y., 900 tons.

Jobs which have been awarded include the following:

Apartment house in Philadelphia, 1900 tons, to American Bridge Co.
Home Insurance Building, New York, 750 tons, to Hedden Iron Construction Co.
Bridges and repair work for Delaware, Lackawanna & Western Railroad, 1800 tons, to American Bridge Co.
Building for the Abbott Worsted Co., Forge Village, Mass., 200 tons, to American Bridge Co.
Twelve story loft, Madison Avenue and Forty-eighth Street, 4300 tons, to Post & McCord.
Piershed for Lehigh Valley Railroad, Greenville, N. J., 1800 tons, reported let to Bethlehem Steel Bridge Corporation.
Knights of Columbus building at Bayonne, N. J., 200 tons, to Fagan Iron Works.
Building for Conley T'n Foll Co. at Glendale, Long Island, 400 tons, to McClintic-Marshall Co.
Cane sugar plant at Miami, Fla., 700 tons, to McClintic-Marshall Co.
Chamber of Commerce building, Newark, 1700 tons, to Hay Foundry & Iron Works.
Loft building on Seventh Avenue, New York, 500 tons, to A. E. Norton Co.
Temple University building, Philadelphia, 400 tons, to American Bridge Co.
Summer Building, Boston, 800 tons, to New England Structural Co.
Warehouse, Boston, 3500 tons, to McClintic-Marshall Co.

Directors of the New York Central Railroad met last week and adjourned without a decision being announced regarding the letting of the proposed bridge at Castleton, N. Y., across the Hudson River. The Chesapeake & Ohio is in the market for 63 passenger and express cars.

We quote for mill shipments, New York, as follows: Soft steel bars, 1.78c.; plates, 1.78c.; structural shapes, 1.78c. to 1.88c.; bar iron, 1.73c. to 1.88c. On export shipments the freight rate is 28.5c. per 100 lb. and the domestic rate is 38c.

Cast-Iron Pipe.—The tone of the market is extremely optimistic. Buying by private water and gas companies continues large and municipal tenders appear from time to time. The Department of Water Supply, Gas and Electricity, New York, closed March 22 on a contract which involves about 1100 tons of cast iron pipe, ranging through a number of sizes from 8 in. to 32 in. One cast-iron pipe manufacturer reports 85 per cent operation and more pits going than prior to the war. We quote per net ton, f.o.b. New York, as follows: 6-in. and larger, \$47.30; 4-in. and 5-in., \$52.30; 3-in., \$62.30, with \$4 additional for Class A and gas pipe.

Warehouse Business.—Although lower prices prevail in other markets, warehouses in this district have not announced any change in quotations. Current

prices are weak, however, and there is a distinct tendency to shade them whenever good business presents itself. Structural material is fairly active and there is some sheet buying. Brass and copper warehouses report activity and a general stiffening in prices. No change in the situation among dealers in wrought iron and steel pipe is reported. We quote prices on page 846.

High-Speed Steel.—The market is unchanged at about 75c. to 85c. per lb. for 18 per cent tungsten high-speed steel, with special brands of some companies still quoted up to as high as \$1.05 per lb.

Coke.—The market continues fairly active. Prices on beehive grades range from \$4.50 to \$4.75 with \$4.50 more frequently prevailing. It is becoming more difficult to obtain prompt delivery, but there is no excitement about the expected strike of coal miners. By-product coke is still quoted at \$8.59, delivered to points on the Pennsylvania, Erie and Lackawanna railroads, and \$9.15 to points on the Central of New Jersey.

Old Material.—The upward trend in the market continues. No. 1 heavy melting steel is firm at \$9 to \$9.50 per ton, buying price New York, although it is reported that \$16.25 per ton has been done on sales in the Pittsburgh district. Some brokers in this market claim to be willing to offer up to \$10 per ton for heavy melting steel. Wrought iron track shows an advance this week of \$1 per ton, now being quotable at \$9.50 to \$10. Iron and steel pipe, not under 2 ft. long is also 50c. per ton higher, bringing from \$8.25 to \$8.75 per ton. A fair quotation on mixed borings and turnings is \$6 to \$6.50 per ton.

Buying prices per gross ton, New York, follow:		
Heavy melting steel, yard	\$9.00 to	\$9.50
Steel rails, short lengths, or equivalent	9.50 to	10.00
Revolving rails	9.25 to	9.75
Relaying rails, nominal	27.00 to	28.00
Steel car axles	10.00 to	10.50
Iron car axles	17.50 to	18.50
No. 1 railroad wrought	9.50 to	10.00
Wrought iron track	9.50 to	10.00
Forge fire	5.50 to	6.00
No. 1 yard wrought, long	9.50 to	10.00
Cast borings (clean)	7.00 to	7.50
Machine-shop turnings	5.75 to	6.25
Mixed borings and turnings	6.00 to	6.50
Iron and steel pipe (1 in diam. not under 2 ft. long)	8.25 to	8.75
Stove plate	10.50 to	11.00
Locomotive grate bars	10.00 to	10.50
Malleable cast (railroad)	8.50 to	9.00
Cast-iron car wheels	10.50 to	11.00

Prices which dealers in New York and Brooklyn are quoted to local foundries, per gross ton, follow:

No. 1 machinery cast	\$17.00 to	\$17.50
No. 1 heavy cast (columns, building materials, etc.), cupola size	16.00 to	16.50
No. 1 heavy cast, not cupola size	15.00 to	15.50
No. 2 cast (radiators, cast boilers, etc.)	10.50 to	11.00

Cleveland

CLEVELAND, March 21.

Iron Ore.—While some consumers are showing an interest in iron ore prices for this year, ore shippers do not expect that the season's prices will be named before May 1. Ore men look for a little demand for small lots of ore for shipment when the season of navigation opens, but it is probable that such sales will be made subject to whatever prices are named later. The general improvement in the iron and steel industry is encouraging to ore shippers. Taking into consideration the large stocks of ore on hand at docks and in furnace yards, the season's movement is not expected to exceed 35,000,000 tons. No developments have occurred locally in the freight rate situation since the railroads notified the shippers that a 20 per cent reduction on rates from Lake Erie ports to interior furnaces would be placed in effect April 17. Shippers feel confident that the Interstate Commerce Commission will refuse the request of Buffalo interests that a proposed rate be suspended. The announcement of a reduction in rail rates has had no effect on dock shipments, as very little ore is moving from docks, furnaces taking only what ore they are actually in need of.

We quote delivered lower lake ports: Old range Bessemer, 55 per cent iron, \$6.45; Old range non-Bessemer, 51½ per cent iron, \$5.70; Mesabi Bessemer, 55 per cent iron, \$6.30; Mesabi non-Bessemer, 51½ per cent iron, \$5.55.

Pig Iron.—Sales of foundry iron show an increase, but there are weak spots in the market which have resulted in some price concessions, although most sellers are adhering to recent quotations. A local producer has taken some foundry iron at \$18.50 for Cleveland delivery and this price is evidently being shaded about 50c. a ton for shipment to some points. One sale of 1000 tons is reported at \$18.50 for delivery to a nearby point. A local producer is quoting foundry iron on the basis of \$19, Valley furnace, for shipment to points where the Valley has the freight advantage. Several lots have been sold for shipment from Cleveland to the Pittsburgh district, but it is stated that on this business the Cleveland producer did not absorb all the freight differential, which would have brought the price down to approximately \$18 a furnace. Sales during the week included several 1000 ton lots to Ohio consumers. A Cleveland foundry purchased 1000 tons and several 500-ton lot sales were made to local consumers. One lake furnace reports sales aggregating 8000 tons during the week, mostly at \$19. These include 1000 tons of foundry iron taken by a Michigan manufacturer of motor castings, 600 tons of malleable iron by an Indiana foundry and 400 tons of malleable by an Ohio foundry. While the bulk of the sales are for early shipment, some contracts have been placed for the second quarter. Only one or two inquiries have developed for more extended deliveries and buyers and sellers generally are not disposed to enter into contracts for delivery beyond July 1. Sales and shipments show a marked gain over February. One interest operating four of eight furnaces is now shipping more iron than it is making. The demand for low phosphorus iron in small lots has improved but prices are easier.

Quotations below are f.o.b. local furnaces for Northern foundry iron, not including a 56c. switching charge. Other quotations are delivered Cleveland, being based on a \$1.96 freight rate from Valley points, a \$3.36 rate from Jackson and a \$6.67 rate from Birmingham:

Basic	\$19.96
Northern No. 2 fdy., sil. 1.75 to 2.25	\$18.50 to 19.50
Southern fdy., sil. 1.75 to 2.25	22.17
Ohio silvery, sil. 8 per cent	30.86
Standard low phos., Valley furnace	\$0.00 to \$1.00

Finished Material.—The stimulating effect on buying that was caused by the stiffening of prices continued during the week. Mills booked a good volume of business from jobbers, bolt and nut manufacturers, automobile manufacturers and other consumers. Orders came from manufacturers of automobile springs for 700 tons of spring steel. Orders show that buyers are not being stampeded by the possibility of higher prices into placing large tonnages for stock, but are buying rather conservatively. While a few sales are reported at the 1.50c. price, 1.40c. is still the going market price and the bulk of the business was taken at that price. Independent mills before they advanced prices gave protection to many of their customers at the old price and considerable of the business placed during the week was the closing of the contracts covered by these protections. However, some inquiries came out from consumers who had not secured protection. The leading interest which is still quoting steel bars, plates and structural material at 1.40c. for current orders have taken some contracts at 1.50c., but will make shipments against these contracts at 1.40c. as long as that remains its market price. With these contracts it will not have lower priced steel on its books, should it decide to mark its prices up. Reeves Brothers, Alliance, Ohio, have taken oil tanks for the Magnolia Petroleum Co. requiring 1300 tons of plates which have been placed with a Johnstown, Pa., mill, which has also taken 500 tons of structural material for the Kresge Building, Cleveland. In structural lines, the Detroit Medical Building, Detroit, requiring 1260 tons, has been placed with the Russell Wheel & Foundry Co., Detroit, and the East High School, Columbus, Ohio, requiring 200 tons, has been taken by the Massillon Bridge & Structural Co. Bids have been taken for the Genesee Building, Buffalo, requiring 2800 tons and for a bank at Brownsville, Pa., requiring 500 tons, and an inquiry is out for a Physics Building for the University of Michigan requiring 200 tons.

Hoops and Bands.—The demand for hoops and bands has become more active, but prices are irregular.

Quotations of 1.85c. for hoops and 1.75c. for bands are appearing, but one Valley mill is now asking 2c. for hoops and 1.85c. for bands.

Sheets.—The demand for sheets continues fair. While prices are generally firm, there are reports of shading on galvanized sheets. Weakness is also reported in warehouse prices on galvanized sheets, quotations of 4.25c. appearing or about the present delivered cost to the jobbers. This \$10 a ton concession is evidently being made to reduce stock.

Warehouse Business.—Cleveland warehouses have reduced prices \$3 per ton on steel bars, plates and structural material and on hoops and bands and \$5 a ton on cold-rolled steel. These reductions are due to competition in the Central Western territory and to the naming of lower warehouse prices in Chicago and Detroit. Warehouse orders show some gain.

Jobbers quote steel bars, 2.21c.; plates and structural shapes, 2.46c.; No. 9 galvanized wire, 3c.; No. 9 annealed wire, 2.50c.; No. 28 black sheets, 3.75c.; No. 28 galvanized sheets, 4.75c.; No. 10 blue annealed sheets, 3.06c. to 3.10c.; hoops and bands, 2.56c.; cold-rolled rounds, 3.25c.; flats, squares and hexagons, 3.75c.

High Speed Steel.—German made high speed tool steel is being offered in this market at 55c. to 58c. per pound for steel running about 14 per cent tungsten, but no sales of the imported steel are reported. The market continues very irregular. Prices on domestic 18 per cent tungsten high speed steel range from 65c. to 80c. per lb. with some of the leading manufacturers holding to a minimum price of 70c.

Bolts, Nuts and Rivets.—The improvement in the demand for bolts and nuts continues and some makers report that they booked more business during the first half of March than during all of February. One maker has taken some contracts for the second quarter, but manufacturers are not inclined to get loaded up with orders for that delivery at current prices. Regular discounts appear to be holding better than they have recently. Rivet sales have improved. Prices are steady at 2.10c. for structural and 2.20c. for boiler rivets, but there are occasional reports of shading of these prices.

Old Material.—Prices on many grades have advanced and the market is firm. There was very little buying by the mills during the week, the only local activity on the part of a consumer being the purchase of a few lots of machine shop turnings. Heavy melting steel is quoted at \$15.50 to \$16 for Valley delivery. Dealers have forced prices up on this grade to a higher point than mills are willing to pay. For Valley shipment dealers are offering up to \$15.75 for heavy melting steel, \$13 for compressed steel, \$12 for borings and turnings and \$12.50 for flashings. For delivery to a Cleveland consumer they are offering \$13.50 for heavy melting steel and \$10 for turnings.

We quote per gross ton, f.o.b. Cleveland, as follows:

Heavy melting steel.....	\$12.00 to \$13.25
Steel rails, under 3 ft.....	13.25 to 13.75
Steel rails, rerolling.....	15.00 to 16.00
Iron rails.....	13.00 to 14.00
Iron car axles.....	18.00 to 19.00
Low phosphorus melting.....	14.00 to 14.25
Cast borings.....	9.50 to 9.75
Machine shop turnings.....	9.50 to 9.60
Mixed borings and short turnings.....	9.50 to 9.60
Compressed steel.....	10.25 to 10.50
Railroad wrought.....	13.00 to 13.75
Railroad malleable.....	13.00 to 13.50
Light bundled sheet stampings.....	8.50 to 9.00
Steel axle turnings.....	11.00 to 11.50
No. 1 cast.....	15.00 to 16.00
No. 1 busheling.....	9.50 to 9.75
Drop forge flashings, over 10 in.....	10.25 to 10.75
Drop forge flashings, under 10 in.....	10.50 to 11.00
Railroad grate bars.....	13.00 to 13.25
Stove plate.....	13.25 to 13.50
Pipes and flues.....	10.00 to 11.00

Ore Rate Hearing Resumed

The hearing on upper lake ore rates which was adjourned some two or three months ago was resumed at the Great Northern Hotel, Chicago, on March 21, with Examiner Howard Hosmer of the Interstate Commerce Commission presiding. The morning session was taken up with rebuttal by Robert Hula, Steel & Tube Co. of America, and representatives of the Midvale Steel & Ordnance Co. and M. A. Hanna & Co., of exhibits entered in the previous hearing by the Chicago & Northwestern.

Cincinnati

CINCINNATI, March 21.

Pig Iron.—The market was fairly active during the week, most of the sales being, however, for small tonnages for immediately delivery. The largest sale reported was one of 6000 tons of Southern iron taken by a sanitary ware manufacturer. This interest is expected to close on another 3000 tons during the week, the whole tonnage being for delivery during the second quarter. A Columbus melter bought 300 tons of Northern iron, and a nearby melter 200 tons. Several sales of Southern iron are also reported, one being for 200 tons. A number of fair-sized inquiries are current. The Rundle Mfg. Co. is inquiring for 2500 tons of Southern iron, and the Ross-Meehan Co. has not closed on its inquiry for 1000 tons of malleable. The Westinghouse company is inquiring for 3000 tons of foundry iron, and a Michigan melter is in the market for 400 tons of Bessemer. Several other inquiries for 100-ton lots are also current. Prices show no change, although reports are current that Southern irons are inclined to advance. A very encouraging feature of the market is seen in the report of the Ohio State Foundrymen's Association for the month of February. The melt showed 50 per cent increase over January, having jumped from 22 to 33 per cent of normal.

Based on freight rates of \$4.50 from Birmingham and \$2.52 from Ironton, we quote f.o.b. Cincinnati:

Southern coke, sil. 1.75 to 2.25 (base).....	\$19.50 to \$20.00
Southern coke, sil. 2.25 to 2.75 (No. 2 soft).....	20.00 to 20.50
Ohio silvery, 8 per cent sil.....	30.02
Southern Ohio coke, sil. 1.75 to 2.25 (No. 2).....	21.02 to 21.52
Basic, Northern.....	21.02
Malleable.....	21.52 to 22.02

Finished Material.—The effect of the recent advance in prices made by practically all of the independent mills can hardly be gaged as yet. The immediate result of the advances, however, was to bring in a fair amount of business that had been quoted on, but during the past week the number of orders booked was rather light, the buyers, no doubt, hesitating to commit themselves until the price situation becomes more clear. A number of carload orders were placed at the advanced prices, but on the whole business during the week was light. An inquiry for 800 tons of reinforcing bars is the largest one reported and it is said that some hesitancy is being shown by mills in quoting on this business, as the delivery extends over the next few months. Prospects of a coal strike, with possible interruption to mill operations, is also being taken into account by mills when booking business and there appears to be a hesitancy on their part to quote for extended deliveries. The sheet market during the week was reported to be fairly active, but tin plate manufacturers, while booking some fair-sized orders, state that the market may well be regarded as spotty. Most of the orders placed are for immediate delivery, and there is not much tendency on the part of buyers to book as far ahead as is generally the case at this season of the year. In wire products, business has been fairly good, one order calling for 3000 kegs of nails. An inquiry for 800 kegs during the week, which it was thought would bring out a lower price than \$2.40 Pittsburgh, is reported to have been placed on this basis. One of the most encouraging features in the local situation was the appearance of several carload orders for cold-rolled steel. The city of Dayton, Ohio, has purchased 200 tons of cast iron pipe and fittings, the order going to the United States Cast Iron Pipe & Foundry Co. The only award of consequence in the structural field was one of 500 tons of bridge work made by the Nashville, Chattanooga & St. Louis Railway to the American Bridge Co. Bids will close on March 27 for the 22-story Snowden building at Memphis, Tenn. On the same date bids will close for the new dormitory building at the University of Cincinnati. Estimates will be received until March 29 for a five-story office building for the First National Bank at Richmond, Ind. Bids are also being taken on section 6 of the rapid transit loop in Cincinnati. This section is to cost approximately \$400,000 and a fair tonnage of reinforcing bars will be required. Plans have been

approved for two new school buildings in Cincinnati involving an expenditure of \$650,000 and a new high school for Evansville, Ind., will likely be up shortly. The city of Cincinnati will start at once preparing plans for the new Eighth Street viaduct, which will cost approximately \$1,500,000.

Plant Operations.—The American Rolling Mill Co. will continue to operate both plants at Middletown to capacity and it is expected that three sheet mills at the Ashland plant will be in operation toward the end of the week. This company is now operating 35 of its 50 sheet mills. The Andrews Steel Co. at Newport, Ky., will commence making steel this week, three open-hearth furnaces being on. The Newport Rolling Mill Co. will put on two additional sheet mills, giving it a total of 10, and it is expected that a slightly increased operation at the plant of the Whitaker-Glessner Co. at Portsmouth will also be made.

Warehouse Business.—Local jobbers report a considerable improvement during the week. Structural steel and reinforcing bars continue to be active, and there is also a slight increase noted in the demand for wire products. Prices are firm and unchanged.

Iron and steel bars, 2 7/8 in. base; hoops and bands, 3.35c. base; shapes and plates, 2 8/16 in. base; reinforcing bars, 2.82 1/2 c. base; cold rolled rounds, 1 1/2 in. and larger, 3.50c. base; under 1 1/2 in. and flats, squares and hexagons, 4c.; No. 10 blue annealed sheets, 3.60c.; No. 28 black sheets, 4.25c.; No. 28 galvanized sheets, 5.25c.; wire nails, \$2.75 per keg base; No. 9 annealed wire, \$2.60 per 100 lb.

Coke.—The coke market still shows fair activity, and some contracting is still going on for the year's requirements. Connellsville furnace coke is quoted at \$3.50, and foundry at \$4.50 to \$5. Quotations from New River and Wise County districts are unchanged.

Old Material.—The local scrap market continues inactive, but Western markets are showing more life. Inquiries from the smaller centers for special grades are also increasing in number, and altogether the tone of the market is much improved. It is reported that a steel company operating in the Cincinnati district had closed for 10,000 tons of scrap. The report in this paragraph several weeks ago indicated that the purchase was much smaller. Prices are unchanged, but firm.

We quote dealers' buying prices f.o.b. cars:

	Per Gross Ton	
Bundled sheets	\$4.50 to \$5.00	
Iron rails	11.50 to 12.00	
Relaying rails, 50 lb. and up	24.50 to 25.00	
Re-rolling steel rails	10.00 to 10.50	
Heavy melting steel	9.50 to 10.00	
Steel rails for melting	9.50 to 10.00	
Car wheels	12.00 to 12.50	

	Per Net Ton	
No. 1 railroad wrought	9.00 to 9.50	
Cast borings	4.00 to 4.50	
Steel turnings	3.00 to 3.50	
Railroad cast	12.00 to 12.50	
No. 1 machinery	14.00 to 14.50	
Burnt scrap	7.50 to 8.00	
Iron axles	16.00 to 16.50	
Locomotive tires (smooth inside)	9.00 to 9.50	
Pipes and flues	3.50 to 4.00	

Boston

BOSTON, March 21.

Pig Iron.—Although individual orders in most cases are small, a more diversified buying movement of pig iron is reported this week than noted before in months. Sales aggregate 6500 tons, largely Buffalo iron, and include 1000 tons of silicon 2.75 to 3.25 to a Massachusetts maker of textile machinery, and another 1000 tons made up of three different grades from two furnaces to another Massachusetts textile interest. Both melters recently purchased round tonnages. Other sales range in size from car lots to 500 tons, practically all of them for second quarter delivery. As far as known, no furnace is quoting for delivery beyond July. Practically no No. 2 plain iron is selling. Sales of Buffalo iron this week are reported at \$18 for No. 2X and No. 1X, and in some instances at \$18.25 for No. 1X, but \$17.75 furnace was done by one Worcester, Mass., machinery maker. Eastern Pennsylvania is still available at \$19 furnace, although most furnaces are on a \$20 furnace base and asking differentials. One eastern Pennsylvania furnace this week made a few sales of No. 2X at \$20 furnace. A few sales of Alabama iron

for mixture purposes are reported in this territory at delivered prices \$3 to \$4 above Northern irons. The inactivity of Virginia furnaces eliminates such irons from this market. Small sales of charcoal iron were made this week at \$22.50 furnace.

We quote delivered at common New England points as follows, having added to furnace prices \$4.06 freight from eastern Pennsylvania, \$5.46 from Buffalo, \$6.58 from Virginia and \$10.66 from Alabama:

East. Penn., sil.	2.25 to 2.75	\$23.06 to \$24.56
East. Penn., sil.	1.75 to 2.25	23.06 to 24.06
Buffalo, sil.	2.25 to 2.75	23.46 to 23.96
Buffalo, sil.	1.75 to 2.25	23.46 to 23.96
Virginia, sil.	2.25 to 2.75	29.58
Virginia, sil.	1.75 to 2.25	29.08
Alabama, sil.	2.25 to 2.75	26.16 to 26.66
Alabama, sil.	1.75 to 2.25	25.66 to 26.16

Cast Iron Pipe.—The city of Boston has awarded 1850 tons, 6 to 36-in. pipe, to the United States Cast Iron Pipe & Foundry Co., and the town of Wellesley, Mass., 210 tons, 6, 8 and 10-in. pipe to the Warren Foundry & Machine Co. These two sales represent the largest placed in this territory during the past 10 days. Business otherwise has been confined largely to car lots. Prospects for future business are bright, especially from municipal sources, but amounts on which bids will be asked are rather indefinite at this time. Prices on cast iron pipe are reported as strong, but unchanged, as follows: Per net ton, f.o.b. Boston and district, in car load lots, 3-in., \$66.70; 4-in., \$56.70; 6-in., \$50.70; 10-in. and larger, \$49.70, with \$4 differentials on class A and gas pipe.

Coke.—The movement of by-product foundry coke from New England ovens to foundries continues heavy, but the force of incoming business apparently has spent itself, a majority of melters having sufficient fuel on hand to meet their requirements for some time. The leading coke producer in this territory, the New England Coal & Coke Co. has an adequate reserve stock of bituminous to supply its needs for some weeks after April 1. The by-product coke market is firm on a basis of \$10.15 delivered where the local freight does not exceed \$3.40.

Old Material.—The local market is sentimentally firmer, although quiet. Dealers in this territory say the outlook for Pittsburgh district mill buying within the near future is encouraging. Some speculation among dealers in anticipation of mill buying is noted, but such business is restricted by a lack of material. Heavy melting steel and wrought pipe quotations made here this week show a slight advance. Turnings and mixed borings and turnings are in demand and 50c. to 75c. higher. Ordinary cast iron borings, on the other hand, are about \$1 lower due to the withdrawal of Massachusetts buyers from the market. Chemical borings continue in demand at previously quoted prices. Small sales of railroad malleable at \$14 delivered Massachusetts are reported. Business in machinery cast is confined to an occasional car-lot at around \$17.50 delivered.

The following prices are for gross ton lots delivered consuming points:

No. 1 machinery	\$17.00 to \$17.50
No. 2 machinery	16.00 to 16.50
Stove plate	14.50 to 15.00
Railroad malleable	13.00 to 13.50

The following prices are offered per gross ton lots f.o.b. Boston rate shipping points:

No. 1 heavy melting steel	\$9.00 to \$9.50
No. 1 railroad wrought	10.50 to 11.00
No. 1 yard wrought	9.50 to 10.00
Wrought pipe (1 in. in diam. over 2 ft. long)	7.25 to 7.75
Machine shop turnings	5.50 to 6.00
Cast iron borings, rolling mill	7.50 to 8.00
Cast iron borings, chemical	9.00 to 9.50
Blast furnace borings and turnings	5.50 to 6.00
Forged scrap and bundled skeleton	4.50 to 5.00
Street car axles	11.50 to 12.00
Shafting	13.00 to 13.50
Car wheels	11.00 to 11.50
Re-rolling rails	9.50 to 10.00

Basing Point Hearing at Chicago

A Chicago hearing on the Pittsburgh basing point practice was opened before the Federal Trade Commission on March 20. Among the witnesses who appeared on the first day were George E. Lasker, Lasker Iron Works, Chicago; Eugene H. Heller, president Hill Pump Valve Co., Chicago, and H. E. White, traffic expert, Western Association of Rolled Steel Consumers.

St. Louis

St. Louis, March 21.

Pig Iron.—The principal sale of the week was that of 2500 tons of low phosphorus, off in sulphur iron, made by a local producer to a St. Louis melter. The situation continues steadily to improve, the demand being better and purchasers being eager to get deliveries of orders placed. The stove foundries report that salesmen are sending in a greater volume of business than was expected, and one plant here placed a repeat order for 300 tons of Southern iron. Local job foundries also report an increasing volume of business. A Southern maker reports that more interest is being shown in the water and rail price from Sheffield, equal to \$19.44, St. Louis, made several weeks ago, and several 300-ton orders were placed during the week, in addition to a number of smaller requirements. Other Southern makers are quoting \$15 to \$15.50, but the Sheffield concern is believed to be getting the bulk of the business because of the lower rate. The market for Northern iron is firm at \$20, Chicago, with the local makers meeting that figure. A Quincy, Ill., stove manufacturer is in the market for 1000 tons for second quarter delivery. A Missouri melter wants 350 tons over six months' delivery. Negotiations are on with a southern Illinois melter for 500 tons, and a Kansas melter wants from 300 to 500 tons.

We quote delivered consumers' yards, St. Louis, as follows, having added to furnace prices \$2.80 freight from Chicago and \$5.74 from Birmingham:

Northern foundry, sil. 1.75 to 2.25	\$22.80
Northern malleable, sil. 1.75 to 2.25	22.80
Basic	22.80
Southern foundry, all rail, sil. 1.75 to 2.25	\$20.74 to 21.21
Southern foundry, water and rail, sil. 1.75 to 2.25, f.o.b. St. Louis	19.44

Finished Iron and Steel.—The center of interest in these lines lies with the railroads. The Missouri Pacific Railroad, which is the heaviest purchaser of material of any of the railroads centering here, is in the market for 500,000 tie plates; the Mobile & Ohio wants 20,000 tie plates; the Wabash has an inquiry out for 500 tons of tie plates, and the Terminal Railway wants 40 to 50 tons of angle bars. The Missouri, Kansas & Texas Railway's requirements of 200,000 tie plates went to the Railway Supply Co. The work of double tracking and grade revision to be done by the St. Louis & San Francisco, already announced in THE IRON AGE, will begin April 1. A total of 21½ miles will be double tracked. The requirements for 90-lb. rails and all track fastenings will be handled by the United States Steel Corporation under a contract of several years' standing and which has several years to run. The Missouri, Kansas & Texas is in the market for 30 72½-foot passenger coaches. The St. Louis Car Co. got the contract for 50 steel electric passenger cars from the Southern Pacific Railway of San Francisco, the contract for the motors going to the Westinghouse Manufacturing Co., Pittsburgh. The estimated cost of the cars is \$800,000. The biggest sale of structural steel of the week was that of 600 tons to the Stupp Brothers Bridge & Iron Co. by the Jones & Laughlin Steel Co. for all-barge shipment. An arrangement made with an Eastern fabricator for the purchase of 450 tons of structural steel for the Majestic Theater and Office Building, Dallas, has been cancelled and bids are to be asked on this as well as for 100 tons of bars.

For stock out of warehouse we quote: Soft steel bars, 2.37½¢ per lb.; iron bars, 2.37½¢; structural shapes, 2.47½¢; tank plates, 2.47½¢; No. 10 blue annealed sheets, 3.47½¢; No. 28 black sheets, cold rolled, one pass, 4.15¢; cold drawn rounds, shafting and screw stock, 3.50¢; structural rivets, \$3.09½ per 100 lb.; boiler rivets, \$3.19½; tank rivets, 7/16-in. and smaller, 65 and 5 per cent off list; machine bolts, large, 60-10 per cent; small, 60, 70 and 10 per cent; carriage bolts, large, 55-5 per cent; small, 60 and 10 per cent; lag screws, 65-5 per cent; hot pressed nuts, square or hexagon blank, \$4; and tapped, \$3.75 off list.

Coke.—The coke market is improving right along, a condition applying to all grades. Buying is heavier, and there is an insistent demand by purchasers for immediate shipment. The market has advanced, and some Connellsville producers are quoting from \$4.75 to \$5.25.

Old Material.—The market maintains a fairly firm undertone, although some dealers appear to be weakening, because of fear they have carried the market too far, as consumers refuse to pay by about \$1 a ton the

prices paid by the dealers on railroad lists recently closed. There appears to be a heavy short interest among the dealers, as some of them are eager to cover the bought material which they can only dispose of at a loss. The larger consumers contend they are paying the limit and cannot make steel at a profit by buying old material at the advances asked by dealers, as they must either use the cheaper grades or remain out of the market until the present flurry has subsided. Relaying rails are active, and several large inquiries are out for the heavier sections. Light section relayers, however, are not in demand.

We quote dealers' prices f.o.b. consumers' works, St. Louis industrial district and dealers' yards, as follows:

Per Gross Ton	
Old iron rails	\$14.00 to \$14.50
Steel rails, rerolling	12.50 to 13.00
Steel rails, less than 3 ft.	12.50 to 13.00
Relaying rails, standard section	23.00 to 23.00
Cast iron car wheels	15.00 to 15.50
No. 1 heavy railroad melting steel	10.50 to 11.00
No. 1 heavy shovelling steel	10.00 to 10.50
Ordinary shovelling steel	10.00 to 10.50
Progs, switches and guards, cut apart	10.50 to 11.00
Ordinary bundle sheet	4.50 to 5.00
Cast steel bolsters	11.00 to 11.50

Per Net Ton	
Heavy axle and tire turnings	6.50 to 7.00
Iron angle bars	13.00 to 13.50
Steel angle bars	11.00 to 11.50
Iron car axles	18.00 to 18.50
Steel car axles	13.00 to 13.50
Wrought iron arch bars and transoms	15.50 to 16.00
No. 1 railroad wrought	9.50 to 10.00
No. 2 railroad wrought	9.00 to 9.50
Railroad springs	12.00 to 12.50
Steel couplers and knuckles	11.50 to 12.00
Locomotive tires, 42 in. and over, smooth inside	10.00 to 10.50
No. 1 dealers' forge	0 to 9.00
Cast iron borings	5.50 to 6.00
No. 1 busheling	8.50 to 9.00
No. 1 boilers cut in sheets and rings	6.00 to 6.50
No. 1 railroad cast	13.50 to 14.00
Stove plate and light cast	12.50 to 13.00
Railroad malleable	10.50 to 11.00
Agricultural malleable	10.50 to 11.00
Pipes and flues	7.50 to 8.00
Heavy railroad sheet and tank	6.00 to 6.50
Light railroad sheet	3.50 to 4.00
Railroad gate bars	10.50 to 11.00
Machine shop turnings	3.00 to 3.50
Country mixed iron	6.50 to 7.00
Uncut railroad mixed	9.50 to 10.00
Horseshoes	9.50 to 10.00
Railroad brake shoes	10.50 to 11.00

Birmingham

BIRMINGHAM, ALA., March 21.

Pig Iron.—At the close of the week the Birmingham iron market was buoyant except as to price. The base remained at \$15 to \$15.50. Makers expect price to harden following the brisk business done and being done. One maker sold 3000 tons to Belleville, Ohio, stove works, one plant taking 1600 tons. San Francisco took 500 tons at \$15.50 and wants more. A Michigan melter took 750 tons. Sales have been scattered throughout the South, Middle West and Northwest. Woodward Iron Co. blew in its banked furnace and now has three active. One maker has sold March make and 10,000 tons additional for March delivery, has sold capacity for April and 60 per cent of capacity for May. Another maker with no iron on yards has booked April and May to 80 per cent of capacity and two interests have made some third quarter bookings where customers insisted on connecting them with second quarter orders. Several lots of Sheffield iron on the base of \$16 Sheffield were taken by St. Louis melters. Some Eastern business is being figured on and there was a competitive bid on a lot for Pennsylvania. One maker figures putting in another blast furnace soon to care for large bookings and this will probably be done. Active stacks in Alabama now include eight on basic, seven on merchant iron and two on charcoal iron. Small sales of charcoal iron were made the past week. A sanitary manufacturing company with plant at Louisville took 1000 tons of foundry. Consumers are showing a decided interest in forward delivery and there is general conviction that prices have reached the bottom.

We quote per gross ton f.o.b. Birmingham district furnaces as follows:

Foundry, silicon 1.75 to 2.25	\$15.00 to \$15.50
Basic	14.00 to 14.50
Charcoal, warm blast	32.00

Finishing Mills.—In order to have more iron for steel mill purposes, the Tennessee Company blew in

No. 2 stack at Bessemer Monday. It now has seven furnaces on basic iron and is operating the open-hearth plant with nine furnaces on full turn with rail mill on turn of 10,000 tons. Other mills are operating at good capacity as evidenced by increase in blast furnace and open hearth operations. The American Steel & Wire Co. and Gulf States Steel Co. are around 60 per cent of capacity with steady influx of new business.

Cast Iron Pipe.—The American Cast Iron Pipe Co. booked 3000 tons for Seattle and the McWane Iron Pipe Co. booked additional tonnage of its handlength high pressure pipe for Honolulu. Pressure pipe is strong at \$33 base. Sanitary pipe brokers began coming into the market again last of week.

Coal and Coke.—Birmingham district operators have tentative arrangements to supply certain concerns dependent on competitive field in case the strike necessitates that supply. Alabama is so completely non-union that no strike worthy the name can occur here. Coke is strong at \$5. Monterey, Mex., is figuring on a large tonnage.

• **Old Material.**—Cast scrap is active owing to demand on part of pipe shop and steel scrap is beginning to show some strength. Dealers are not yet inclined to raise prices. Yards are short on stocks and buying what is offered.

We quote per gross ton f.o.b. Birmingham district yards as follows:

Steel rails	\$11.00 to \$12.00
No. 1 steel	10.00 to 11.00
No. 1 cast	14.00 to 15.00
Car wheels	13.00 to 14.00
Tramcar wheels	12.00 to 13.00
No. 1 wrought	12.00 to 13.00
Stove plate	11.00 to 12.00
Cast iron borings	6.00 to 7.00
Machine shop turnings	6.00 to 7.00

Buffalo

BUFFALO, March 21.

Pig Iron.—Buying is more general and from a continually widening circle. The price situation shows no change and \$18 is the usual quotation irrespective of silicon. A number of carload sales at \$18.50 have been made and one furnace has sold some tonnages of this character at \$18.75. The largest inquiries now engaging local furnaces are one for 2000 tons and one for 1600 tons. The Donner Steel Co. has two furnaces blowing on foundry iron. The total placement for the week does not exceed 5000 tons.

We quote f.o.b. per gross ton Buffalo as follows:

No. 1 foundry, 2.75 to 3.25 sil.	\$18.50 to \$19.00
No. 2X foundry, 2.25 to 2.75 sil.	18.50 to 19.00
No. 2 plain, 1.75 to 2.25 sil.	18.00 to 18.50
Basic	18.00 to 18.25
Malleable	18.00 to 18.50
Lake Superior charcoal	26.14

Finished Iron and Steel.—The greater buying activity which was apparent a week ago continues and is felt in finished lines such as wire products more than in bars, shapes or plates. Strengthening of wire prices has served to stimulate buying and the 1.50c. price on bars, shapes and plates is more generally observed. Automobile activity has helped the leading wire maker and the enlarged Ford program for the month of March has greatly stimulated operation at this mill. Outside Buffalo, price shading on sheets is reported, but the Buffalo market is firm at \$3c. Release of shipping instructions on some very old contracts has also encouraged sellers. Improvement in demand for cold rolled material is a new development and pipe business has also come in in greater quantity. These improvements are mostly from small buyers. An inquiry for 500 tons of reinforced bars for a Canadian interest is engaging two local makers. The general contract for a new high school at Niagara Falls which will require 500 tons of shapes has been awarded but the steel order has not been placed.

We quote warehouse prices f.o.b. Buffalo as follows: Structural shapes, 2.65c.; plates, 2.85c.; plates, No. 3 gage, 3.35c.; soft steel bars and shapes, 3.55c.; hoops and bands, 3.15c.; blue annealed sheets, No. 10, 3.40c.; galvanized steel sheets, No. 28, 3.75c.; black sheets, No. 28, 4.25c.; cold-rolled strip steel, 5.90c.; cold-rolled round shafting, 3.40c.

Coke.—So many foundries have ordered ahead that the leading seller is virtually out of the market. Prices are stronger, heating coke now being quoted at \$3.50 and best grades of foundry from \$4.50 to \$5.50.

Old Material.—A number of sales of heavy melting steel at \$14 have been made. Considerable negotiating is going on between dealers in possession of stocks of steel, with the dealers who settled with the bar maker for \$21 on an old contract, an account of which was published in THE IRON AGE last week. Demand for borings from Eastern points has been brisk and greater activity in hydraulic compressed and No. 1 machinery cast is also evident.

We quote dealers' asking prices per gross ton f.o.b. Buffalo as follows:

Heavy melting steel	\$13.50 to \$14.00
Low phos., 0.04 and under	16.50 to 17.00
No. 1 railroad wrought	15.00 to 16.00
Car wheels	16.50 to 17.50
Machine shop turnings	8.00 to 9.00
Cast iron borings	9.50 to 10.00
Heavy axle turnings	12.00 to 12.50
Grate bars	12.00 to 13.00
No. 1 busheling	10.00 to 11.00
Stove plate	14.00 to 15.00
Bundled sheet stampings	8.00 to 9.00
No. 1 machinery cast	17.00 to 18.00
Hydraulic compressed	10.50 to 11.50
Railroad malleable	13.00 to 14.00

British Iron and Steel Market

(By Cable)

LONDON, ENGLAND, March 21.

Engineering and shipbuilding labor disputes continue. The Government has refused intervention.

German steel works are endeavoring to purchase their supplies direct from the mine owners.

Continental material is quiet. French foundry pig iron is held at £5 5s. to £5 10s. (\$23 to \$24.09) f.o.b. Luxemburg and Belgian foundry pig iron is quoted at £5 to £5 5s. (\$21.90 to \$23) f.o.b. Cleveland foundry hematite is competing on the Continent.

Belgian, French and Luxemburg merchant bars are obtainable at £8 to £8 10s. (1.56 to 1.66c. per lb.) f.o.b., for May and June delivery. Belgian angles are held at £10 7½s. (2.03c. per lb.) c.i.f. Japan.

Luxemburg structural beams are quoted at £7 10s. to £7 15s. (1.47 to 1.51c. per lb.) f.o.b., for April and May shipments. French beams are held at £8 (1.56c. per lb.) f.o.b., for April and May delivery. Belgian beams are quoted at £7 12½s. to £7 15s. (1.49 to 1.51c. per lb.) f.o.b., for April and May shipment. Belgian 3/16-in. plates are held at £8 12½s. to £9 (1.69 to 1.76c. per lb.) f.o.b., for May and June delivery.

French wire rods are quoted at £9 5s. (\$40.51) f.o.b., for June shipment. Belgian billets are held at £6 10s. (\$28.47) f.o.b., for April delivery. Belgian sheet bars are quoted at £6 12½s. to £6 15s. (\$29.02 to \$29.56) f.o.b., for April shipment.

We quote per gross ton, except where otherwise stated, f.o.b. maker's works, with American equivalent figured at \$4.38 per £1, as follows:

Durham coke, delivered	£1 9s.	\$6.35
Cleveland No. 1 foundry	4 15	20.80
Cleveland No. 3 foundry	4 10	19.71
Cleveland No. 4 foundry	4 7½	19.16
Cleveland No. 4 forge	4 10	19.71
Cleveland basic	4 10	19.71
Hematite	7 0*	30.66*
East Coast mixed	5 0	21.90 to \$23.45
East Coast hematite	4 17½ to 5 0	21.35 to 21.90
Ferromanganese	15 0 to 14 10*	65.70 & 63.51*
Rolls, 60 lb. and up	8 0 to 9 10	35.04 to 41.61
Billets	7 0 to 7 10	30.66 to 32.38
Sheet and tin plate bars, Welsh	7 0 to 7 7½	30.66 to 32.38
Tin plates, base box	0 18½ to 0 19½	4.31 to 4.37
C. per Lb.		
Ship plates	9 5 to 10 10	1.81 to 2.05
Boiler plates	12 10 to 14 0	2.44 to 2.74
Tees	9 10 to 11 0	1.86 to 2.15
Channels	8 15 to 10 5	1.71 to 2.00
Beams	8 10 to 10 0	1.66 to 1.95
Round bars, ½ to 3 in.	10 10	2.05
Galvanized sheets, 24 g.	16 0 to 16 5	3.13 to 3.18
Black sheets	12 10 to 12 15	2.44 to 2.49
Steel hoops	12 0 to 12 5*	2.35 & 2.38*
Cold rolled steel strip, 20 g.	23 10	4.55

*Export price.

Prices Finished Iron and Steel, f.o.b. Pittsburgh

Freight Rates

Freight rates from Pittsburgh on finished iron and steel products, in carload lots, to points named, per 100 lb., are as follows:

Philadelphia, domestic...	\$0.36	Kansas City	\$0.815
Philadelphia, export...	0.265	Kansas City (pipe)...	0.77
Baltimore, domestic...	0.35	St. Paul	0.665
Baltimore, export...	0.255	Omaha	0.815
New York, domestic...	0.38	Omaha (pipe)	0.77
New York, export...	0.285	Denver	1.35
Boston, domestic...	0.405	Denver (wire products)...	1.415
Boston, export...	0.285	Pacific Coast	1.665
Buffalo	0.295	Pacific Coast, ship plates...	1.335
Cleveland	0.24	Birmingham	0.765
Detroit	0.325	Jacksonville, all rail...	0.655
Cincinnati	0.325	Jacksonville, rail and	
Indianapolis	0.345	water	0.46
Chicago	0.38	New Orleans	0.515
St. Louis	0.475		

The minimum carload to most of the foregoing points is 36,000 lb. To Denver the minimum loading is 40,000 lb., while to the Pacific Coast on all iron and steel products, except structural material, the minimum is 80,000 lb. On the latter item the rate applies to a minimum of 50,000 lb., and there is an extra charge of 9c. per 100 lb. on carloads of a minimum of 40,000 lb. On shipments of wrought iron and steel pipe to Kansas City, St. Paul, Omaha and Denver the minimum carload is 46,000 lb. On iron and steel items not noted above the rates vary somewhat and are given in detail in the regular railroad tariffs.

Rates from Atlantic Coast ports (i.e., New York, Philadelphia and Baltimore) to Pacific Coast ports of call on most steamship lines, via the Panama Canal, are as follows: Pig iron, 55c.; ship plates, 75c.; ingot and truck bars, structural steel, common wire products, including cut or wire nails, spikes and wire hoops, 75c.; sheets and tin plates, 60c. to 75c.; rods, wire rope, cable and strands, \$1; wire fencing, netting and stretcher, 75c.; pipe, not over 3 in. in diameter, 75c.; over 3 in. in diameter, 25c. per in. or fraction thereof additional. All prices per 100 lb. in carload lots, minimum 40,000 lb.

Structural Material

I-beams, 3 to 15 in.; channels, 3 to 15 in.; angles, 3 to 6 in., on one or both legs, 3/4 in. thick and over, and zees, structural sizes, 1.40c. to 1.50c.

Sheared plates, 1/4 in. and heavier, tank quality, 1.40c. to 1.50c.

Wire Products

Wire nails, \$2.40 base per keg; galvanized, 1 in. and longer, including large-head barbed roofing nails, taking an advance over this price of \$1.25 and shorter than 1 in., \$1.75; bright Bessemer and basic wire \$2.25 per 100 lb.; annealed fence wire, Nos. 6 to 9, \$2.25; galvanized wire, \$2.75; galvanized barbed wire, \$3.05; galvanized fence staples, \$3.05; painted barbed wire, \$2.55; polished fence staples, \$2.55; cement-coated nails, per count keg, \$1.90; these prices being subject to the usual advances for the smaller trade, all f.o.b. Pittsburgh, freight added to point of delivery, terms 60 days, net, less 2 per cent off for cash in 10 days. Discounts on woven-wire fencing are 70 1/2 per cent off list for carload lots; 69 1/2 per cent for 1000-rod lots, and 68 1/2 per cent for small lots, f.o.b. Pittsburgh.

Bolts and Nuts

Machine bolts, small, rolled threads, 70, 10 and 10 per cent off list

Machine bolts, small, cut threads, 70 and 10 per cent off list

Machine bolts, larger and longer, 70 and 10 per cent off list

Carriage bolts, 3/4 in. x 6 in.:

Smaller and shorter rolled threads, 70 and 10 per cent off list

Cut threads, 70 per cent off list

Longer and larger sizes, 70 per cent off list

Lag bolts, 70, 10 and 5 per cent off list

Plug bolts, Nos. 1, 2 and 3 heads, 60 and 10 per cent off list

Other style heads, 20 per cent extra

Machine bolts, c.p.c. and t. nuts, 3/4 in. x 4 in.:

Smaller and shorter, 65, 10 and 5 per cent off list

Larger and longer sizes, 65 and 10 per cent off list

Hot pressed sq. or hex. blank nuts, \$5.50 off list

Hot pressed nuts, tapped, \$5.25 off list

C.p.c. and t. sq. or hex. blank nuts, \$5.25 off list

C.p.c. and t. sq. or hex. blank nuts, tapped, \$5.00 off list

Semi-finished hex. nuts:

1/4 in. to 9/16 in. inclusive, .80, 10, 10 and 10 per cent off list

Small sizes S. A. E., .80 and 10 per cent off list

1/2 in. to 1 in. inclusive, U. S. S. and S. A. E., 70, 10, 10 and 10 per cent off list

Stove bolts in packages, 80 and 3 tens and 5 per cent off list

Stove bolts in bulk, 80, 3 tens and 2 1/2 per cent off list

Tire bolts, 70, 10 and 5 per cent off list

Track bolts, carloads, 3c. base

Track bolts, less than carloads, 3.75c. to 4c. base

Upset and Hex. Head Cap Screws

3/4 in. and under, 80 and 10 to 80, 10 and 10 per cent off list

9/16 in. to 1 in., 80 and 10 to 80, 10 and 10 per cent off list

Upset Set Screws

3/4 in. and under, 80, 10 and 5 to 85 per cent off list

9/16 in. to 1 in., 80, 10 and 5 to 85 per cent off list

Milled Square and Hex. Cap Screws

All sizes, 75 and 10 to 80 per cent off list

Milled Set Screws

All sizes, 70, 10 and 10 per cent off list

Rivets

Large structural and ship rivets, \$2.00 to \$2.10
Large boiler rivets, 2.10 to 2.20
Small rivets, .75 and 10 off list

Wire Rods

No. 5 common basic or Bessemer rods to domestic consumers, \$36; chain rods, \$36; screw stock rods, \$41; rivet and bolt rods and other rods of that character, \$36; high carbon rods, \$43 to \$46, depending on carbons.

Railroad Spikes and Track Bolts

Railroad spikes, 9/16-in. and larger, \$2 to \$2.10 base per 100 lb. in lots of 200 kegs of 200 lb. each or more; spikes, 1/2-in., 3/4-in. and 7/16-in., \$2.15 to \$2.25 base, 5/16-in., \$2.15 to \$2.25 base. Boat and barge spikes, \$2.15 to \$2.25 base per 100 lb. in carload lots of 200 kegs or more, f.o.b. Pittsburgh. Track bolts, 3c. base per 100 lb. Tie plates, \$1.75 per 100 lb. Angle bars, \$2.40 per 100 lb.

Terne Plates

Prices of terne plates are as follows: 8-lb. coating, 290 lb., \$9.30 per package; 8-lb. coating, 1 C., \$9.60; 15-lb. coating, 1 C., \$11.80; 20-lb. coating, 1 C., \$13; 25-lb. coating, 1 C., \$14.25; 30-lb. coating, 1 C., \$15.25; 35-lb. coating, 1 C., \$16.25; 40-lb. coating, 1 C., \$17.25 per package, all f.o.b. Pittsburgh, freight added to point of delivery.

Iron and Steel Bars

Steel bars, 1.40c. to 1.50c. from mill. Refined bar iron, 2c. to 2.10c.

Welded Pipe

The following discounts are to jobbers for carload lots on the Pittsburgh basing card:

Butt Weld				Iron			
Inches	Steel	Black	Galv.	Inches	Black	Galv.	
1/4 to 3/4	54 1/2	28	33 1/2	1 1/2 to 2	36 1/2	42 1/2	+22 1/2
1/2 to 1	60	33 1/2	38 1/2	2 to 2 1/2	42 1/2	48 1/2	27 1/2
1 to 1 1/2	65	38 1/2	43 1/2	2 1/2 to 3	48 1/2	54 1/2	27 1/2
1 1/2 to 2	69	43 1/2	48 1/2	3 to 3 1/2	54 1/2	60 1/2	27 1/2
2 to 3	71	48 1/2	54 1/2	3 1/2 to 4	60 1/2	66 1/2	27 1/2

Lap Weld				Iron			
Inches	Steel	Black	Galv.	Inches	Black	Galv.	
1/4 to 3/4	64	51 1/2	56 1/2	1 1/2 to 2	39 1/2	45 1/2	25 1/2
1/2 to 1	68	56 1/2	61 1/2	2 to 2 1/2	45 1/2	51 1/2	29 1/2
1 to 1 1/2	65	53 1/2	58 1/2	2 1/2 to 3	51 1/2	57 1/2	27 1/2
1 1/2 to 2	66	54 1/2	59 1/2	3 to 3 1/2	57 1/2	63 1/2	27 1/2
2 to 3	64	52 1/2	57 1/2	3 1/2 to 4	63 1/2	69 1/2	27 1/2

Butt Weld, extra strong, plain ends				Iron			
Inches	Steel	Black	Galv.	Inches	Black	Galv.	
1/4 to 3/4	33	38 1/2	43 1/2	1 1/2 to 2	35 1/2	41 1/2	+37 1/2
1/2 to 1	38 1/2	43 1/2	48 1/2	2 to 2 1/2	41 1/2	47 1/2	28 1/2
1 to 1 1/2	43 1/2	48 1/2	53 1/2	2 1/2 to 3	47 1/2	53 1/2	28 1/2
1 1/2 to 2	48 1/2	53 1/2	58 1/2	3 to 3 1/2	53 1/2	59 1/2	28 1/2
2 to 3	53 1/2	58 1/2	63 1/2	3 1/2 to 4	59 1/2	65 1/2	28 1/2

Lap Weld, extra strong, plain ends				Iron			
Inches	Steel	Black	Galv.	Inches	Black	Galv.	
1/4 to 3/4	62	50 1/2	55 1/2	1 1/2 to 2	40 1/2	46 1/2	27 1/2
1/2 to 1	66	54 1/2	59 1/2	2 to 2 1/2	46 1/2	52 1/2	31 1/2
1 to 1 1/2	65	53 1/2	58 1/2	2 1/2 to 3	52 1/2	58 1/2	30 1/2
1 1/2 to 2	61	49 1/2	54 1/2	3 to 3 1/2	58 1/2	64 1/2	28 1/2
2 to 3	55	43 1/2	48 1/2	3 1/2 to 4	64 1/2	70 1/2	18 1/2

To the large jobbing trade the above discounts are increased by one point, with supplementary discounts of 5 and 2 1/2 per cent.

Boiler Tubes

The following are the discounts for carload lots f.o.b. Pittsburgh:

Lap Welded Steel				Charcoal Iron			
Inches	Steel	Black	Galv.	Inches	Black	Galv.	
1 1/2 in.	26 1/2	32 1/2	37 1/2	1 1/2 in.	5	10	
2 to 2 1/2 in.	41	47 1/2	52 1/2	1 3/4 to 1 1/2 in.	15	20	
2 1/2 to 3 in.	52	58 1/2	63 1/2	2 to 2 1/4 in.	25	30	
3 1/4 to 13 in.	57	63 1/2	68 1/2	2 1/4 to 3 in.	30	35	
				3 1/4 to 4 1/2 in.	32	37	

To large buyers of steel tubes, a supplementary discount of 5 per cent is allowed.

Standard Commercial Seamless Boiler Tubes

New discounts have been adopted on standard commercial seamless boiler tubes, but manufacturers are not yet ready to announce them for publication, and for that reason we publish no discounts this week.

Sheets

Prices for mill shipments on sheets of standard gage in carloads, f.o.b. Pittsburgh, follow:

Blue Annealed				Hot Rolled			
Cents per Lb.				Cents per Lb.			
Nos. 8 and heavier	2.20	Nos. 11 and 12	2.30	Nos. 11 and 12	2.30	Nos. 13 and 14	2.35
Nos. 9 and 10 (base)	2.25	Nos. 13 and 14	2.35	Nos. 15 and 16	2.45		

Box Annealed, One Pass Cold Rolled				Two Pass Cold Rolled			
Cents per Lb.				Cents per Lb.			
Nos. 17 to 21	2.80	Nos. 28 (base)	3.00	Nos. 29	3.10	Nos. 30	3.20
Nos. 22 to 24	2.85						
Nos. 25 and 26	2.90						
Nos. 27	2.95						

Galvanized				Tin-Mill Black Plate			
Cents per Lb.				Cents per Lb.			
Nos. 10 and 11	3.00	Nos. 25 and 26	3.70	Nos. 15 and 16	2.80	Nos. 28 (base)	3.00
Nos. 12 to 14	3.10	Nos. 27	3.85	Nos. 17 to 21	2.85	Nos. 29	3.05
Nos. 15 and 16	3.25	Nos. 28 (base)	4.00	Nos. 22 to 24	2.90	Nos. 30	3.05
Nos. 17 to 21	3.40	Nos. 29	4.25	Nos. 25 to 27	2.95	Nos. 30 1/2 and 31	3.10
Nos. 22 to 24	3.55	Nos. 30	4.50				

PERSONAL

Charles F. Smith, chairman of the board of directors of the New Britain Machine Co., New Britain, Conn., recently resigned.

Vincent S. Whitney has become sales manager of Bridgeport sales for the Shea Foundry & Machine Co., Bridgeport, Conn.

Louis W. Arny, secretary of the Leather Belting Exchange, Philadelphia, addressed the Meriden, Conn., branch of the American Society of Mechanical Engineers, on leather and leather belting, at a meeting held at the Home Club, Meriden, March 16.

Albert Turner recently joined the engineering department of the Heald Machine Co., Worcester, Mass. Mr. Turner was formerly with the Norton Co., Worcester, where he was engineer for 19 years.

M. M. Marcus, E. M., Met. E., and general superintendent Rhode Island Malleable Iron Works, Hills-grove, R. I., on March 14 spoke before the Providence Engineering Society, Providence, R. I., on certified malleable iron castings, describing the modern scientific practice in the manufacture of malleable iron castings.

Harry V. Hayman, sales manager Automatic Machine Co., Bridgeport, Conn., recently resigned, has accepted a position as sales manager of the Wellman-Seaver-Morgan Co., Cleveland. Mr. Hayman was with the Automatic Machine Co. for 13 years.

John C. Neale, vice-president in charge of sales of the Midvale Steel & Ordnance Co., Philadelphia, accompanied by Mrs. Neale, has left on a business trip to the Pacific Coast.

Webster D. White has resigned from the position of secretary and treasurer of Kemsley, Millbourn & Co., Ltd., 90 West Street, New York, and Robert R. Appleby has been appointed in his stead.

George E. Learnard, president International Combustion Engine Co., New York, sailed March 21 on the Aquitania for London. Mr. Learnard will be engaged part of his time on business of the company in London and will spend some time on the continent.

W. J. Paul has been appointed by the General Drop Forge Co., Inc., Buffalo, as Eastern district representative, with offices in the Woolworth Building, New York. He will also have charge of the Philadelphia offices in the Drexel Building.

W. A. Thomas, former president of the Brier Hill Steel Co., has been elected a director of the General Fireproofing Co., Youngstown, Ohio, succeeding R. M. Bell, resigned. The latter continues as secretary-treasurer.

William Ochse, for the past two years sales representative Manning, Maxwell & Moore, Inc., at Chicago, has resigned to become efficiency engineer the Ohio Machine Tool Co., Kenton, Ohio, manufacturer of shapers and planers, effective April 1. Before joining the sales organization of Manning, Maxwell & Moore, Mr. Ochse was for 20 years with Gould & Eberhardt, manufacturers of shapers and automatic gear and rack cutting machinery, Newark, N. J., latterly having charge of their planning and tool design department.

J. R. Camm has been appointed assistant to C. J. Sturgeon, manager of the Cleveland office of the Kearney & Trecker Corporation, milling machines, Milwaukee, and will cover the southern part of Ohio, with residence at Dayton. Mr. Camm is a brother of John A. Camm, sales manager of the Kearney & Trecker Corporation, and has been connected with the Milwaukee office for the past two years.

Nils Anderson, president Debevoise-Anderson Co., Inc., was elected a director of the Queen's Run Refractories, Inc., Lock Haven, Pa., at the annual meeting of latter company, in Boston March 14.

John J. Brant, for 20 years identified with the accounting department of the Youngstown Sheet & Tube Co., who retired Jan. 1 as general auditor, has been appointed secretary of the Sinking Fund Commission of Youngstown, Ohio.

Joseph G. Butler, Jr., is slowly convalescing at his home in Youngstown from injuries sustained last year when he was struck by a motor truck. Mr. Butler receives friends and business callers each day at his residence, 525 Wick Avenue and transacts business from his home. Almost every day he visits the McKinley Memorial building at Niles, Ohio, which he was instrumental in building.

Charles A. Sargeant has been elected president of the Domhoff & Joyce Company, pig iron merchants, Cincinnati, to succeed his father, the late Col. John Sargeant, who died on March 4. Mr. Sargeant has also been appointed a colonel on the staff of Governor Edwin P. Morrow of Kentucky, the honor being conferred as a tribute to himself and to the memory of his father. Mr. Sargeant is one of the youngest men to ever receive such an honor.

W. J. Metcalf has been chosen as assistant to the president of the Yale & Towne Mfg. Co., Stamford, Conn., and Richard G. Plumley, has been made manager of the order department, as per announcements just made by President Walter C. Allen.

William H. Hulick, Jr., son of William H. Hulick, president Warren Foundry & Machine Co., 11 Broadway, New York, has joined the sales force of that company. He was formerly with the Frederick Snare Corporation, 8 West Fortieth St., New York.

Horace S. Peck, comptroller, S-K-F Industries, Inc., New York has resigned through reorganization of the personnel of the company and has been succeeded by T. W. Dinlocker, formerly assistant comptroller. Both Mr. Peck and Mr. Dinlocker had been associated with the company for about two years.

Prof. J. H. Moffett, formerly metallurgical engineer at the University of Cincinnati, but at present in charge of foundry practice in the department of mechanical engineering at the University of Minnesota, Minneapolis, is carrying out a research on the Relative Rates of Elimination of Oxidizable Elements in Cast Iron.

Norman L. Snow has resigned as vice-president and active head of the Terry Steam Turbine Co., Hartford, Conn., to become president and treasurer of the Diamond Power Specialty Corporation, Detroit, a new company which has purchased the business and plant of the Diamond Power Specialty Co., a copartnership, the members of which are retiring from the soot blower business in the western hemisphere.

W. C. Allen, former manager of the Philadelphia branch of the Black & Decker Mfg. Co., Baltimore, and subsequently special representative, has been made branch manager of the Black & Decker Chicago territory.

The New Spanish Tariff

WASHINGTON, March 18.—While in some instances the changes are only slight, the general trend of duties carried in the new Spanish tariff as it affects iron and steel products and machinery is decidedly upward. The new tariff as explained by Henry Chalmers, Chief Division of Foreign Tariff, Bureau of Foreign and Domestic Commerce, continues the two scales of duty known as the "First" and "Second" tariffs. While Spain has abrogated most of her commercial treaties preliminary to this revision of the tariff, the products of most countries, including the United States, are being temporarily granted most-favored-nation treatment, including the rates of the "Second," or lower tariff, which are the only ones here shown. The rates of the "First" tariff are, as a rule, two to three times as high as the "Second," and are to be applied to such countries as do not within a reasonable period open negotiations for reciprocal favored-nation treaties with Spain.

OBITUARY

EDWARD M. BARR, manager of the Chicago office of Chisholm-Moore Mfg. Co., died March 15. Mr. Barr had complained of not feeling well for several days and dropped dead suddenly while downtown in Chicago. He had been with the company 11 years, in charge of the Chicago office, and has a wide acquaintance in the Chicago district. Mr. Barr was born and raised in Milwaukee and lived there until he went into business about 20 years ago. He was the son of J. M. Barr, formerly assistant to President A. J. Earling of the Chicago, Milwaukee & St. Paul Railroad, and one of the pioneer railroad men in the West. He leaves his wife and one son.

MRS. HENRIETTA ELIZABETH BROWN died last week at Newton Center, Mass. She was the daughter of the late Henry J. R. Farnum, senior partner of the Davis & Farnum Mfg. Co., Waltham, Mass., iron founders. In 1877 she was married to Frank H. Brown, manager of the same concern. He died four years ago, and, since that time, the widow served as vice-president of the company and took an active interest in its affairs.

JAMES A. DOUGHTY, president Torrington Mfg. Co., Torrington, Conn., died of heart failure at his home March 15. Mr. Doughty was very well known in industrial activities of the New England States, and held official positions with several concerns. He also served as an official of the American Brass Co., Waterbury, Conn., for a number of years. He was 71 years of age.

GORDON M. MCGREGOR, of Windsor, Ont., vice-president and general manager of the Canadian Ford Motor Co., who died last week, was a prominent industrial figure of Canada. When his father died in 1903, he succeeded to the presidency of the Walkerville Wagon Works, a rather unprofitable concern, and it was from this nucleus that Mr. McGregor developed the Canadian branch of the Ford Motor Co., which became one of the most extensive and profitable manufacturing companies in the Dominion. The new company was started with a capitalization of \$125,000, of which Mr. McGregor raised \$40,000 himself by selling stock. Henry Ford received 51 per cent of the stock in return for his patents and a contract reserving Canada for the new company. In 1911 the capitalization was increased to \$1,000,000, and in 1916 to \$10,000,000.

HARRY DEAN BUSH, general superintendent of the Carnegie Steel Co., Baltimore, died on March 15 at his home in Baltimore, aged 64. Mr. Bush was born in Springfield, Mass. He began his career as a civil engineer with the old R. F. Hawkins bridge plant at Springfield, and at the end of two years became bridge engineer for the Northern Pacific Railroad. He also served for a year as assistant engineer in the office of George S. Morrison, New York, and later became superintendent for the Dominion Bridge Co., Ltd., Montreal. In 1903 Mr. Bush became vice-president and manager of the Baltimore Bridge Co., Baltimore. He was a member of the American and Canadian Societies of Civil Engineers and the Engineers' and Whitehall Clubs of New York.

CHARLES H. BOLLES, aged 90, of Bolles, White & Co., Hartford, Conn., hardware dealers, died March 9, at his home in Charlestown. Mr. Bolles was born in Hartford in 1831, going to Boston in 1861, where he engaged in the hardware business, later becoming a member of the firm of Benjamin Callender & Co. This company later became Bolles, White & Co. Mr. Bolles had not taken an active part in the business for the past 15 years.

Management, "looking backward and forward," is to be discussed at a meeting of the Providence Engineering Society on the evening of April 4 by Carle M. Bigelow, of the Cooley & Marvin Co., accountant, appraiser and engineer, Boston.

ORE RATE CONTROVERSY

Railroads File Tariffs of New Rates Opposed by Buffalo Furnaces

WASHINGTON, March 21.—Railroads have filed tariffs with the Interstate Commerce Commission proposing reductions, effective April 17, of 20 per cent in ore handling charges and in ore rates from lower Lake ports to interior furnaces. The tariffs are in accordance with those which were specified in the Cleveland report of THE IRON AGE last week. The new schedules began to arrive on March 16, the first being those of the Buffalo, Rochester & Pittsburgh Railroad, which provided lower rates and charges from Buffalo on traffic to DuBois (Adrian furnace), Josephine, Lindsey, and Punxsutawney, Pa., and are typical of the others that have been filed as they relate to the percentage of reductions in rates and handling charges.

The following table shows the present and proposed line haul rates over the Buffalo, Rochester & Pittsburgh Railroad, together with the charge for handling ore from vessels to the car and the aggregate:

Rules on Traffic Originating in the United States From Buffalo (B., R. & P. Tracks)

To	Present Rates			Effective April 17, 1922		
	Line Haul	Vessel to Car	Aggregate	Line Haul	Vessel to Car	Aggregate
DuBois (Adrian Furnace)	98	8 1/2	106 1/2	78	7	85
Josephine	119	8 1/2	127 1/2	95	7	102
Lindsey	98	8 1/2	106 1/2	78	7	85
Punxsutawney						

As pointed out in THE IRON AGE of last week, Buffalo iron and steel makers have protested against the reduced rates and have asked that they be suspended.

Previous to their decision to make the 20 per cent cuts, executives of the Eastern carriers held a conference with executives of the Northwestern railroads carrying ore from the mines in the Lake Superior region to upper docks. The representatives of the Eastern lines suggested that the Northwestern carriers make a 25 per cent reduction in the rates from the mines to the upper docks. Apparently this was done both to placate the Buffalo district producers and have them withdraw their protest and to have the Lake Superior ore shippers withdraw their complaint in the so-called Adriatic Mining Co. case against rates on ore from Lake Superior mines to upper ports. It has been stated that even if this reduction had been proposed, it would not have been acceptable to either the Buffalo iron and steel producers or the ore interests in the Lake Superior district. The former are urgently seeking lower coal and coke rates before agreeing to reduced ore rates from lower Lake ports and also contend that ore rates already are relatively lower than fuel rates to Buffalo. At the same time, ore interests in the Lake Superior district not only are asking for reduced rates, but are also asking for restoration of the old relationship of rates between the Minnesota mines on the one hand and the old range mines on the other.

The upper Lake lines themselves strongly opposed any reductions and flatly refused to make them. Their representatives expressed the opinion that a 25 per cent reduction would not satisfy the complainants in the Adriatic case and they emphasized the fact that these complainants were also seeking restoration of the old relationship of rates. They also expressed doubt as to the ability of the Eastern carriers to persuade the Lake front furnace interests to withdraw their opposition simply by showing them that it would be to their advantage if a cut were made in rates from mines to upper docks, though the Buffalo producers are asking that this be done, but do not stop there. The executives of the Northwestern carriers also claimed that such a cut would be to the advantage of the interior furnaces and consequently leave unsolved the question of relationship between rates on ore from the lower Lake ports to interior furnaces and the rates on coal and coke from the mines and ovens near the interior furnaces to Lake front furnaces.

NON-FERROUS METALS

The Week's Prices

Cents Per Pound for Early Delivery

March	Copper, New York		Tin Straits		Lead		Zinc	
	Lake	Electrolytic*	New York	New York	*St. Louis	New York	St. Louis	
15	13.00	12.75	29.12½	4.70	4.42½	5.00	4.65	
16	13.00	12.75	28.62½	4.70	4.42½	5.05	4.70	
17	13.00	12.75	29.00	4.70	4.42½	5.05	4.70	
18	13.00	12.75	.....	4.70	4.42½	5.05	4.70	
20	13.00	12.75	29.00	4.70	4.42½	5.07½	4.72½	
21	13.00	12.75	29.12½	4.70	4.42½	5.07½	4.72½	

*Refinery quotation.

New York

NEW YORK, March 21.

The markets are only moderately active and prices are steady to firm. Buying of copper has been in good volume but prices are no higher. The tin market has been exceedingly dull with prices fairly steady. Lead consumption continues in steady volume. The zinc market is fundamentally unchanged but prices are a little stiffer.

Copper.—Despite the fact that according to various estimates sales of copper thus far this month have been between 70,000,000 and 100,000,000 lb., prices have not advanced. It is still possible to buy electrolytic copper for any delivery through May at 13c., delivered, or 12.75c., refinery. Inquiries and sales are not quite as numerous this week as last, but the volume is good with both domestic and foreign sales involved. Some producers are unwilling to sell at present prices, but the market in general is fairly broad.

Tin.—The market for Straits tin has been extremely quiet with hardly one day of real activity in the past week. Prices have hovered around 29c., New York, for spot Straits with the quotation to-day at 29.12½c., New York. Consumers are apparently well provided despite the pronounced activity in the tin plate market. Prices in London to-day were about £1 per ton higher than a week ago, with spot standard at £143 7s. 6d., future standard at £144 17s. 6d. and spot Straits at £145 17s. 6d. Arrivals thus far this month have been 5375 tons with 6165 tons reported afloat.

Lead.—Buying of lead continues in a volume apparently equal to production and there has been substantially no change in prices, except a slightly stronger market at St. Louis. The leading interest still quotes 4.50c., St. Louis, or 4.70c., New York, with wholesale lots for early or April delivery, while independents are selling on a basis of 4.40c. to 4.45c., St. Louis, sales being noted at both these levels, and 4.70c. to 4.75c., New York and Eastern points.

Zinc.—The gradual advance in prices for prime Western zinc, which has been going on for some weeks, continues and quotations are slightly higher at 4.72½c., St. Louis, or 5.07½c., New York, for wholesale lots for March-April delivery, although spot delivery can be obtained at 4.70c., St. Louis, or 5.05c., New York. The apparent strength of the market is due more to the attitude of sellers than to any marked increase in demand.

Old Metals.—Business is more active and values are firmer. Dealers' selling prices are as follows:

	Cents Per Lb.
Copper, heavy and crucible.....	12.50
Copper, heavy and wire.....	11.50
Copper, light and bottoms.....	9.50
Heavy machine composition.....	9.50
Brass, heavy.....	7.25
Brass, light.....	5.75
No. 1 red brass or composition turnings.....	8.00
No. 1 yellow red brass turnings.....	6.25
Lead, heavy.....	4.25
Lead, tea.....	3.25
Zinc.....	3.00

Antimony.—The market is unchanged at 4.20c., New York, duty paid, for wholesale lots for early delivery.

Aluminum.—The leading interest continues to quote

virgin metal, 98 to 99 per cent pure, for early delivery in wholesale lots at 19c. to 19.10c., f.o.b. plant, depending on the quantity and the same grade from foreign sources is quoted by importers at 17c. to 18c., duty paid.

Chicago

MARCH 21.—Although there has been more buying in small lots, the market is on the whole very quiet. Lead and zinc have advanced slightly. The old metals are unchanged. We quote in carload lots: Lake copper, 13.25c. to 13.50c.; tin, 30.50c.; lead, 4.55c.; spelter, 4.80c.; antimony, 6c., in less than carload lots. On old metals we quote: Copper wire, crucible shapes and copper clips, 9.50c.; copper bottoms, 7.50c.; red brass, 7.50c.; yellow brass, 6c.; lead pipe, 3.25c.; zinc, 2c.; pewter, No. 1, 22c. tin foil, 23c.; block tin, 25c.; all buying prices for less than carload lots.

St. Louis

MARCH 21.—The market for lead and zinc is slightly better. We quote lead at 4.35c. to 4.45c., car lots, and slab zinc, 4.65c. to 4.75c. On old material we quote: Light brass, 8.50c.; heavy red brass, 7c.; light copper, 7c.; heavy yellow brass, 4c.; heavy copper and copper wire, 7.50c.; pewter, 15c.; tin foil, 16c.; tea lead, 2c.; aluminum, 9c.

Some Improvement in February Fabricated Steel Business

In February 78,700 tons of fabricated structural steel work was contracted for throughout the United States, against 72,100 tons in January and 71,500 in December. The improvement of February over January is not quite 10 per cent, while the average February bookings for the preceding decade have averaged 13½ per cent over the January bookings for the same ten years. In short, the average February tonnage booked for the years 1912 to 1921, inclusive, has been 94,000 tons and the corresponding figure for January 82,800 tons.

The tabulation of the volume of business taken by the bridge and structural shops of the country was made by George E. Gifford, secretary of the Bridge Builders and Structural Society, 50 Church Street, New York. It indicates that 43½ per cent of shop capacity was covered, the total monthly capacity being put at 180,000 tons. The volume of business in January was 40 per cent of capacity. Incidentally, as a possible commentary on the large fabricating capacity of the country, it may be added that for all of the preceding decade the average amount of business did not take more than 55 to 60 per cent of the capacity of the country's shops.

Rehearing Asked in Hardwood Case

WASHINGTON, March 21.—Motion for rehearing or modification of the United States Supreme Court's decree in the American Hardwood case will be made by L. C. Boyle, general counsel, this week. He will ask the highest tribunal to more definitely state whether its judgment in the so-called open-competition case means absolute prohibition or inhibition on gathering industrial statistics and the distribution of this data to memberships of various trade organizations. The court will also be requested to determine whether such activity is prohibitive only when used in connection with other factors of the trade association work which reflect agreement or understanding as to fixed prices or curtailed production. The outcome of the Supreme Court action in this matter will be of utmost importance to all lines of industry. The trade associations are manifestly uncertain as to methods of procedure in view of the hardwood decision. Secretary of Commerce Hoover is cognizant of the situation and as a consequence, has called a meeting of various trade bodies in this city on April 12, for the purpose of discussing trade association work and devising lines of operation in accordance with the views of the Department of Justice and the Department of Commerce.

IRON AND INDUSTRIAL STOCKS

Trend of Values Indicates Confidence Among Investment Public

The investment security market has shown little uneasiness over the pending scheduled coal strike. Industry has had ample time to secure adequate supplies of bituminous to tide it over several weeks. The firmer undertone of prices as quoted in such basic industries as the steel and pig iron, together with recoveries in grain and cotton values, indicates a strengthening of buying power, and, with continued ease in the money market in the face of larger outstanding loans, explains in a large measure the confidence felt in security investment circles. Individual developments like the passing of the Crucible Steel dividend temporarily check the movement, but the trend of stock values in general continues upward. The stability of stocks like United States Steel common, General Electric and Union Pacific is a sustaining influence on investment sentiment.

The range of prices on active iron and industrial stocks from Monday of last week to Monday of this week was as follows:

Allis-Chal. com.	46 1/4 - 47 1/4	Lima Loco. com.	101 - 104 1/4
Allis-Chal. pf.	92 - 93 1/4	Lima Loco. pf.	101 1/4 - 104
Am. B.S. & F. com.	58 - 60 1/4	Midvale Steel.	29 1/4 - 32 1/4
Am. B.S. & F. pf.	103 - 107	Nat.-Acme	12 1/4 - 13
Am. Can. com.	44 - 47 1/4	Nat. E. & S. com.	35 - 37 1/2
Am. Can. pf.	102 1/2 - 104	Nat. E. & S. pf.	85
Am. C. & F. com.	152 - 156 1/4	N. Y. Air Brake.	62 1/2 - 63
Am. Loco. com.	108 - 109 1/4	Nova Scotia Steel	23 - 25
Am. Loco. pf.	117 - 118	Otis Steel	10 1/4 - 12 1/4
Am. Rad. com.	87 - 90 1/4	Otis Steel pf.	45 - 46
Am. St. Pd. com.	33 1/4 - 34	Pittsburgh St. pf.	85 - 86
Bald. Loco. com.	106 1/2 - 108 1/4	Pressed St. com.	68 - 72
Bald. Loco. pf.	109	Pressed St. pf.	92 - 93
Beth. Steel com.	59 1/4 - 68 1/4	Ry. St. Sp. com.	97 1/4 - 99
Beth. St. Cl. B.	63 1/4 - 65 1/4	Ry. St. Sp. pf.	115 1/4
Beth. St. 8% pf.	109	Replough Steel	30 1/4 - 33
Brier Hill St. cm.	17 1/4	Republic com.	50 1/4 - 51 1/4
Brit. Em. Steel.	8 1/4 - 9	Republic pf.	77 1/4 - 78 1/4
Brit. Em. St. 1 pf.	59 1/4 - 61 1/4	Sloss com.	36 1/4 - 41 1/4
Brit. Em. St. 2 pf.	19 1/4 - 19 1/2	Steel & Tube.	69 1/4 - 74
Chic. Pneu. Tool.	65 1/4 - 66	Steel of Can.	57 - 62
Colo. Fuel	27 1/4 - 30 1/4	Stewart-Warner.	36 - 37 1/4
Crucible St. com.	53 1/4 - 58 1/4	Superior Steel.	27 - 27 1/4
Crucible St. pf.	80 - 85	Transue-Williams	33 1/4 - 37 1/4
Deere & Co. pf.	71 - 71 1/4	Un. Alloy Steel.	28 1/4 - 30 1/4
Gen. Electric	155 - 156 1/4	U. S. Pipe com.	31 1/4 - 35 1/4
Gt. Nor. Ore Cert	34 1/4 - 36 1/4	U. S. Pipe pf.	64 - 70
Gulf States Steel	71 - 74 1/4	U. S. Steel com.	94 - 96 1/4
Harbison-Walker.	96 - 96 1/2	U. S. Steel pf.	116 1/4 - 117 1/4
Inland Steel	48 1/4 - 49	Vanadium Steel.	37 - 39 1/4
Int. Har. com.	82 - 94 1/4	V. I. C. & Coke.	44 - 45
Int. Har. pf.	107 1/4 - 110	Westinghouse Air Br.	84 - 85
Lackawanna St.	47 1/4 - 49	Whitcomb Elec.	57 - 58 1/4

Industrial Finances

The Ohio Body & Blower Co., Cleveland, in its annual report for 1921 shows an operating loss of \$391,568. Deductions for interest charges, depreciation, etc., brought the total net loss up to \$558,000, leaving a net surplus Dec. 31 of \$909,317.

The Youngstown Sheet & Tube Co., Youngstown, Ohio, has declared the regular quarterly dividends of 50c. per share on common stock and \$1.75 on preferred, both payable April 1 to holders of record March 20. The common dividend is the same as has been paid quarterly since June 30, 1921.

In common with the machine tool industry, the small tool suffered last year as a result of the business depression, as is shown by the 1921 report of the Chicago Pneumatic Tool Co. That document gives the net income, after providing for Federal taxes and depreciation, as \$158,107, contrasted with \$1,869,093 for 1920. There was a balance before dividends of \$118,364 and a deficit after dividends of \$499,286, whereas after paying larger dividends in the previous year there was a surplus of approximately \$335,000.

The Union Tank Car Co. reports net earnings for 1921, after deductions for depreciation, amortization and taxes, of \$1,002,625, as compared with \$3,393,063 in 1920. After dividends on the common and preferred stock there was a deficit of \$677,375, against a surplus in 1920 of \$2,049,620. Surplus at the close of 1921 stood at \$10,815,177, against \$11,492,552 at the end of 1920.

The Vanadium Corporation of America for the year ended Dec. 31, 1921, had a net loss after all charges and depreciation of \$427,546. The previous report covered 15 1/2 months ended Dec. 31, 1920, and showed net income of \$2,578,930, equivalent to \$6.62 a share earned on the 378,334 shares of capital stock of no par value in the previous year.

The report of the Harbison-Walker Refractories Co. for the year ended Dec. 31, 1921, shows net profits, after charges, depreciation and Federal taxes, of \$1,751,444, as compared with net profits of \$2,869,996 in the previous year.

The J. I. Case Threshing Machine Co. has issued its annual

report for last year, showing net loss, after all charges, inventory adjustments and depreciation, of \$2,888,431. This compares with net profits of \$1,936,963 earned on the \$13,000,000 outstanding common stock in the previous year.

The Westinghouse Air Brake Co.'s annual report for the year ended Dec. 31 shows net income after charges and inventory adjustments of \$705,546, equal to \$1.21 a share (\$50 par value) earned on the \$29,144,200 capital stock outstanding. This compares with net income of \$5,330,403, or \$9.15 a share in the previous year.

The Alliance Machine Co., Alliance, Ohio, has increased its capital stock from \$500,000 to \$2,000,000.

The Sterling Brass Co., Cleveland, has increased its capital stock from \$100,000 to \$3,000,000.

The sale of the plants of the Allen Motor Co., at Columbus, Fosteria, and Bucyrus, Ohio, has been ordered by the court and will take place at the Court House at Columbus, April 18. The court has fixed the minimum price for the sale of the plants at \$500,000.

Crucible Passes Dividend

The directors of the Crucible Steel Co. of America have passed the quarterly dividend on the common stock. Horace S. Wilkinson, chairman Crucible Steel Co. of America, issued a statement in part as follows:

"I am of the opinion that long drawn out depression in the steel business is nearing the end and that from now on we shall have a gradual return to more normal business. I believe it will not be long before the company will be able to resume the payment of the dividend on its common stock.

"On March 1, 1922, the company had surplus of \$24,032,121, which may be applied to payment of dividends, but we do not believe this surplus should be reduced at this time, except in payment of dividends upon preferred stock. It will be the policy of the management to resume a reasonable disbursement for dividends on the common stock as soon as the earnings and business conditions improve sufficiently to justify same. Within the last week we have started some of our furnaces and have started to use some of new construction, which have cost us \$15,000,000, and which we completed about the time depression began."

The report of the Chicago Railway Equipment Co. for last year shows earnings for 1921 at \$350,699. Deducting \$150,000 for depreciation and \$232,741 for dividends, leaves \$318,242 as the net profits. President Leigh opposes reductions in freight rates until labor costs have been adjusted downward and he says that to reduce rates before reducing labor costs would be to court disaster, not only to the railroads, but to other industries. On Dec. 31 last the company paid its 101st consecutive dividend.

Report of Receiver of Standard Parts Co.

The Standard Parts Co., Cleveland, has made a profit, before depreciation and adjustment, during its sixteen months under the direction of Frank A. Scott as receiver, according to the annual statement filed in the Federal Court in Cleveland. Net sales for 1921 were \$7,223,033, or about one-third of those of the preceding year. This business resulted in a profit, before depreciation and inventory adjustment, of \$316,289. Depreciation for the year was \$398,341 and adjustments \$204,348, resulting in a loss of \$286,400. Including the last four months of 1920, total net sales for the sixteen months to Dec. 31, 1921, were \$10,451,861, and after allowance for depreciation and adjustment resulted in a loss of \$494,825, or, if omitting the depreciation charge, a gain of \$146,360.

Ohio Steel Co. Inventory Write-off

The annual report of Otis Steel Co., Cleveland, for the year ended Dec. 31, 1921, shows net loss after depreciation, interest charges and inventory adjustments of \$5,189,543. This compares with net income of \$1,141,088 the previous year. Decline in inventory values was a great handicap to the company in 1921, points out President George Bartol in his statement to stockholders. As a result of this, he says, the deficit would have been larger if mills had not been operated at all, as a large part of operating loss could have been properly charged off to inventory depreciation. Mr. Bartol said in part:

"On account of rapid decline in value of stocks since Dec. 31, 1920, inventory was written down as of April 1, 1921, and again as of Dec. 31, 1921, in each case to a fair market value. As the material out of stock was charged to operating at

inventory prices, a considerable part of the operating loss is properly chargeable to inventory depreciation, and approximate estimates indicate that a greater loss would have been made by shutting down completely and writing down the material charged to operation to Dec. 31, 1921, values.

"Our production for the year was only 15 per cent of total capacity. The new sheet mill plant at Riverside works was completed and put into operation during the year and it has fully come up to expectations."

Replogle Steel Co. Deficit

The Replogle Steel Co. reports for the year ended Dec. 31 last net income of \$84,029, compared with a loss of \$102,267 in the previous year. After depreciation, etc., there was a deficit of \$163,768, contrasted with a deficit of \$287,854 in 1920. The income account follows:

Net earnings, \$55,029; depreciation, etc., \$248,797; deficit, \$163,768; interest, \$334; inventory adjustment, \$709,450; total deductions, \$709,804; deficit, \$873,572; previous surplus adjusted, \$386,231; total surplus, \$512,659.

The report states that the only income last year came from railroad earnings and interest on securities owned. A small volume of business was offered to the company, which, if taken, would have resulted in a loss, so that operations were not started.

Stocks at Youngstown

YOUNGSTOWN, March 21. Under influence of dividend payments April 1, preferred stocks of industrial issues are slightly firmer. Common stock of the Youngstown Sheet & Tube Co. has been fluctuating from \$63 to \$64 on the Cleveland and Youngstown exchanges, which compares with a recent trading level of \$60.

Common of the Brier Hill Steel Co. is held at \$17.50, while the junior issue of the Trumbull Steel Co. is listed at \$19.50.

Dividend declarations by the Sheet & Tube Co. for the first quarter will mean a distribution of \$575,000 April 1. The company has \$10,000,000 of preferred stock outstanding and 800,000 shares of non-par value common.

Receiver for Defiance Company

The Defiance Machine Works, Defiance, Ohio, has been placed in the hands of a receiver as a result of proceedings brought in the Federal Court in Toledo by the Chicago Screw Co., acting for itself and other creditors. E. M. Hammer, manager of the company, was named receiver. The complaint states that the company had a number of machinery orders amounting to about \$1,000,000, but that the business depression resulted in a cancellation of many of these orders, leaving the company with large inventories and claims against companies in financial troubles on which it could not collect. It further stated that the machine works has assets in excess of its debts.

Superior Steel Report

The annual report of the Superior Steel Corporation for 1921 shows a net loss, after all expenses and depreciation, of \$273,395. In 1920 the company showed profits, after all expenses, depreciation, inventory adjustments and Federal taxes, amounting to \$1,022,820. The operations for last year showed a deficit, after sinking fund and dividend requirements, amounting to \$1,113,373, as compared with a surplus of \$205,547 in 1920.

Gulf States Steel Loss

The report of the Gulf States Steel Co. for the year ended Dec. 31, 1921, shows a deficit after expenses, charges, and dividends of \$731,915. This compares with a surplus of \$606,174 in 1920.

The income account compares as follows:

	1921	1920
Gross loss	\$242,821	*\$1,153,089
Depreciation Federal tax	348,915	401,869
Net loss	591,915	*751,229
First preferred dividend	140,000	140,000
Second preferred dividend		5,046
Deficit	731,915	†606,174

*Profit. †Surplus.

The Underpinning & Foundation Co., 290 Broadway, New York, has acquired land in the Degnon Terminal district, Brooklyn, totaling 77,500 sq. ft., for the erection of a three-story plant to manufacture special tools and instruments.

TRADE CHANGES

The headquarters of the American Supply & Machinery Manufacturers' Association is now located in the Gotham National Bank Building, 1819 Broadway, New York.

The Detroit offices of the Trumbull Steel Co., Warren, Ohio, have been moved from the fifth to the tenth floor of the Ford Building. The new office numbers are 1010-11-12. W. J. Hanna is district manager, with headquarters in Detroit.

The Orton & Steinbrenner Co., Chicago and Huntington, manufacturer of locomotive cranes, clam shell and orange peel buckets and coal crushers, has made arrangements with J. Ross Bates, formerly connected with Wonham Bates & Hoode Trading Corporation of New York and Boston, to represent it in the New England States and New York. Mr. Bates has offices at 136 Liberty Street, New York, and 128 School Street, Watertown, Mass.

The Diamond soot blower business has been purchased by new interests in the form of the Diamond Power Specialty Corporation of Detroit, a new company which has taken over the business and plant of the Diamond Power Specialty Co., a copartnership, the members of which are retiring from the soot blower business in the Western Hemisphere.

The C. W. Hunt Co., Inc., West New Brighton, S. I., announces the re-establishment of its New York office at 143 Liberty Street. It has taken over all the sales and engineering work which has heretofore been carried on by its subsidiary company, the C. W. Hunt Engineering Corporation, for the past 18 months, as the business of this latter corporation has now been consolidated with the C. W. Hunt Co., Inc.

The Barto-Phillips Co., Inc., engineer and builder, formerly located at 280 Madison Avenue, New York, has removed offices to 52 Vanderbilt Avenue, New York.

The Aluminum Die Casting Corporation is a successor to the Acme Die Casting Corporation, New York. The business will be moved to Garwood, N. J., on or about May 1.

Gropler Brothers, representing manufacturers of metal cutting tools, will be located at 16-22 Hudson Street, New York, after April 1. They have a separate sales organization selling to jobbers and dealers only.

The Tool Sales Co. announces that after April 1 its new address will be the Hudson-Read Building, New York. It sells tools and specialties to the hardware and automobile supply trade, and would be glad to hear from manufacturers desiring sales service in the metropolitan district.

The Mitchell Specialty Co., Philadelphia, manufacturer of automobile body hardware, announces the reorganization of the company and the election of J. H. Mitchell to the office of general manager and treasurer. Mr. Mitchell brings to his new connection years of experience as a successful executive in organization and finance. The officers are: E. R. Mitchell, president; J. H. Mitchell, treasurer and general manager; J. J. Seitz, vice-president and manager of production.

The Shelton Tool & Machine Co., 235 Canal Street, Shelton, Conn., has voted to change the name to the Shelton Cutlery Co. The personnel of the firm remains the same.

Plans of New Companies

The Auto Trimmers Supply Co. and Iron Products Co., both Michigan corporations, were absorbed by the S. L. Jackson Co., incorporated for \$100,000 with \$75,000 paid in. Officers are as follows: S. L. Jackson, president and general manager; J. D. Burke, vice-president; F. L. Sutherland, secretary and treasurer. The location of the office and warehouse is 500 to 516 Congress Street, West, Detroit. The company handles a complete line of automobile upholstery and top materials, automobile top and body hardware and also everything in the way of cap screws, semi-finished nuts, bolts, washers, wood screws, etc.

Handley Brothers, Inc., buffer and plater, 82 Myrtle Street, Meriden, Conn., recently incorporated, has organized with the election of George Handley, as president; John Handley, as secretary and treasurer. Directors are the two above mentioned, and F. V. and N. Handley. The business was formerly carried on as Handley Brothers at the same address.

The A. C. Chesley Co., 704 East 133d Street, New York, manufacturer of hollow metal and metal-covered fireproof doors, sash, etc., is taking bids for the erection of an addition to its plant. P. J. Murray, Tuckahoe, N. Y., is architect.

Machinery Markets and News of the Works

LARGE CRANE ORDER IS PLACED

Wheeling Steel Corporation Buys 21 for Its Various Plants

Improvement in Machine-Tool Orders and Prospects Is Noted in Some Markets

The Wheeling Steel Corporation, Wheeling, W. Va., has placed an order with the Morgan Engineering Co. for 21 cranes for its various steel plants, the largest order of its kind since the war. The crane business shows more life than the machine-tool trade, and there is a number of very promising prospects. The Steel Corporation has obtained prices for estimating purposes on 35 cranes and other steel companies in the Pittsburgh district which contemplate plant improvements are also expected to come into the market soon.

In machine tools a moderate degree of improvement is reported from Chicago, Cleveland and Cincinnati, but in New York and New England conditions are substantially unchanged. Large industrial companies are conspicuous in their absence from the market, and the bulk of the buying is being done by small or intermediate companies. Orders and inquiries are largely for single tools and a considerable

share of the activity in all markets is in used tools.

Two promising prospects in the Cleveland district are noted, one inquiry from a Cleveland manufacturer calling for \$100,000 worth of tools for a new line of products, while an inquiry from a neighboring State covers 25 new or used machines.

In Chicago the demand for tools is slowly expanding. Railroads are doing practically no buying against recent inquiries. The Santa Fe is expected to put out additional inquiries for tools for a proposed boiler shop at Albuquerque, N. M. About \$50,000 worth of machine tools and allied equipment was destroyed in the recent Chicago fire and several of the companies whose shops were destroyed or damaged are looking for machinery for replacement.

The H. H. Franklin Mfg. Co., Syracuse, N. Y., has bought tools for the manufacture of its new four-cylinder car and is expected to close shortly on 14 drilling machines. Two boring machines were bought of a Cleveland builder. The Universal Portland Cement Co., Chicago, is understood to have bought some of the tools it recently inquired for. The Ward Baking Co., New York, has bought against a recent list to equip a motor truck shop.

In foundry equipment an outstanding order is that placed by the Ford Motor Co., covering 72 tumbling barrels for its River Rouge, Mich., plant. The company is also in the market for nine foundry cupolas.

New York

NEW YORK, March 21.

The local machine-tool market continues very dull. Scarcely any business is being placed except in used tools. The Ward Baking Co., New York, is reported to have bought most of the tools for which it recently inquired, the equipment being for a motor truck shop.

An export company is in the market for two tool room lathes for Japan.

Activity in cranes the past week centered about the placing of several inquiries for overhead cranes that have been pending for some time. At present inquiries for large cranes seem to predominate. Bidding has practically been closed on the 110-ton power house crane for the West Penn Power Co., Pittsburgh, being purchased by Sanderson & Porter, 25 William Street, New York. Estimates were recently requested by the Foundation Co., 120 Liberty Street, New York, on a 150-ton power house crane, but it is not expected that purchase will be made for some time. Bids are also being submitted by about seven crane builders on another 150-ton overhead traveling crane. C. L. Cadle, superintendent of public works, Albany, N. Y., is receiving bids until April 11, on contract 122, calling for two 5-ton electric gantry cranes for the Barge Canal terminals at Syracuse and Rochester, N. Y.

Among recent purchases are: Stone & Webster for Flax Rock, Mich., a 10-ton, 18-ft. 10-in. span and 15-ton, 33-ft. 8-in. span, overhead traveling cranes; the Flockhart Foundry, Newark, N. J., a 5-ton, 50-ft. span, overhead traveling crane, and Russell, Birdsall & Ward, Portchester, N. Y., two 2-ton, 55-ft. 6-in. span, overhead traveling cranes from the Pawling & Harnischfeger Co.; F. L. Smidth & Co., 50 Church Street, New York, for the Glens Falls-Portland Cement Co., Glens Falls, N. Y., a 10-ton, 65-ft. span bucket crane with 3-yd. Hayward bucket from the Cleveland Crane & Engineering Co., and M. W. Kellogg & Co., Jersey City, N. J., a 15-ton, 61-ft. span, 3-motor, overhead traveling crane from the Niles-Bement-Pond Co.; International Trading Corporation, 60 Broadway, New York, two 30-ton locomotive cranes for the Imperial Government Railways, Japan, from the Industrial Works.

Edward V. Galen, 14 Irving Place, New York, desires information and prices regarding belt-driven bench grinding heads, equipped with tool rests, chisel holder, drill and shear grinding guides; also taper shank for buffing and polishing work; size of wheels desired to use 6 to 8 in. diameter, 1 to 1½-in. face.

The International Nickel Co., New York, has decided to discontinue certain of its manufacturing operations at its Bayonne, N. J., plant, and some of the equipment there is being shipped to its new plant at Huntington, W. Va., and some to the Canadian plant. A part of the equipment is to be offered for sale.

The Barnet Weinstein Iron Works, 53 Boorum Street, Brooklyn, has awarded a contract to Levering & Garrigues, 552 West Twenty-third Street, New York, for a two-story building at Stewart and Meserole avenues, Brooklyn, 100 x 280 ft., to cost about \$65,000.

A four-story cold storage and refrigerating plant to cost \$200,000, with equipment, will be constructed by the Brooklyn, N. Y., Retail Butchers' Corporation, care of Henschien & McLaren, 1637 South Prairie Avenue, Chicago, architects.

Parker Axles, Inc., Fifteenth Floor, Gotham National Bank Building, Broadway and Fifty-ninth Street, New York, manufacturer of automobile axles, has awarded contract to H. K. Ferguson, 25 West Forty-third Street, for a one and two-story plant at Poughkeepsie, N. Y., 100 x 160 ft.

Bids are being taken until April 4 by the Bureau of Supplies and Accounts, Navy Department, Washington, for a 100-hp. vertical fire tube boiler for use at the Brooklyn Navy Yard.

The Municipal Gas Co., Albany, N. Y., furnishing electrical service in this district, is planning for extensions and improvements in its power house and electrical system to cost \$955,000, including new equipment. Application has been filed with the Public Service Commission for permission to issue bonds in this amount and carry out the work.

The L. B. Lynd Mfg. Co., Canal Street, Mechanicsville, N. Y., manufacturer of hardware and other metal products, is having plans prepared for rebuilding its three-story factory, 70 x 90 ft., recently partially destroyed by fire.

The Watertown Battery & Electric Co., 1313 State Street, Watertown, N. Y., is planning for the installation of

new equipment for the manufacture of electric storage batteries and other electrical products.

The Savage Arms Corporation, 50 Church Street, New York, with plants at Utica, N. Y., and Pittsburgh, for the manufacture of firearms and ammunition, is arranging to manufacture a line of refrigerating machinery and electric washing machines and parts. One or both of the plants will be converted, in part, to accommodate the new branch of manufacture. The company recently took over the former plant of the Westinghouse Electric & Mfg. Co., at Chicopee, Mass.

The Eastern Malleable Iron Co., Naugatuck, Conn., has plans under way for a one-story foundry at Watervliet, N. Y., 50 x 250 ft.

W. W. Farley, 79 Chapel Street, Albany, N. Y., has had plans prepared for a three-story automobile machine and service works, 75 x 122 ft., at Chapel and Orange streets, estimated to cost \$100,000 with equipment. H. Rogers, 443 Broadway, Albany, is architect.

A vocational department will be installed in the two-story high school, 160 x 230 ft., to be erected at Elmira, N. Y., for which bonds for \$550,000 have been voted. Pierce & Rickford, 118 Lake Street, are architects.

The Sinclair Consolidated Oil Corporation, 45 Nassau Street, New York, has disposed of a bond issue of \$45,000,000, the proceeds to be used in part for plant acquisitions, extensions and improvements. During the past twenty-four months the company has expended about \$60,000,000 in plant and expansion work.

The Port Jefferson Shipyard Corporation, Port Jefferson, L. I., has taken title to the local plant of the New York Harbor Dry Dock Corporation for \$168,000. The new owner will operate the yard for building merchant vessels and for repair work.

Through Kuhn, Loeb & Co., 52 William Street, New York, bankers, the Paris-Lyons-Mediterranean Railroad Co., Paris, France, is disposing of a bond issue of \$30,000,000, the proceeds to be used for the electrification of certain sections of the system, power plants and equipment, new rolling stock, shops and machinery, and other extensions and improvements.

The Deep Drawn Metal Corporation, 30 Church Street, New York, has acquired the three-story factory at 61-67 Navy Street, Brooklyn, for a local plant. It is now operating a factory at 195 Plymouth Street.

A vocational department will be installed in the two-story high school to be erected at Bridgeton, N. J., estimated to cost about \$225,000. Ritter & Shay, North American Building, Philadelphia, are architects.

Fire, March 15, destroyed the plant of the Fischer-Sweeney Bronze Co., 1301-11 Grand Street, Hoboken, N. J., manufacturer of bronze, aluminum and other metal castings, with estimated at \$200,000, including equipment.

A vocational department will be installed in the three-story high school to be erected at Clifton, N. J., estimated at \$750,000. H. Barrett Crosby, 125 Ellison Street, Paterson, N. J., is architect.

An ice-manufacturing and refrigerating plant will be erected by the Montclair Rink & Ice Co., care of George W. Backoff, 9 Clinton Street, Newark, N. J., architect, to be used in connection with a skating rink, 125 x 350 ft., estimated to cost \$300,000.

Effective with the closing of the foundry and machine shop of the Bethlehem Shipbuilding Corporation, at Redington, Pa., April 1, the company will transfer all of this work to its Moore plant at Elizabeth, N. J. The production will include pumps, fittings and kindred equipment, for use at all of the shipyards of the company.

Phillip Woolf, 50 Columbia Street, Newark, N. J., manufacturing jeweler, has had plans prepared for a new factory, 25 x 85 ft., at 412 South Twelfth Street. Nathan Siegler, 164 Market Street, is architect.

Buffalo

BUFFALO, March 20.

C. L. Cadie, superintendent of Public Works, Albany, N. Y., will take bids until April 11 for two 5-ton electric gantry cranes for the Barge Canal Terminals at Rochester and Syracuse, N. Y., respectively.

The Malone Light & Power Co., Malone, N. Y., has filed application for permission to build new electric power plants at Dickinson and Waverly for light and power service in these districts.

The Board of Education, Boonville, N. Y., will purchase machine tools and other mechanical equipment for installation in the manual training department at the high school.

The A. & J. Mfg. Co., Water Street, Binghamton, N. Y., manufacturer of wire goods, is planning for the erection of

an addition, 60 x 120 ft., at Water and Eldredge streets, to cost about \$45,000. E. H. Johnson is president.

The Lang Mfg. Co., Olean, N. Y., recently organized, is planning for the establishment of a factory to manufacture a re-winding machine for motion picture service and other kindred equipment. Carl Lang, Olean, inventor of the machine, is president of the company.

A one-story power house addition will be erected by the Board of Directors of the City Hospital, South Quarry Street, Ithaca, N. Y.

An appropriation of \$4,500,000 has been made by the City Council, Buffalo, for a new filtration plant, to include electrically-operated pumping plant, filtering machinery and other equipment. George D. Andrews, City Hall, is city water commissioner. Clark D. Parsons is engineer for the Department of Public Works.

G. F. Hausner, 939 Northampton Street, Buffalo, is planning for the installation of new sheet-metal working machinery at his factory.

A vocational department will be installed in the new high school to be erected by the Salina School District, Liverpool, N. Y., estimated to cost \$150,000, to replace the present school on Second Street. M. D. Green, Liverpool, is in charge.

A cold storage and refrigerating plant will be installed at the Gowanda State Homeopathic Hospital, Collins, N. Y., by the State Hospital Commission, Albany. Lewis F. Pilcher, Capitol Building, Albany, is State architect.

The Acme Cylinder Grinding Co., Rome, N. Y., is planning for the installation of new grinding and other equipment. M. J. Kernan is head.

The City Council, Batavia, N. Y., has called a special election on April 6 to vote bonds for \$450,000 for the erection of a three-story high school with vocational department, 145 x 200 ft. E. E. Joralemon, 482 Delaware Avenue, Buffalo, is architect.

Benjamin Spielberg, 28 Brinkerhoff Street, Plattsburg, N. Y., has plans under way for a new two-story machine shop, 60 x 90 ft.

The Northern New York Utilities, Inc., 58 Public Square, Watertown, N. Y., will soon break ground for a hydroelectric generating plant at Browns Falls, near Watertown, to cost about \$100,000.

Philadelphia

PHILADELPHIA, March 20.

The Pennsylvania Equipment Co., 1420 Chestnut Street, Philadelphia, is in the market for a second-hand passenger coach with rattan seats, suitable for workmen's train; also a second-hand, standard gage, four-driver, saddle tank locomotive, weight 50 tons.

The U. M. C. Garage, Fifteenth and Locust streets, Philadelphia, has completed plans for a three-story repair and service building, 70 x 115 ft., to cost about \$125,000, including equipment. The Hoffman-Henon Co., Finance Building, is architect.

The Philadelphia Electric Co., Tenth and Chestnut streets, Philadelphia, Pa., will install electric power equipment for the municipal rapid transit system, including cables, controls, transformers, substation apparatus, etc., to cost \$150,000. It will soon commence the erection of an addition to its generating plant at Beach and Palmer streets for the installation of a new 30,000-kw. generator and auxiliary equipment.

The Electric Foundry & Equipment Co., Tacony and Bjeigh streets, Philadelphia, is arranging for the installation of electric furnaces, cranes and other equipment at its new plant, now in course of erection, to be used primarily for the production of steel castings. William P. Cunningham is president.

The John T. Lewis & Brothers Co., Lafayette Building, Philadelphia, will soon commence the erection of the superstructure for a two-story power house, 63 x 77 ft., at its paint manufacturing plant, to cost \$80,000. E. F. Beale is president.

The Douglas Mfg. Co., Philadelphia, manufacturing jeweler, has leased a floor in the new building at 45-47 North Eighth Street. Precision equipment, bench tools, etc., will be installed at once.

The Gulf Refining Co., Widener Building, Philadelphia, has purchased 70 acres in the vicinity of Girard Point, for extensions in its oil distributing works, to include pumping equipment, tanks, mechanical buildings, etc.

The Bureau of Supplies and Accounts, Navy Department, Washington, will receive bids until April 4 for one motor-driven precision bench lathes, one motor-driven emery grinder, one motor-driven watchmakers' lathes, one set of watch-

makers' tools, and one gage testing outfit, as specified in schedule 9522, for use at the Philadelphia Navy Yard.

Joseph Kalter, 1621 Ridge Street, Philadelphia, manufacturer of lighting fixtures, is planning for the installation of new lathes and other machine tools at his factory.

The Quaker City Cold Storage Co., 301 Delaware Avenue, Philadelphia, is perfecting arrangements for a one-story cold storage and refrigerating plant, 27 x 125 ft., on South Delaware Avenue, to cost about \$75,000.

The Commissioner of Education, State House, Trenton, N. J., is taking bids until March 28 for a power house and pumping plant at the New Jersey School for the Deaf, Trenton Junction. Arnold H. Moses, Temple Building, Camden, N. J., is architect.

George Shearman, 119 Pennsylvania Avenue, Atlantic City, N. J., has filed plans for the erection of a one-story machine shop, 35 x 66 ft. Haining & Palliser, Guarantee Trust Building, are architects.

The Sun Shipbuilding Corporation, Chester, Pa., has secured the exclusive rights of manufacture in this country of opposed piston Diesel oil engines, secured under British patents by Doxford & Sons, shipbuilders, England. Plant arrangements will be made for the manufacture of the new engine units and parts.

The Danville Iron & Steel Co., Danville, Pa., is planning for the erection of a new foundry in the spring. It manufactures machinery and parts.

A new power house, 100 x 130 ft., to cost about \$150,000 with equipment, will be erected by the Scranton Lacle Co., Albright Avenue, Scranton, Pa. Lockwood, Greene & Co., 101 Park Avenue, New York, are engineers.

The Luzerne County Gas & Electric Co., Plymouth, Pa., has arranged for a bond issue of \$1,000,000, a portion of the proceeds to be used for extensions and improvements in its power plant and system.

The Forbes Aluminum Products Co., Steele Building, Easton, Pa., will soon break ground for its new plant in the South Side section, estimated to cost about \$150,000 with machinery. A. D. Childsey, Jr., 341 Northampton Street, Easton, is architect. Ewing W. Forbes is president.

A vocational department will be installed in the new high school to be erected at Glenolden, Pa. Clarence W. Brazer, Crozer Building, Chester, Pa., architect, has been commissioned to prepare plans.

The Glen Rock Electric Light & Power Co., Glen Rock, Pa., has acquired the plant of the Deer Creek Light & Power Co., at Shrewsbury, Pa., and in the future will furnish service in this district. Extensions will be made to the present station and additional equipment installed.

A one-story machine shop will be constructed by the Arbogast & Bastian Co., Front and Hamilton streets, Allentown, Pa., in connection with extensions to its meat-packing plant. An addition will be built to the cold storage and refrigerating plant and new equipment installed.

A vocational department will be installed in the two-story and basement high school to be constructed by the Haverford Township School District, at Oakmont, Pa., 170 x 245 ft., to cost \$300,000. Royd, Abel & Gubert, Eatey Building, Philadelphia, are architects, and J. W. Huff, 6035 Lansdowne Avenue, Philadelphia, is secretary.

The Sempie Rubber Co., Trenton, N. J., manufacturer of inner tubes, has purchased the factory property on Murray Street, comprising a number of brick buildings, for \$40,000.

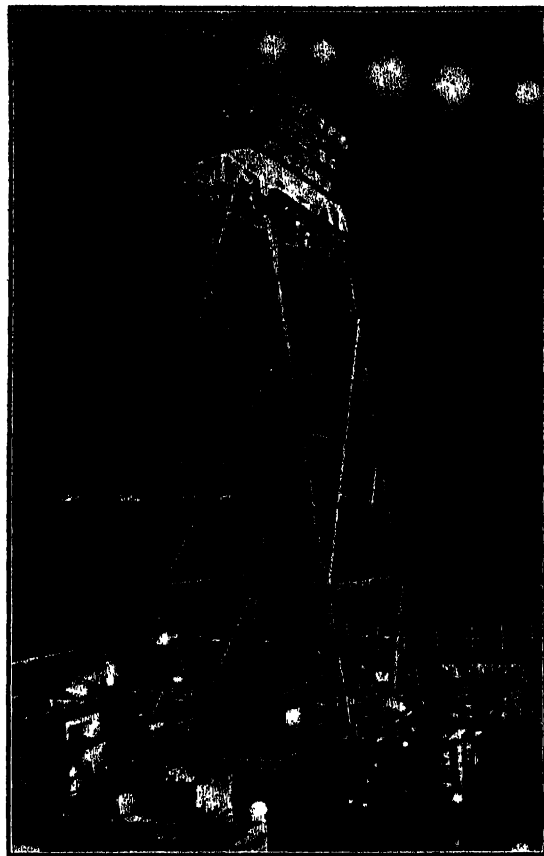
The Board of Directors, State Normal School, Slippery Rock, Pa., will take bids early in April for the erection of a two-story refrigerating plant at the institution.

The Martin-Parry Corporation, York, Pa., manufacturer of automobile bodies, is perfecting plans for new works at Lumberton, Miss., for assembling and finishing automobile body base and top units. A complete saw mill and cutting up plant will be constructed in the same district by the Edward Hines Lumber Co., 2431 South Lincoln Street, Chicago, which has taken a contract for material from the Martin-Parry company.

Cincinnati

CINCINNATI, March 20.

An improved tone to the machinery market was noted by a number of manufacturers the past week. Orders placed, however, were still at a very low point, the better feeling coming as a result of the complexion of the inquiries received. A local manufacturer who recently visited many dealers in new and second-hand equipment in the East, has returned to the city filled with optimism regarding the future. From his observations it would appear as though the number



One of the 54-ft., 220,000-volt snow-type steel towers, built by the Pacific Coast Steel Co. for use on the Pitt River line of the Pacific Gas & Electric Co. was installed in the Municipal Auditorium, San Francisco, at the California Industries Exposition. In the base of the tower was built a small booth representing an electrical kitchen. Around the outside were placed a number of small trees, the idea being to indicate that the tower was standing in a forest.

of used machine tools in good condition is diminishing rapidly and that prices are much firmer than they have been for some time. He reports having been able to place orders for 13 machines with dealers in the East. Some fair sized orders were closed during the week. A Dayton manufacturer is said to have placed an order with a Cleveland machine tool builder for turret lathes and automatic screw machines. The Wheeling Steel Corporation, in addition to placing an order for 21 cranes with the Morgan Engineering Co., is also said to have secured the machine tools recently inquired for, practically all of the machines being used tools. The Universal Portland Cement Co., has also closed on several tools. It is understood here that the Rock Island Railroad has decided to defer its purchases of machine tools for the present. A deal involving five machines is reported by a local manufacturer, but this is more or less in the nature of a trade—used machines being taken as part payment in exchange for new ones.

The J. A. Fay & Egan Co., Cincinnati, manufacturer of wood-working machinery, is having plans prepared for its new plant in the Bond Hill section, building operations to be under way within three or four months.

The Pioneer Auto Heater Co., Cincinnati, has been incorporated with a capitalization of \$50,000 to manufacture automobile heaters and other accessories. Its plant will be located at 2682 Madison Road and will be operated in connection with the tool business now being conducted by the Scott-Spencer Automatic Tool Co. T. J. Scott is president.

Officials of the American Laundry Machinery Co., Cincinnati, have issued a denial of the report that the company is to be amalgamated with the U. S. Hoffman Machinery Co., Syracuse, N. Y. The report originated through the fact that the Laundry company has granted rights to the Hoffman company to use certain of its patents.

Fire at the plant of the William Hamilton Sons Car Co., Newark, Ohio, on March 11 destroyed the boiler and engine room, with loss of approximately \$30,000. The power plant will be rebuilt at once.

Chicago

CHICAGO, March 20.

Demand is slowly expanding and it is notable that orders are principally for one or two tools and are coming from miscellaneous sources. The larger industrial companies are conspicuous for their absence from the market and the railroads have done practically no buying against the inquiries they have been issuing from time to time. The Santa Fe, which is regarded as the most likely to buy of any of the local railroads, is expected to put out an additional list covering the needs for a proposed boiler shop at Albuquerque, N. M. The Western Clock Co., LaSalle, Ill., which, as noted a week ago, placed an order for 24 automatic screw machines, has also bought one 14-in. x 6-ft. and one 16-in. x 6-ft. geared head motor-driven engine lathes, a geared head motor-driven 26-in. shaper, and three bench lathes with slide rests.

The disastrous fire which on March 14 destroyed the block bounded by Clinton and Canal streets, Jackson Boulevard, and the Metropolitan Elevated Railroad tracks, wiped out the shops of a number of companies which have already taken steps to replace their equipment. It is estimated that close to \$50,000 worth of machine tool equipment was destroyed. Among the companies which are now in the market as the result of the conflagration are the Monarch Mfg. Co., manufacturer of automobile specialties, Krone Sebek & Co., maker of die casting equipment and tools, the Utility Tool & Die Works, the Superior Tool Co., the Markle-Korff Gear Co., manufacturer of car wrapping machinery and gears, and the U. & J. Carburetor Co.

The Great Northern Railroad, St. Paul, F. A. Bushnell, purchasing agent, has sent out inquiries for the following shop equipment:

One 400-ton full hydro-pneumatic 52-in. car wheel press including 7½-hp. motor, 3 phase, 60 cycles, 440 volts complete with starter having overload and no voltage release, also one recording gage.

One 42-in. Bullard (or similar) vertical turret boring mill, direct connected to and including 15-hp., 60 cycle, 3 phase, 440 volt motor and starter.

One set standard tool equipment for above mill.

One 36-in. heavy duty upright common drill press. Spindle to have No. 5 Morse taper including motor and starter of 60 cycle, 3 phase, 440 volts.

One 30-in. Lodge & Shipley (or similar) 7 ft. between centers, selective head and taper attachment, high duty lathe, direct connected to and including suitable motor and starter of 60 cycle, 3 phase, 440 volts, including four-jaw independent chuck and full set of tool holders.

One 600-ton full hydro-pneumatic, slanting head, driving-wheel press with 13-in. throat, direct connected to and including one 15-hp. 60 cycle, 3 phase, 440 volt motor and starter.

One throatless shear to be direct connected to and including suitable motor of 60 cycle, 3 phase, 440 volt characteristic and starter, to have a capacity to shear 3/16-in. sheet

Two pneumatic riveting hammers suitable for driving ¼-in. rivets.

One 1½-in. Acme double head bolt cutter (or equal) to be direct connected if possible and driven by suitable 440 volt, 60 cycle, 3 phase squirrel cage induction motor with starter, to be furnished with full set of dies.

One Oster pipe threading machine (or equal) to cut pipe from ¼-in. to 2 in. direct connected to and driven by suitable squirrel cage induction motor of 440 volts, 3 phase, 60 cycle with starter to be furnished with full set of dies.

One Webber crank pin turning tool.

One No. 5 Landis (or equal) cylinder grinding machine capable of grinding cylinders from 3 in. to 8 in. to be belt driven and including counter shaft and grinding wheels.

One 15-hp. 60 cycle, 3 phase, 440 volt squirrel cage induction motor with starter.

One 30-in. Lodge & Shipley selective head lathe 7 ft. between centers (or equal) to be direct connected to suitable squirrel cage induction motor of 440 volt, 3 phase, 60 cycles with starter and one 18-in. four-jaw independent chuck and full set of 10 Armstrong tool holders to suit lathe to be furnished with taper attachment.

The Great Northern Railroad Co., Railroad Building, St. Paul, Minn., has plans nearing completion for the construction of a new one-story car repair shop, 84 x 300 ft., at Minot, N. D., to cost about \$50,000. A. H. Hogeland is chief engineer.

• The Ford Motor Co. has placed orders for 72 tumbling barrels for its River Rouge, Mich., plant, 36 each being placed with the Whiting Corporation and the W. W. Sly Mfg. Co. The Ford company is also in the market for nine cupolas.

The U. S. Sample Co., printer, 801 South Wells Street, Chicago, is receiving bids through Alfred S. Alschuler, 28 East Jackson Boulevard, on a six-story printing plant, 125 x 125 ft., at Jackson Boulevard and Laflin Street, to cost \$300,000.

Alfred S. Alschuler, architect, 28 East Jackson Boulevard, Chicago, has let contracts for a three-story automobile salesroom and service station, 100 x 390 ft., on Michigan Avenue between Twenty-second and Twenty-third streets, for the Hudson Motor Car Co.

The Paasche Air Brush Co., 1219 West Washington Boulevard, Chicago, has let a contract through Frank D. Chase, Inc., architect, for a two-story factory, 108 x 125 ft., at 1909-15 Diversey Parkway, to cost \$100,000.

Holton, Seelye & Co., builders, 140 South Dearborn Street, Chicago, have let contract for a one-story factory for the manufacture of jewelers' boxes, at 4431-43 West Lake Street, to cost \$18,000.

The construction of two units of the new Cadillac Malleable Iron Co. plant, Cadillac, Mich., is expected to start soon. The foundry will be ready to commence operations by the middle of the summer, it is hoped.

Elmer Moore has opened a general machine shop and garage at 518 Erie Street, Storm Lake, Iowa.

The Automatic Traffic Regulator Co., Inc., Andrews Building, 163 West Washington Street, Chicago, recently organized to manufacture an automatic traffic signal or regulator to take the place of the human signal at street intersections, is letting its manufacturing work by contract for the present. The officers are R. E. Blick, president; P. A. Baulsair, treasurer, and F. C. Hawkins, secretary.

Forbes-Babcock, Inc., 4113 West Irving Park Boulevard, Chicago, recently incorporated with \$5,000 capital stock, will engage in the manufacture of radio telephone receiving sets complete. Factory space will probably be leased and it has not yet been decided whether machines will be manufactured or assembled. The officers are Allan C. Forbes, president; Samuel Rubinkam, vice-president and Robert S. Babcock, secretary-treasurer.

The Universal Electric Sign Co., 4854 West Kinzie Street, Chicago, has been incorporated with \$12,000 capital stock to manufacture electric signs. It has leased a plant, 60 x 90 ft., at the above address and has purchased the needed metal-working machinery. The officers are R. I. O'Connor, president; S. M. Moses, vice-president; and G. Thompson, Jr., secretary-treasurer.

V. B. and V. L. Parker have purchased and taken possession of the Howard Brothers Sheet Metal Co.'s business at 713 West State Street, Rockford, Ill. They will remodel the plant and do all kinds of sheet metal and furnace work.

The Pope Machine Co., Kankakee, Ill., has been incorporated to manufacture textile machinery. T. W. Prosser, superintendent Paramount Hosiery Form Drying Co., Kankakee, is a stockholder. No announcement of the immediate plans of the company has been made.

G. J. Kramer, 487 Aurora Avenue, St. Paul, Minn., has taken bids on a one-story garage, 125 x 127 ft., at University and Farmington avenues, to cost \$40,000.

The Ster-o-Lock Mfg. Co., 417 South Dearborn Street, Chicago, has been incorporated with \$50,000 capital stock to manufacture automobile accessories and machine shop equipment and has equipped a plant for manufacturing operations. The officers are Bertram W. Coltman, president; Joseph E. Krass, secretary and general manager, and Edward J. Krass, treasurer.

The National Stamping & Electrical Works, 424 South Clinton Street, Chicago, has awarded contract to McKeown Brothers, 112 West Adams Street, for a new one-story plant 3238-50 West Lake Street, 130 x 150 ft., estimated to cost about \$60,000.

C. R. Berglund, 2630 Wentworth Avenue, Chicago, is taking bids on a general contract for a one-story plant, 100 x 125 ft., at South Park Avenue and Sixty-seventh Street, to manufacture automobile bodies. It will cost about \$45,000 with equipment.

A vocational department will be installed in the two-story high school to be erected by the Board of Education, Waseca, Minn., estimated to cost \$200,000. C. H. Eidler is clerk of the board.

The Red River Power Co., 27 South Third Street, Grand Forks, N. D., is planning for extensions and improvements in its electric power plant and system to cost about \$150,000, including machinery. A new turbine unit will be installed. W. G. Brown is general manager.

Fire, March 9, destroyed a portion of the plant of the

Elaborated Ready Roofing Co., Forty-fourth and La Salle streets, Chicago, manufacturer of roofing products, with loss estimated at about \$45,000, including equipment.

The Illinois Oil Co., Rock Island, Ill., has plans under way for a new three-story plant, 40 x 150 ft., estimated to cost about \$165,000, including equipment. Cervine & Horn, 310 Safety Building, are architects. F. J. Welsh is president.

The Gopher Machinery Co., New Prague, Minn., will install an electric traveling crane at its new plant, 80 x 100 ft., estimated to cost \$50,000, plans for which are being prepared by J. C. Meyer, 648 Endicott Building, St. Paul, Minn.

The Elgin & Marengo Railroad Co., Marengo, Ill., has plans for a new electric power plant, 45 x 105 ft., and will proceed with the work at once.

The Board of Water and Light Commissioners, Austin, Minn., has plans in progress for a new electric power plant for municipal service, 60 x 80 ft., comprising in part the rebuilding of a former station, estimated to cost about \$100,000, including equipment. A. L. Pillsbury, 1200 Second Avenue, South Minneapolis, Minn., is engineer. William Todd is superintendent for the board.

The Rozum Motor Co., 400 East Fourth Street, Mitchell, S. D., is planning for the erection of a two-story repair and service works at Fifth Avenue and Main Street, to cost approximately \$50,000. A. J. Rozum is head.

New England

Boston, March 20.

Machine tool orders the past week were practically at a standstill, a few individual low-priced machines furnishing most of the business. Considerable looking about in the used machinery market by prospective customers is noted, but actual sales are few and far between. One Massachusetts municipality is expected to close within a few days on three South Bend lathes and a shaper, which will constitute the largest sales for the week in this district. Stone & Webster, Boston, have purchased a 15-ton Western made crane, with 33-ft. span and three motors, for a Ford, Flat Rock, Mich., project.

Machine-tool manufacturers are beginning to circulate among shops in New England to get views of users as to how their metal-working equipment can be improved for certain kinds of work. Screw machine representatives report little inquiry for machines but a decided improvement in the demand for screw machine products, especially from automotive equipment manufacturers.

Plans are being drawn for a one-story locomotive repair shop for the Boston & Maine Railroad at Concord, N. H. The estimated cost is \$307,900.

Frank Perrone, 9 Boardman Street, East Boston, contemplates the construction of a one-story, 75 x 150 ft. garage and service station on Bennington Street to cost \$40,000. Plans are being drawn.

Bids are being asked on a two-story and basement factory, 82 x 113 ft., by the New England Machine & Electric Co., 31 Bagley Street, Pawtucket, R. I.

The old casting shop, Torrington, Conn., formerly owned by the American Brass Co., is being razed to make way for a new rolling mill, to be erected by the Anaconda Copper Co., which recently acquired the American Brass Co.

The Bush Mfg. Co., Hartford, Conn., truck, tractor and airplane radiators, will erect a one-story, 50 x 250 ft. plant on Wellington Street at an estimated cost of \$40,700.

The Stamford Foundry Co., 115 Canal Street, Stamford, Conn., stove manufacturer, is having plans drawn for an addition and other improvements. Emmens & Abbott, Washington Building, Stamford, are the architects.

The Vaast Brothers Garage & Taxicab Co., 17 Chestnut Street, South Norwalk, Conn., are planning to erect a garage and repair shop, two stories, about 80 ft. sq.

Bids will be opened in Washington about April 15 by the Bureau of Yards and Docks, Navy Department, for the construction and equipment at the South Boston Navy Yard of a substation, distributing system and first aid station, as provided in specification No. 4550. The work will involve about \$100,000 and will call for the erection of an annex to the pump house to conform to the present building. The equipment will include a three-unit motor generator set, 355-kw., 2300-volt, alternating current to 140-volt direct current, a 2300-volt alternating current to 250-volt direct current, an exciter set and a nine-panel switchboard, together with accessories. It had been erroneously published that the bureau was planning for a new dry dock and power house at the South Boston yard.

The Gilbert & Bennett Mfg. Co., Georgetown, Conn.,

manufacturer of wire cloth and other wire goods, has completed plans for a three-story and basement addition, 50 x 150 ft. Greenwood & Noerr, 347 Main Street, Hartford, Conn., are engineers. It will also build a one-story addition to its plant at Wireton, near Blue Island, Ill., 25 x 125 ft., estimated to cost about \$25,000. L. G. Hallberg & Co., 116 South Michigan Avenue, Chicago, architects, will prepare plans for the latter work.

A two-story power plant, 45 x 60 ft., and one-story machine shop, 25 x 45 ft., will be erected by the Colwell Worsted Co., Providence, R. I., in connection with its new plant on Hartford Avenue, for which the general contract has been awarded to the C. I. Bigney Construction Co., 357 Westminster Street.

The Wireless Specialty Apparatus Co., 493 C Street, South Boston, manufacturer of radio equipment, has leased a five-story, reinforced-concrete plant on Atherton Street, Jamaica Plains, Boston, and will remove its present factory to this location in April. About twice the present amount of floor space will be utilized at the new plant.

The Meisel Press Mfg. Co., 944 Dorchester Avenue, Boston, manufacturer of printing presses, screw machine products, etc., has awarded contract to the Tredennick Co., 10 High Street, for a one and two-story addition, 160 x 300 ft., and 40 x 80 ft., to cost about \$250,000, including machinery. McNaughton & Cleverdon, 19 Congress Street, are architects.

A one-story power house will be erected by the American Hosiery Co., Park Street, New Britain, Conn., 40 x 50 ft. Motors and other electrical equipment will be installed in different departments of the mill. Reeds & Thorpe, 60 Prospect Street, Hartford, Conn., are engineers.

The Boston Elevated Railway Co., 108 Massachusetts Avenue, Boston, has plans nearing completion for an addition to its power plant on First Street, estimated to cost about \$900,000, including machinery. Contract has been awarded to McDonald & Imhof, Roxbury, Mass., for a car inspection shop, 60 x 300 ft., at Forest Hills, estimated to cost about \$150,000. The latter building will be supplemented by a one-story car repair shop, 350 x 350 ft., and other mechanical buildings, estimated to cost in excess of \$2,000,000. Dwight P. Robinson & Co., 61 Broadway, New York, are engineers.

The W. F. Concannon Shear Co., 42 Depot Street, Milford, Conn., recently organized, is arranging for the establishment of a plant at Bridgeport, Conn., to manufacture steel shears, scissors, etc. William F. Concannon heads the company.

The Union Specialty Co., 138 Hurd Avenue, Bridgeport, Conn., manufacturer of metal products, will soon commence the erection of the superstructure for a two-story and basement plant, 50 x 125 ft., to cost about \$50,000.

The W. J. Hyland Mfg. Co., 151-3 Dwight Street, Springfield, Mass., manufacturer of piping, plumbing equipment, etc., will soon break ground for a three-story, brick and steel plant, 48 x 85 ft., on Liberty Street, estimated to cost about \$45,000.

Cleveland

CLEVELAND, March 20

The improvement in demand for machine tools noted earlier in the month continues and sentiment in the trade is more optimistic than it has been for many months. While no round lot sales are reported, dealers are getting a fair volume of single tool orders, the demand being largely for small tools and a considerable share of the activity being in used machinery. A few new inquiries have come out that look promising. One is from a Cleveland company that is considering the purchase of approximately \$100,000 worth of equipment for making a new line of products and another is from a company in an adjoining state for about 25 new or used machines.

Manufacturers of turret lathes report that some inquiries which have been pending for several weeks show signs of resulting in orders shortly. A representative of a local manufacturer of drilling machinery, who has just recently made a trip to the railroad shops in the East and South, has returned with a few definite prospects for early sales. The H. H. Franklin Automobile Co., Syracuse, N. Y., is purchasing equipment to manufacture a new four-cylinder motor car. It has placed orders with a Cleveland manufacturer for two boring machines and is expected to purchase 14 drilling machines shortly.

The Wellman-Seaver-Morgan Co., Cleveland, has just taken an order for three hydraulic turbines of 35,000 hp. capacity each for the new Big Creek plant of the Southern California Edison Co., Los Angeles, Cal.

The Zeder Motor Co. has been incorporated and plans to begin the manufacture of the Chrysler motor car at the plant of the Cleveland Tractor Co., Cleveland. The Elizabeth, N. J., plant of the Willys Corporation was equipped for the

manufacture of this car. The Cleveland Tractor Co. will continue the manufacture of farm tractors and it is not known as yet what additional equipment will be required for the manufacture of the motor cars.

Bellefontaine, Ohio, is planning extensions to its municipal power plant which will include a 600-kw. turbo generator unit with additional boiler and condenser capacity and other power plant equipment, involving the expenditure of approximately \$91,000. A special election will be held April 4 to secure authority to issue the necessary bonds.

The Lorain Steel Foundry Co., Lorain, Ohio, recently incorporated with a capital stock of \$250,000, has taken over the plant of the Aetna Steel Casting Co., Lorain, and is making improvements. W. W. Davidson is president, W. D. Jones, vice-president and secretary and C. M. Hartzell, treasurer and sales manager.

The Fisher Ohio Body Co., Cleveland, has leased the plant of the Briggs Mfg. Co., Cleveland, for additional manufacturing capacity.

Baltimore

BALTIMORE, March 20.

The Universal Heater & Mfg. Co., Charlotte, N. C., is building a plant for the manufacture of heaters, sheet metal work, etc. C. W. Sexton is president.

The Richmond, Va., plant of the Chicago Nipple Co., manufacturer of pipe nipples, etc., has acquired a building at First Avenue and Ninth Street, Baltimore, and will move to that location as soon as necessary alterations can be made. D. C. Williams is president of the company.

The Thornhill Wagon Co., Lynchburg, Va., is in the market for a second-hand vertical reaming or boring machine that will bore tempered cast iron cylinders $2\frac{1}{2} \times 8$ in. to $3\frac{1}{2} \times 11$ in. About $1/16$ in. will be cut out of the inside diameter. The company also wants a furnace or cupola to melt one ton of gray iron castings, either blast or electric type.

The Wilmington Sugar Refining Co., Christiansa Avenue and B Street, Wilmington, Del., will build a one-story power house, 95x150 ft. W. J. Wayte, Inc., 125 East Forty-sixth Street, New York, is engineer.

The Continental Can Co., Keyser Building, Baltimore, is planning for extensions and improvements in its plant at Highlandtown, to cost about \$18,000.

The Empire State Ice Co., Inc., care of William R. Moore, traffic manager, Chamber of Commerce, Cumberland, Md., is arranging for the erection of a new cold storage plant to cost about \$400,000, including equipment.

The Mexican Petroleum Corporation, 120 Broadway, New York, will build a new pumping plant and steel tankage distributing works on First Street, Baltimore, to cost about \$100,000.

The Natural Abrasive Mining Co. of America, Waynesboro, N. C., is planning for a new grinding mill and operating at Willets, N. C., estimated to cost about \$100,000. Initial works will be extended later, bringing the investment to about \$300,000. Frank R. Hewitt is treasurer.

The Western Maryland Railway Co., Baltimore, will construct 75 storage bins at its grain elevator at Port Covington, Baltimore, with conveying and other mechanical equipment and extensions, estimated to cost about \$525,000.

The Patuxent Clay Products Co., 210 Equitable Building, Baltimore, has selected a site at Patuxent for the erection of its new plant to manufacture hollow tile, etc., to cost about \$100,000, including equipment. I. P. Mills is in charge.

The City Council, Clifton Forge, Va., has arranged for a bond issue of \$240,000 for the construction of a municipal electric power plant. Plans will be drawn at once.

A machine and repair shop, with automobile service department, will be constructed by the Salvation Army, 521 Thirteenth Street, N. W., Washington, at its Industrial Home, to cost about \$200,000, including equipment. A wire baling department will also be installed.

The Bureau of Yards and Docks, Navy Department, Washington, has completed plans for the superstructure of a new machine shop at Pearl Harbor, H. T., for the local navy yard and will call for bids under specification 4518.

The Sandhill Packing Co., Aberdeen, N. C., is planning for extensions in its plant for the establishment of a department to manufacture tin cans and containers.

The Georgia Railway & Power Co., Atlanta, Ga., has arranged for a bond issue of \$150,000, a portion of the proceeds to be used for extensions and improvements in power plant and system.

A vocational department will be installed in the two-story high school to be erected by the Board of Education, Southport, N. C., to cost about \$55,000.

The Atlantic Iron Works, Norfolk, Va., is planning to rebuild its machine shop and other departments, recently destroyed by fire with loss estimated in excess of \$100,000, including equipment.

The Southern Power Co., Charlotte, N. C., is arranging for the immediate erection of a new hydroelectric generating plant in the vicinity of Mountain Island, Catawba River, with initial capacity of about 80,000 hp, estimated to cost in excess of \$2,000,000, including generating equipment and transmission system. It is also completing plans for a hydroelectric power plant at Great Falls, N. C., with capacity of about 60,000 hp, to cost approximately \$1,000,000.

The Palmetto Sheet Metal Works, P. O. Box 1, Florence, S. C., recently organized, has acquired a factory and will take immediate possession, specializing in the manufacture of roofing, skylights and general sheet metal products. B. G. Gregg is president and B. G. Gregg, Jr., secretary and general manager.

Pittsburgh

PITTSBURGH, March 20.

By far the largest individual crane order which has been placed in this district since the war, recently was closed. It calls for 21 cranes and a special trolley, the buyer being the Wheeling Steel Corporation, the entire order going to the Morgan Engineering Co., Alliance, Ohio. The award includes two 125-ton, 50-ft. span, double trolley, four-girder ladle cranes; one 30-ton with 10-ton auxiliary, 38-ft. 9-in. span, blooming engine room crane; one 30-ton with 10-ton auxiliary, 97-ft. 10 in. span, to serve the continuous mill; one 40-ton with 10-ton auxiliary, 84-ft. span to serve the blooming mill; one 20-ton with 5-ton auxiliary, 40-ft. span for the power house; two 25-ton with 10-ton auxiliary, 110-ft. span; for the slab yard; two 25-ton with 10-ton auxiliary, 75-ft. span, for the sheet bar yard and a special trolley, all for the Steubenville, Ohio, plant. (LaBelle Iron Works.) For the Portsmouth, Ohio, works, there is one 5-ton, 77-ft. span to serve the rod storage yard; one 5-ton, 88-ft. span for the galvanizing department; one 5-ton, 23-ft. 6-in. span for the nail mill; one 5-ton, 125-ft. span for the wire mill; one 5-ton, 72-ft. span for the annealing building; one 5-ton, 24-ft. span bucket crane for the gas house; one 15-ton, with 5-ton auxiliary, 42-ft. span for the sub-station and one 15-ton, with 5-ton auxiliary, 66-ft. 9-in. span for the rod mill. The order also includes one 5-ton 71-ft. span crane, one $7\frac{1}{2}$ -ton, 54-ft. span and one 5-ton, 42-ft. span, 4-motor overhead revolving type jib crane for the galvanizing plant at the Beach Bottom, W. Va., works. This order not only provides the Morgan Engineering Co. a substantial backlog, but means business for those providing parts not made by this company.

The crane market, aside from this business, shows much more life than in some time. The U. S. Sanitary Mfg. Co., Zellenople, Pa., has closed for two 5-ton cranes with the Northern Engineering Works, Detroit, which also has taken another order for a 2-ton hoist for the Pennsylvania Rubber Co., Jeannette, Pa. The Coshoccon Iron Co., Monongahela City, Pa., has not yet acted on its recent inquiry for four cranes, but an award is expected shortly and also on a 110-ton crane for the new power plant of the West Penn Power Co., at Windsor, W. Va. For the latter plant the General Electric Co., recently was awarded two 30,000-kw. turbines and several boilers were placed with the Babcock & Wilcox Co. A 30,000-kw. turbine for the Springdale, Pa., plant was awarded the Westinghouse Electric & Mfg. Co. The John F. Casey Co., Union Arcade, Pittsburgh, has asked for bids on four 2-ton cranes and a 5-ton crane in connection with a sewage project in Ohio, on which it is bidding. The Pittsburgh Supply Co., 2 Ross Street, Pittsburgh, is inquiring for two 10-ton overhead cranes. Altogether there are 30 cranes in the active or semi-active stage. In addition, a large number will some time be wanted in connection with modernizing several of the plants of the Steel Corporation. Prices for estimating purposes have gone in against about 35 cranes and much rolling mill equipment. A number of other steel companies are figuring on the replacement of obsolete equipment.

The machine tool market is over-shadowed by the activity of cranes and other equipment. Business, as has been the case for months, is merely of a pickup character and with so much used or second-hand machinery available the trade does not look forward to much activity in new tools in the near future. Government war purchases still are bothersome and the failures in machinery using industries are bringing upon the market much equipment at prices which make a strong appeal to intending buyers. A case in point is the recent sale of the machinery of the Owens Magnetic Motor Car Co., Wilkes-Barre, Pa. It is currently stated that the bulk of these tools were taken by the Wheeling Steel Corporation for its new rod and wire mill at Portsmouth.

Ohio. Because of these purchases, among which were some machines which had not been uncrated, the list of that company, which originally called for 20 tools, has dwindled to two or three items. There is no sign of railroad buying in this district.

The Keystone Power Co., Kane, Pa., is arranging for enlargements in its electric plant, with the installation of two new generating units. One of the generators will be placed during the year, and the other early in 1923.

The Sharpsburg Foundry Co., Sharpsburg, Pa., is planning for the installation of a new cupola and other equipment.

J. C. Forster & Son, 2519 Penn Avenue, Pittsburgh, manufacturers of dies, tinware and other metal products, have awarded contract to R. E. Murray, 310 Iron Exchange Building, for a new two-story plant, 50 x 100 ft., estimated to cost about \$42,000.

A one-story electrically-operated pumping plant will be constructed by the Board of Water and Light Commissioners, Tarentum, Pa., for the municipal waterworks.

The Ray-Burdette Coal Co., Delaware and Hall streets, Charleston, W. Va., is planning for the installation of a new gas engine and other power equipment at its works.

The City Council, Parkersburg, W. Va., will soon call a special election to vote bonds for \$300,000 for the erection of a new high school with vocational department. The Board of Education is in charge.

The Young Brothers Foundry Co., Charleston, W. Va., recently organized, has plans under way for the erection of a one-story foundry to manufacture iron and steel castings. R. M. and Walter Young, Charleston, head the company.

The Lunsdale Coal Co., Lunsdale, W. Va., has preliminary plans under way for a new tippie at its properties at Three Forks. It will also install considerable electrical and mining machinery in different departments of the plant. The entire project is estimated to cost close to \$1,000,000. George M. Jones is general manager.

A vocational department will be installed in the high school to be erected by the School Board, Hundred, W. Va., for which bonds for \$75,000 have been voted.

The Wheeling Machine Products Co., 1920 Main Street, Wheeling, W. Va., is arranging for the installation of a new power plant.

The Pennsylvania-Ohio Power & Light Co., Sharon, Pa., is planning for the installation of equipment at its new power house addition at Lowellville. It is expected to have the plant unit ready for operation late in May.

The Board of Education, McKeesport, Pa., has approved plans for an addition to the technical and vocational high school to cost about \$300,000. T. B. and Lawrence Wolfe, Century Building, Pittsburgh, are architects.

St. Louis

ST. LOUIS, March 20.

The Union Electric Light & Power Co., St. Louis, has acquired fifty acres of land on the Illinois side of the Mississippi River immediately south of the city limits of East St. Louis, Ill., as a site for a power plant to supply the rapidly increasing demands for electrical energy in St. Louis and environs. Much of the present power is received from the large water power plant of the Mississippi River Power Co. at Keokuk, Iowa, and from the company's own Ashley Street steam power plant. The cost of the power plant and equipment will be upward of \$6,000,000. McClellan & Junkersfeld, 45 William Street, New York, have been engaged as engineers.

The Hall & Brown Woodworking Machinery Co., 1913-33 North Broadway, St. Louis, is planning to call for bids early in April for the erection of an addition to cost about \$50,000.

The Press Sign Co., 202 South Seventeenth Street, St. Louis, manufacturer of metal signs, has arranged with the Modoc Realty Co., St. Louis, for the erection of a new two-story plant, 120 x 135 ft., estimated to cost about \$35,000, to be occupied under lease.

The Carbur-Ald Garage & Machine Co., Poplar Bluff, Mo., is planning for the erection of a new two-story machine works addition, estimated to cost about \$40,000.

The St. Louis & San Francisco Railroad Co., St. Louis, is perfecting plans for the enlargement of its locomotive shops at Springfield, Mo., to include the installation of new machine tools and other equipment, estimated to cost about \$200,000.

The Lecoutour Brothers Stair Mfg. Co., 4523 Shaw Avenue, St. Louis, has plans under way for rebuilding its two-story factory, recently damaged by fire, to cost about \$50,000. New equipment will be installed. Emil H. Nieman, 3816 Shaw Avenue, is architect.

The Chicago, Rock Island & Pacific Railroad Co., La Salle

Street Station, Chicago, has plans in progress for new locomotive repair works at Little Rock, Ark., estimated to cost about \$250,000, including machinery. C. A. Morse is chief engineer.

Fire, March 6, destroyed a portion of the plant of the Kanok Metal Co., Crestline, Kan., with loss estimated at \$45,000, including equipment.

A vocational department will be installed in the two-story high school to be erected at Thonias, Okla., estimated to cost about \$70,000. A. J. Love & Co., 205 Richards Building, Tulsa, Okla., are architects.

The Muskogee Refining Co., Muskogee, Okla., is planning for extensions in its oil refinery on South Cherokee Street to cost about \$250,000, including equipment.

The American Public Service Co., Okmulgee, Okla., is disposing of a bond issue of \$1,000,000, a portion of the proceeds to be used for extensions and improvements in electric plants and system.

The Charleston Mining & Mfg. Co., Charleston, S. C., is planning to rebuild its grinding plant at Mt. Pleasant, Tenn., recently destroyed by fire with loss estimated at \$150,000, including equipment.

The City Council, Fulton, Mo., has plans in progress for the installation of additional machinery at the municipal electric light and power plant.

The Harlan County Motor Co., Harlan, Ky., will call for bids at an early date for the erection of a new one-story branch machine shop and service building at Lynch, Ky. R. P. McGeekin, Lynch, is architect.

The Willhoit Oil Co., Webb City, Mo., is planning to rebuild the portion of its refinery destroyed by fire March 13, with loss estimated at close to \$75,000.

The Triangle Machine Works, Central City, Ky., has completed plans for a new two-story and basement factory, 75 x 100 ft., estimated to cost approximately \$30,000. W. B. Mix is head.

The Carbon Coal Co., Jackson, Ky., recently organized with a capital of \$120,000, is planning for the construction of an electric power plant at its local properties. It will also install considerable equipment for operating the mines, including motors, shaker screens, etc. Emory Cain is president and general manager.

The Kansas Gas & Electric Co., Topeka, Kan., has arranged for a bond issue of \$8,000,000, a portion of the proceeds to be used for extensions and improvements in power plants and system. Preliminary plans are under way for the installation of new generating equipment and extensions in other power departments and distributing system. F. G. Sykes is vice-president.

The Standard Oil Co. of Kentucky, Louisville, has called a special meeting April 3 to approve an increase in its capital from \$6,000,000 to \$12,000,000, a portion of the proceeds to be used for extensions in its oil refineries and mechanical plants. C. T. Collings is chairman of the board.

Detroit

DETROIT, March 20.

The Barton Auto Top Co., 4445 Woodward Avenue, Detroit, is completing plans for a new three-story factory, 62 x 160 ft., at 60 West Canfield Avenue, estimated to cost \$50,000. Albert Barton is president.

The Cartwright Die & Tool Co., 2962 Hart Avenue, Detroit, is planning for the installation of new die-manufacturing and other equipment at its plant.

The Stearns & Niles Co., Detroit, is arranging facilities to provide for the manufacture of the Knight superheater for automobiles.

A complete machine shop and manual training building will be erected by the Board of Education, Saginaw, Mich., in connection with a new junior high school in the East Side section, estimated to cost about \$1,200,000. Henry Witters is president of the board.

The Precision Tool Co., 5465 Lincoln Avenue, Detroit, is planning for the installation of new bench tools and machine shop equipment at its plant.

The Michigan Porcelain Tile Works, Ionia, Mich., has been organized with a capital of \$100,000 to construct a factory for the manufacture of tile products. Plans have been drawn for a one-story and basement works, 120 x 160 ft., estimated to cost about \$50,000, with machinery. Harry E. Kidder is general manager. P. Lindhout, fifth floor, Michigan Trust Building, Grand Rapids, Mich., is architect.

A vocational department will be installed in the two-story and basement high school, 95 x 130 ft., to be erected at Grosse Isle, Mich., to cost about \$30,000. Malcomson, Higginbotham & Palmer, 404 Moffat Building, Detroit, are architects.

The Detroit Edison Co., Detroit, has arranged for a cap-

ital stock issue to provide in part for the proposed expenditures for plant extensions and improvements, estimated at close to \$3,000,000. The work will include the installation of new generating and line equipment, with auxiliary operating machinery. Alexander Dow is president.

The Michigan Tool Co., 403 East Jefferson Avenue, Detroit, will soon begin construction of a new factory at Mack Avenue and the Detroit Terminal Railroad.

Milwaukee

MILWAUKEE, March 20.

Business the past week was not much, if any, above the average of the last four to six weeks, but inquiries were more numerous, particularly from the automotive and farm equipment industries. The latter trade is just entering a new epoch of production, although it probably will require some time to wipe out surplus stores. Passenger automobile trade is active once more. Railroad buying is increasing slowly and some business was placed during the week in this line. Manufacturers of steam and hydroelectric generating equipment, who are at present engaged in executing some large orders, have considerable new business in sight. Other divisions of the metal-working industries are also moving steadily into a stronger position.

The Ironwood & Bessemer Railway Co., with headquarters at Ashland, Wis., has been granted authority to issue \$233,000 of preferred stock for additions and extensions to its property and plant. The major expansion will be made at the steam generating plant on the Chequamegon Bay front in Ashland. Details, however, will not be available until later.

The S. W. Miller Piano Co., Sheboygan, Wis., has been obliged to abandon temporarily its plan of erecting a new factory and warehouse, its site having been condemned by the city for park and bathing beach extensions. The company, however, has purchased the American theater building, which it will remodel for occupancy May 15 as a temporary factory. It is seeking another site upon which to carry out its original new plant construction project. W. H. Ackerman is treasurer and general manager.

The Franklin Motor Car Co., Syracuse, N. Y., has addressed an inquiry to the Milwaukee Association of Commerce with reference to the proposed establishment of a new factory estimated to cost \$1,000,000. A similar inquiry has been received from the Halladay Motor Corporation of Newark, N. J. Two manufacturers of power farm machinery, whose identities are not divulged, are negotiating with the new industries division of the Association of Commerce for suitable buildings or sites for new buildings.

The Wisconsin Castings Co., Sheboygan, Wis., has been incorporated with a capital stock of \$125,000 by Harry W. Bolens of Port Washington, Wis., who recently bid in the property of the Globe Metal Products Co., founder and manager, Sheboygan, at receiver's sale for \$65,800. Mr. Bolens is president and general manager of the Gilson Mfg. Co., Washington, and several other metalworking industries, being in the manufacture of gas engines and farm machinery equipment. The plant of the former Globe company consists of a gray iron foundry and machine shop erected about two years ago. Mr. Bolens intends to place both shops in operation at once.

The S. Heller Elevator Co., 250 Milwaukee Street, Milwaukee, has plans for a new four-story factory to be erected at a cost of \$75,000 to \$100,000 at Milwaukee and Buffalo streets. It manufactures electric, hydraulic and manual freight and passenger elevators. Work will begin about April 1. Siegfried Heller is president and treasurer.

The Milwaukee Boiled Ham Co., 901 Holton Street, Milwaukee, will build a new packing plant, with cold storage and warehouse, at Well Street and Garfield Avenue, at a cost of about \$50,000. Inquiry is being made for engines, boilers, ice machine, etc. John J. Czala is general manager.

The Ashland Light & Power Co., Ashland, Wis., has placed the general contract with the L. E. Meyers Co., 53 West Jackson Boulevard, Chicago, consulting and contracting engineer, for the construction and equipment of a new hydroelectric generating plant costing \$3,500,000 on the Flambeau River near Tony, in Rusk County, Wis. The principal items of equipment will be three 5000-hp. turbo-generating units. Approximately 105 miles of transmission lines will be constructed.

Harry A. White, Marinette, Wis., has engaged Theodore Klauer, Jr., architect, 1861 Dunlap Avenue, local, to prepare plans for a garage and service station, 118 x 120 ft., one story and basement, estimated to cost \$30,000, including equipment, etc.

The Bucyrus Co., South Milwaukee, Wis., has awarded the general contract to Paul Riessen's Sons Co., 1018 Humboldt Avenue, Milwaukee, for a new gray iron foundry, 60 x 276 ft., of brick and steel. It also will build a new machine and

erecting shop at its plant in Evansville, Ind., contract for which has been let to the Worden-Allen Co.

The Madison Gas & Electric Co., Madison, Wis., will take bids within a few days for an addition to its steam generating plant to produce 5000 kw. additional energy. The work is in charge of Mead & Beasone, consulting engineers, Madison. Equipment requirements include a 1000-hp. Sterling boiler, automatic stoking equipment, coal handling machinery, bunkers, etc.

The Chippewa Valley Auto Co., Chippewa Falls, Wis., has plans for a new public garage, sales and service building, 100 x 200 ft., estimated to cost \$75,000 complete. Fred A. Bigler is president and general manager.

The R. J. Schwab & Sons Co., 283 Clinton Street, Milwaukee, iron founder and manufacturer of furnaces, boilers, etc., will erect two brick additions, 30 x 72 and 40 x 50 ft., to provide larger production capacity.

The Board of Education, Ashland, Wis., is taking bids until April 10 for a manual arts building as an addition to the central high school. It will be 65 x 100 ft., three stories and basement, and with full equipment will cost about \$130,000. The architects are Kelley & Scheffnick.

The Domestic Foundry Co., North Milwaukee, Wis., has been incorporated with a capital stock of \$10,000 to manufacture gray iron castings. The incorporators are John Toennesen, J. L. Orth, H. W. Connell and Martin Schottler, 105 Wells Street, Milwaukee, attorney. A statement concerning the company's plans will be made later.

The American Steel Corporation, Milwaukee, has filed articles of incorporation to manufacture iron and steel products. The capital stock is \$100,000. The incorporators are A. J. Vollbrecht, George A. Affeldt, attorney, and B. Glenn Tarkington, 740 Thirty-third Street, sales manager Pittsburgh Furnace Co. The incorporators expect to be ready soon to detail plans of the enterprise.

The Gulf States

BIRMINGHAM, March 20.

The Continental Box Corporation, Brewton, Ala., has acquired the local plant of the T. R. Miller Mill Co., specializing in the manufacture of wire-bound boxes, and will operate the factory. Extensions and improvements are planned.

E. J. Owen, Sixth Street, Gadsden, Ala., has preliminary plans under way for a new one-story foundry to manufacture iron and other metal castings.

The American Public Service Co., Baird, Tex., will build a new cold storage plant, estimated to cost about \$75,000.

The Robstown Gln & Ice Co., Robston, Tex., will install a new generator and other equipment at its power house. The company is arranging to electrify its cotton ginning branch and will install motors and other electrical apparatus. Extensions and improvements will also be made in the local cold storage plant.

The City Council, Fernandina, Fla., has called a special election on April 4 to vote bonds for \$37,000 for extensions and improvements in the municipal electric light and ice plant. New equipment will be installed.

The Brooks Supply Co., 799 Franklin Street, Beaumont, Tex., manufacturer of oil well supplies and equipment, is planning the erection of a one-story machine shop addition. A number of machine tools will be installed.

The Humphreys Oil Co., Mexia, Tex., is being formed by a merger of the Humphreys-Texas Co., and the Humphreys-Mexia Co. It will have a capital of \$15,000,000 and plans extensive operations. A new refinery will be erected at a Gulf point, with pipe line, now in course of installation, from the Mexia field. The entire project will cost approximately \$1,000,000. Col. A. E. Humphreys is president.

The Common Council, Delray, Fla., will commence the immediate construction of a one-story municipal electric lighting plant.

The Fluker Gravel Co., 203 Roumain Building, Baton Rouge, La., recently organized with a capital of \$100,000, will equip a new sand and gravel working plant in the vicinity of Fluker, La. The installation will include drag lines, buckets, two complete washing plants, cars, electrical and other equipment. O. O. Orden is president and general manager.

The Common Council, Paris, Tex., will build an electrically operated pumping and filtration plant in connection with a new waterworks system. Bonds for \$1,000,000 have been sold. Major J. B. Hawley, Fort Worth, Tex., consulting engineer, has plans.

The Houston Electric Co., Houston, Tex., is planning for the purchase of 55 new street cars and other operating equipment, estimated to cost about \$375,000.

The Common Council, Clearwater, Fla., is arranging for the erection of a municipal electric light and power plant.

The ice-manufacturing plant of the Sabine Ice Co., Bronson, Tex., with cotton gin adjoining, has been acquired by I. D. Sparks and E. Cousins, Bronson. The new owners will make additions and improvements and install new equipment. Plans are also being considered for the establishment of an electric power house.

Copeland Brothers, Tuscaloosa, Ala., have acquired timber lands in the vicinity of McSham, Ala., and have plans under way for a new saw mill, planing mill and other buildings, estimated to cost in excess of \$50,000.

A vocational department will be installed in the new high school to be erected at Greenville, Tex., estimated to cost about \$100,000. Bonds have been voted.

The Cantonment Merchantile Co., Cantonment, Fla., will build a new ice-manufacturing and refrigerating plant, in connection with its canning factory. H. R. Root is secretary and treasurer.

Indiana

INDIANAPOLIS, March 20.

A vocational department will be installed in the two-story and basement high school to be erected at Cannelton, Ind., estimated to cost about \$65,000. Breton Minor is secretary.

The Northern Indiana Gas & Electric Co., South Bend, Ind., has secured permission to purchase the plant and property of the Lafayette Service Co., Lafayette, Ind., at a chancery sale for \$120,000. The new owner plans extensions and improvements in the power plant and system.

The D. V. Reedy Elevator Co., Indianapolis, manufacturer of passenger elevators, will soon commence the erection of the superstructure for its new two-story plant on South New Jersey Street, estimated to cost close to \$50,000, including machinery. D. V. Reedy is president.

A vocational department will be installed in the two-story and basement high school to be erected by the Franklin School Township Board, Georgetown, Ind., at Lanesville, Ind., estimated to cost \$80,000. George C. Doollittle, Corydon, Ind., is architect.

The J. H. Kripke Co., 512 West Franklin Street, Evansville, Ind., is planning for the erection of a metal and iron-working shop on West Franklin Street, to cost about \$25,000.

Motors and other electrical and mechanical power equipment will be installed in the new printing plant to be erected by the R. R. Donnelly Co., 731 Plymouth Court, Chicago, at Crawfordville, Ind., to cost about \$275,000.

A vocational department will be installed in the two-story and basement high school to be erected at Albion, Ind., estimated to cost \$75,000.

The Elwood Foundry, Elwood, Ind., has been sold by the trustee in bankruptcy to Abe Levi, Elwood, for \$6,500. A new company is being organized to operate the foundry, which will make traffic signs and other devices for which the former concern had contracts. Clayton Cooper is interested.

The new foundry of the C & G Potts Co., 316 Washington Avenue, Indianapolis, has been completed at a cost of \$60,000. It is 90 x 145 ft., of brick and steel, part two-stories, and will have an output of 18 to 20 tons of gray iron and semi-steel castings a day.

The Pacific Coast

SAN FRANCISCO, March 14.

The Armstrong Brothers Tool Co., 335 North Francisco Avenue, Chicago, has acquired water front property at Astoria, Ore., as a site for a new plant for Pacific Coast and Far Eastern trade. It is planned to commence erection late in the spring.

The Long Beach Crystal Ice Co., Long Beach, Cal., recently organized with a capital of \$100,000, has plans nearing completion for a new factory at 2870 American Avenue, Willowville, estimated to cost \$60,000, including machinery.

The Board of Public Works, Municipal Building, San Francisco, will call for bids in April for the proposed municipal hydroelectric power plant at Moccash Creek, estimated to cost about \$1,000,000, with machinery.

W. E. Higman and H. B. Mason, Atascadero, Cal., have organized a company and are completing plans for a new cold storage and refrigerating plant, 100 x 300 ft., estimated to cost \$300,000 with equipment.

A manual training and domestic science building will be erected by the Board of Education, Calipatria, Cal., in connection with a new group of high school buildings, esti-

mated to cost in excess of \$150,000. Donald E. Wells, El Centro, Cal., is architect.

A vocational department will be installed in the new high school to be erected at Corona, Cal., for which \$150,000 in bonds have just been voted. Plans will be prepared at once.

The Great Western Power Co., 14 Sansome Street, San Francisco, will commence the immediate erection of a new two-story power house at El Cerrito, Contra Costa County, estimated to cost about \$150,000.

The Ever-Ready Heater Co., Inglewood, Cal., recently organized with capital of \$500,000 to manufacture heaters and heating equipment, has acquired about five acres of land near the plant of the Hicks Dovetail Lath Co., and plans the erection of a new factory. John B. Reeves is president.

The Pacific Power & Light Co., Portland, Ore., is considering plans for the erection of a new hydroelectric generating plant on the Deschutes River, with initial capacity of about 30,000 hp. Guy W. Talbot is president.

Canada

TORONTO, March 20.

Both manufacturers and dealers report a decided improvement in the demand for machinery and tools. Many manufacturers have recently increased operating capacity and are producing on a larger scale than at any time during the past year and a half. Dealers' orders are mostly for one or two machines, with an occasional order for six or a dozen tools. Buying has not yet started on an extensive scale, but there is a steadily increasing number of users who are entering the market for machines for replacement purposes. In Montreal, where business has been very dull for the past year or more the demand for equipment is showing improvement and sales of various lines of machinery are slowly picking up. Small tools continue active.

The Board of Education, Guelph, Ont., is receiving bids for the erection of a collegiate institute which will contain wood-working and machine shops, electrical department, etc.

The Toronto Transportation Commission, Toronto, will build a machine shop in Hillcrest Park at an estimated cost of \$100,000. Equipment has not yet been purchased. It is also receiving bids for 8000 tons of steel rails.

The Standard Stone Co., Windsor, Ont., will erect a factory and install the necessary machinery.

The governors of the General Hospital, Brantford, Ont., are contemplating equipping an auxiliary power plant to provide against storms, etc.

The Northern Ontario Light & Power Co., Cobalt, Ont., is considering the development of 7000 hp. at Sturgeon Falls, Ont., to cost between \$350,000 and \$600,000.

N. K. Lund, Forestburg, Alta., is making arrangements for the erection of electric lighting plant.

The Red Star Refineries, Ltd., Montreal, recently incorporated, is preparing to erect an oil refinery and has secured a site in the east end of the city with railroad and harbor facilities and is ready to proceed with the erection of the first unit with capacity of 1000 bbl. per day. It will ultimately have a daily capacity of 10,000 bbl. The President of the company is Senator N. A. Belcourt, Ottawa, Ont.; vice-president and general manager, T. A. Kilburn, and the directors include F. W. Stewart, H. W. Austin, J. S. Stanford, J. McNaughton and J. S. Giles.

The Kasutine Co., Ltd., formerly of 28 Eastern Avenue, Toronto, has moved to Dundas, Ont., where it has acquired control of the Dominion Welding Products Co. The latter company commenced manufacturing steel tanks for water, gasoline and storage as well as welded smoke stacks last July.

The Enterprise Foundry Co., Sackville, N. B., has recently completed an addition, 50 x 150 ft., for making bodies for steel and gas ranges and a wing, 30 x 50 ft., for japanning. A new development at the plant is the installation of a large air compressor for sand blasting and other foundry work.

The chairman of the Hydro Commission, 75 Laurier Avenue, Ottawa, Ont., is receiving bids for meters, transformers, wire and general supplies. J. E. Brown is manager.

The Fedders Mfg. Co., Black Rock, N. Y., has purchased the plant of the Lantz Marble Works on Lewis Street, Bridgeburg, Ont., and will equip it to manufacture automobile radiators, aeroplane accessories, etc.

The Canadian Automobile Corporation, 197 Sparks Street, Ottawa, has started work on the erection of a factory in West Hull Township to cost \$50,000. Charles A. Fox, 394 Harvard Street, Montreal, is architect.

The Manitoba Rolling Mill Co., Winnipeg, Man., is in the market for a 24-in. lifting magnet for handling scrap; also a 100,000-lb. testing machine.

Current Metal Prices

On Small Lots, Delivered from Merchants' Stocks, New York City

The following quotations are made by New York City warehouses.

As there are many consumers whose requirements are not sufficiently heavy to warrant their placing orders with manufacturers for shipment in carload lots from mills, these prices are given for their convenience.

On a number of articles the base price only is given, it being impossible to name every size.

The wholesale prices at which large lots are sold by manufacturers for direct shipment from mills are given in the market reports appearing in a preceding part of THE IRON AGE under the general heading of "Iron and Steel Markets" and "Non-ferrous Metals."

Iron and Soft Steel Bars and Shapes

Bars:	Per Lb.
Refined iron bars, base price.....	2.53c.
Swedish bars, base price.....	10.00c.
Soft steel bars, base price.....	2.53c.
Hoops, base price.....	3.38c.
Bands, base price.....	3.13c.
Beams and channels, angles and tees	
3 in. x ¼ in. and larger, base.....	2.63c.
Channels, angles and tees under 3 in. x	
¼ in., base.....	2.53c.

Merchant Steel

	Per Lb.
Tire, 1½ x ½ in. and larger.....	2.50c.
(Smooth finish, 1 to 2½ x ¼ in. and larger) ..	2.70c.
Toe-calk, ½ x ¾ in. and larger.....	3.20c.
Cold-rolled strip, soft and quarter hard..	6.25c. to 7.25c.
Open-hearth spring steel.....	3.55c. to 6c.
Shafting and Screw Stock:	
Rounds.....	3.35c.
Squares, flats and hex.....	3.85c.
Standard cast steel, base price.....	12.00c.
Extra cast steel.....	17.00c.
Special cast steel.....	22.00c.

Tank Plates—Steel

¼ in. and heavier.....	2.63c.
------------------------	--------

Sheets

Blue Annealed

	Per Lb.
No. 10.....	3.28c. to 3.53c.
No. 12.....	3.33c. to 3.58c.
No. 14.....	3.38c. to 3.63c.
No. 16.....	3.43c. to 3.73c.

Box Annealed—Black

	Soft Steel C. It. One Pass Per Lb.	Blued Stove Pipe Sheet, Per Lb.
to 20.....	3.55c. to 3.80c.	.....
and 24.....	3.60c. to 3.85c.	4.10c.
.....	3.65c. to 3.90c.	4.15c.
.....	3.75c. to 4.00c.	4.25c.
.....	4.00c. to 4.25c.	.....

8 and lighter, 36 in. wide, 10c. higher.

Galvanized

	Per Lb.
No. 14.....	3.85c. to 4.10c.
No. 16.....	4.00c. to 4.25c.
Nos. 18 and 20.....	4.15c. to 4.40c.
Nos. 22 and 24.....	4.30c. to 4.55c.
No. 26.....	4.45c. to 4.70c.
No. 27.....	4.60c. to 4.85c.
No. 28.....	4.75c. to 5.00c.
No. 30.....	5.25c. to 5.50c.

No. 28 and lighter, 36 in. wide, 20c. higher.

Welded Pipe

Standard Steel

	Black Galv.
¾ in. Butt...—56	—40
¾ in. Butt...—61	—47
1-3 in. Butt...—63	—49
3½-6 in. Lap...—60	—46
7-8 in. Lap...—56	—34
9-12 in. Lap...—55	—33

Wrought Iron

	Black Galv.
¾ in. Butt...—30	—13
1½ in. Butt...—32	—15
2 in. Lap...—27	—10
2½-6 in. Lap...—30	—15
7-12 in. Lap...—23	—7

Steel Wire

BASE PRICE* ON NO. 9 GAGE AND COARSER

	Per Lb.
Bright basic.....	3.50c. to 3.75c.
Annealed soft.....	3.50c. to 3.75c.
Galvanized annealed.....	4.25c. to 4.50c.
Coppered basic.....	4.00c. to 4.25c.
Tinned soft Bessemer.....	5.50c. to 5.75c.

*Regular extras for lighter gage.

Brass Sheet, Rod, Tube and Wire

BASE PRICES

High brass sheet.....	16½c. to 17 c.
High brass wire.....	17 c. to 17½c.
Brass rod.....	14½c. to 14¾c.
Brass tube, brazed.....	26 c. to 27½c.
Brass tube, seamless.....	18½c. to 19 c.
Copper tube, seamless.....	20¾c.

Copper Sheets

Sheet copper, hot rolled, 24 oz., 19½c. to 20½c. per lb. base.
Cold rolled, 14 oz. and heavier, 2c. per lb. advance over hot rolled.

Tin Plates

Bright Tin	Grade	Grade	Coke—14-20	Primes	Wasters
	"AAA"	"A"			
	Charcoal	Charcoal			
	14x20	14x20			
IC..	\$10.00	\$8.50	80 lb..	\$6.05	\$5.80
IX..	11.50	10.00	90 lb..	6.15	5.90
IXX..	13.00	11.25	100 lb..	6.25	6.00
IXXX..	14.25	12.50	IC..	6.40	6.15
IXXXX..	16.00	14.00	IX..	7.40	7.15
			IXX..	8.40	8.15
			IXXX..	9.40	9.15
			IXXXX..	10.40	10.15

Terne Plates

16-lb. Coating 14 x 20

100 lb.....	\$7.00
IC.....	7.25
IX.....	7.50
Fire door stock.....	9.00

Tin

Straits, pig.....	32c.
Bar.....	37c. to 42c.

Copper

Lake ingot.....	15 c.
Electrolytic.....	14½c.
Casting.....	14¾c.

Spelter and Sheet Zinc

Western spelter.....	6½c. to 7c.
Sheet zinc, No. 9 base, casks.....	10½c. open 11c.

Lead and Solder*

American pig lead.....	5½c. to 6½c.
Bar lead.....	6½c. to 7 c.
Solder, ½ and ¾ guaranteed.....	23c.
No. 1 solder.....	21c.
Refined solder.....	17c.

*Prices of solder indicated by private brand vary according to composition.

Spelter Metal

Best grade, per lb.....	75c.
Commercial grade, per lb.....	85c.
Grade D, per lb.....	25c.

Antimony

Asiatic.....	5½c. to 6c.
--------------	-------------

Aluminum

No. 1 aluminum (guaranteed over 99 per cent pure), in ingots for remelting, per lb....	25c. to 27c.
--	--------------

Old Metals

The market continues fairly firm, with an upward tendency. Dealers' buying prices are nominally as follows:

	Cents Per Lb.
Copper, heavy crucible.....	10.75
Copper, heavy wire.....	9.75
Copper, light and bottoms.....	8.00
Brass, heavy.....	5.00
Brass, light.....	4.50
Heavy machine composition.....	7.75
No. 1 yellow brass turnings.....	5.25
No. 1 red brass or composition turnings.....	5.75
Lead, heavy.....	3.75
Lead, tea.....	2.50
Zinc.....	2.00

THE IRON AGE

ESTABLISHED 1855

New York, March 30, 1922

VOL. 109, No. 13



Mechanical Molding a Success at Council Bluffs— Griffin Plant Equipped Throughout with Labor-Saving Devices

BY GILBERT L. LACHER

CONSTRUCTION of the Council Bluffs, Iowa, plant of the Griffin Wheel Co., Chicago, introduces a new epoch in the manufacture of chilled iron car wheels. In contrast with existing car wheel foundries, all of which were laid out for hand molding, the new Griffin plant was designed and equipped for the mechanical handling of practically all operations and, what is more important, this innovation in practice has proved not only feasible but economical.

That success has been achieved in solving the problem of mechanical molding of car wheels is hardly more surprising than that it was undertaken at all, in view of the discouraging experience of others who have tried it in the past. Necessity, however, is generally the compelling reason for risking radical deviations from established practice. In this case, necessity lay in the labor situation, which was rendered particularly acute by the world war. In times of labor scarcity it is always exceedingly difficult to induce men to take up the arduous work of a wheel foundry and, even when labor is more plentiful, it is not easy to fill the ranks.

Manual molding of car wheels calls for a physique which will stand heavy lifting and long hours in an

atmosphere of variable temperature, often aggravated by the presence of steam and gas. In shops producing more than 175 wheels per cupola, the hours during which the labor necessarily must be performed are unattractive. This is because all molds must be made up prior to the time at which pouring begins, for the conditions are such that a molder cannot work intermittently, molding and pouring. Hence it is necessary to begin operations at 3 or 4 a. m., so that the men who receive iron first will be ready at 8 or 9 a. m.

Because everything connected with it is heavy, the work is laborious. A molder and helper handle about eight tons of sand; this must be tempered, cut over two or three times, shoveled into the molds, tamped, shaken out again, and left in proper shape to condition over night. Ten tons of metal must be poured by the same two men, and the wheels shaken out at the proper time. Car wheels are unlike other castings, which may remain indefinitely in the molds, for, if allowed to remain overtime for even a few minutes, the wheels are spoiled. This requires the maximum exertion during the time of shaking out, which at most seasons of the year is very hot work, developing profuse perspiration and putting the molder in such condition that he cannot

EMBODYING revolutionary methods of handling the heavy molds incident to the making of railroad car wheels, the new Griffin plant in Council Bluffs, Iowa, is confidently expected to show reduced production costs. The outstanding innovations are described and illustrated in this article; the Council Bluffs methods of handling other foundry problems will follow in the second installment. With plants active in Boston, Chicago, Denver, Detroit, Kansas City, Kensington, Los Angeles, St. Paul and Tacoma, the best ideas from all these sources have been gathered into the new unit and whipped into one harmonious whole. Operations under these auspicious beginnings will be watched with great interest by foundrymen the country over, but more particularly by those who have similar obstacles to overcome.

go back to work in a cool atmosphere. The only thing that attracts men to this work is the wage, which is universally on a piece-work basis. There is no union, and the rate paid is always materially higher than that paid union molders.

On account of the unattractive character of the work, there is never a surplus of molders. Most molders now employed are well along in years and restrictions on immigration limit the manual labor available from abroad. Moreover, the younger generation in this country will not take up so strenuous vocations as their fathers. Hence the labor problem confronting the car wheel manufacturers is a difficult one. Whenever an increase in output is required, it is necessary to break in new men as helpers and promote the old helpers to molders; and very often this process is so rapid that a long period must be passed through before molding operations are stabilized. In adding to the working force, it is usually necessary to start in at least ten new men before one is found who will remain permanently. Thus the rate of labor turnover is increasing and the average efficiency of wheel foundries is held down.

The importance of finding a solution of the problem can best be appreciated by considering the magnitude of the car wheel industry. Fully 95 per cent of the 25,000,000 railroad car wheels in service in the United States and Canada are of chilled iron. In addition, chilled-iron wheels are used for street cars, interurban cars, industrial cars, locomotive tenders, cranes, etc. As the average life of a railroad car wheel is about eight years, the renewal requirements amount to 3,000,000 wheels per annum. These are supplied by 25 chilled-iron wheel manufacturers in the United States and Canada, whose plants are located near points where the largest number of wheels are put into use.

During the past two decades several attempts made replace labor with mechanical molding devices all proved dismal failures, notwithstanding the large sums of money use in experiments. Not until 1919, when the Griffin Wheel Co. conducted an experiment at its Kansas City plant, was a successful car wheel molding machine perfected. This was followed by the Brown Car Wheel Co., Buffalo, N. Y., in a modified form for a similar purpose, where it has been successfully applied since the beginning of 1921. This was described briefly at page 847 of THE IRON AGE, Sept. 15, 1921.

Now the Council Bluffs plant is the first car wheel foundry to be designed and built expressly for mechanical handling of all molding operations. While the company had already decided to erect a new plant to meet the growing demand for its product, the successful experiment at Kansas City led it to discard old practices entirely, in favor of mechanical methods of operation

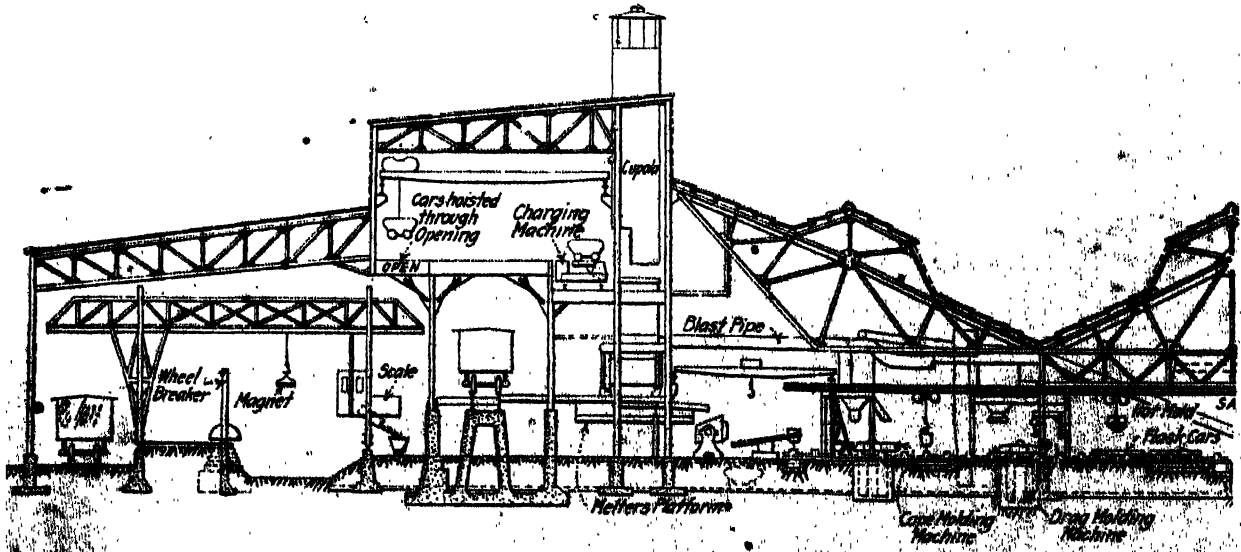
throughout the yard, charging room and molding room.

In the molding room of the Griffin plant an outstanding feature is the method of handling molds from the molding machines to the cupola and thence to the shake-out grates. The molding room is divided into two complete units which are the converse of each other. There are four molding machines, two for each half of the room. As soon as the drag mold is made it is conveyed to the second molding machine, where the cope is superimposed upon it and the finished mold is advanced to the pouring station. Thence the mold is conveyed to the shake-out grates, whereupon the cope and drag portions of the flask are returned to the molding machines for further use.

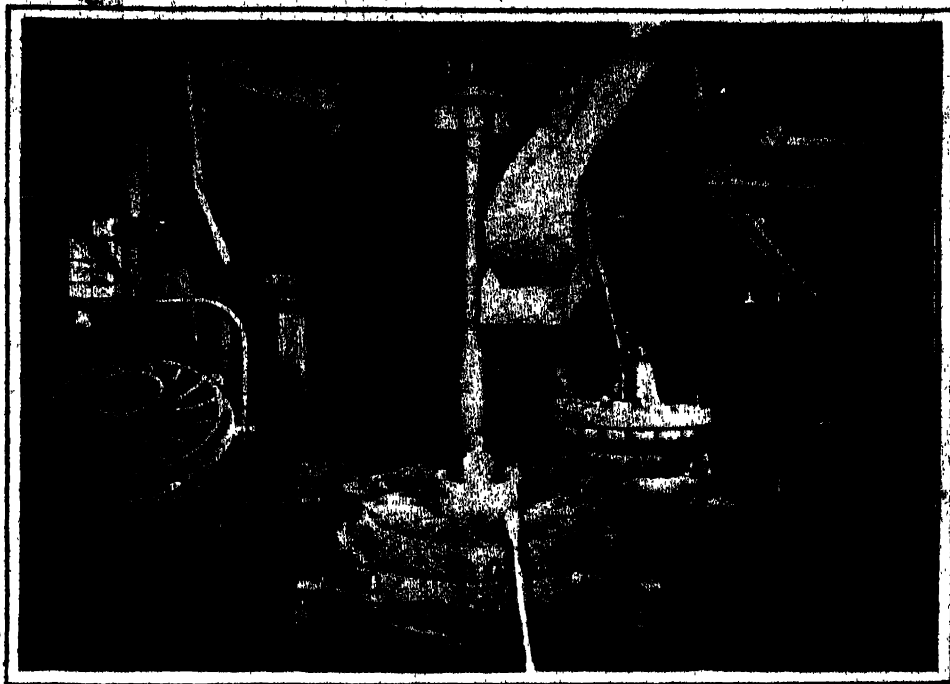
As the process is a continuous one, the conveying equipment is so designed and constructed as to make maintenance costs low and breakdowns unlikely. It consists of two rectangular tracks, one for each half of the molding room. Each side of the rectangle is filled with cars having square platforms. At each corner of the rectangle, a hydraulic pusher cylinder operates to put the series of cars in motion, the square platform of one car pushing that of the car ahead.

On one car is placed the drag half of the flask, consisting of bottom board and nowel, immediately after the mold has been shaken out. The car then progresses to a position adjacent to the drag molding machine, where the bottom board and nowel are lifted off by jib crane, and rammed and faced in the machine. The completed drag is then deposited by the machine on a conveyor car which carries it to a point next to the cope molding machine, where a cope is superimposed upon it.

As it takes longer for the cope half of the flask to cool, it is handled differently from the bottom board and nowel. After the mold is shaken out, a jib crane transfers the chiller and cope to a square top car of the same type as those on the rectangular conveyor track. This car, however, rests on a transfer car by means of which it may be transferred to any one of a series of tracks running longitudinally on the inside of the rectangle formed by the conveyor. There are eight of these longitudinal tracks, six of which are used for storage purposes and two for the return of the empty cars to the transfer track adjacent to the shake-out grates. A second transfer track at the other end of the storage yard is used for transferring the loaded cars from storage to two short tracks serving the cope molding machine and then for returning them, after they have been unloaded, to the two longitudinal tracks which carry them back to the shake-out grates. On the storage tracks the cars move by gravity. The two transfer cars are operated by cable from motor-driven winches, while the empties are returned to the shake-out grates by hydraulic pusher cylinder.



Cope Molding Machine in Fore-ground; Drag Machine Is Similar. Each consists of a vertical hydraulic cylinder from which three horizontal arms radiate. The arms are lifted and turned hydraulically, while, at one point in the circumference of rotation of the arms, a pneumatic jolting machine is stationed for ramming. The sand chute appears above



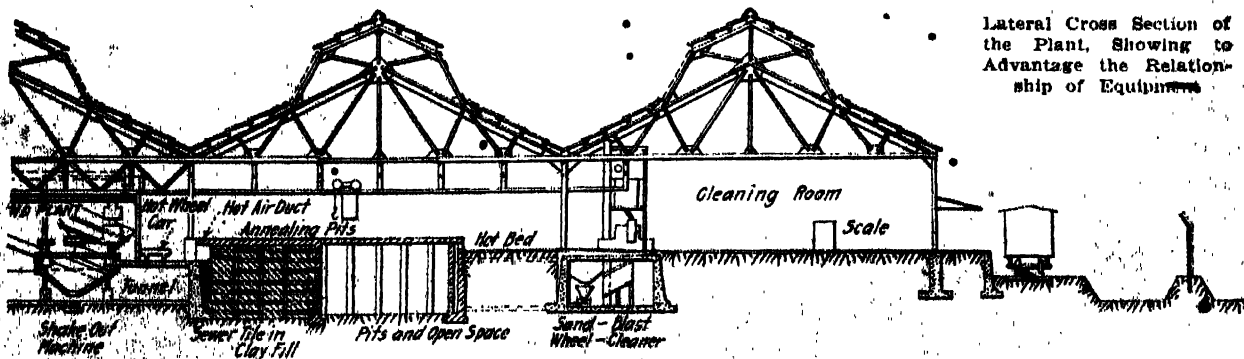
As soon as a cope has been rammed and faced on the cope molding machine, cope and drag are clamped together and the completed mold progresses to a point near the cupola, where the metal is poured from a ladle suspended from a 3-ton crane directly above the car. In this manner molds are poured consecutively as rapidly as the cars are moved forward on the conveying system. The hydraulic pusher cylinders which furnish the motive power for the conveyor are actuated in unison, the control being handled by the same employee who operates the drag molding machine. At each corner of the conveyor is a turntable which is rotated 90 deg. by the pusher on its return stroke. Hence, when a turntable is empty it is turned to position for the receipt of a car from the incoming side of the rectangle. When it is loaded it is rotated to position for the delivery of the car to the outgoing side of the conveyor.

The cope and drag machines are of similar construction, consisting of a vertical hydraulic cylinder from which three horizontal arms radiate. The lifting and turning of the arms is handled hydraulically, while at one point in the circumference described by the rotation of the arms, a pneumatic jolting machine is stationed for ramming purposes.

There are three separate stations in the rotation of the drag machine where certain stages in the molding operations are performed. At Station 1 the core print is placed, the number set, the pattern brushed and the nowel placed on the pattern. Then one riddle full of facing is shaken through a No. 4 riddle and

tucked into the pockets on the brackets. These operations require 35 sec. At Station 2 a measuring ring is placed on the nowel, heap sand is drawn and excess heap sand is struck off. The drag is then placed on a ramming plate, given five jolts, after which the ramming plate and measuring ring are removed. The molder then strikes off and applies bottom board and clamps. These operations take 55 sec. To reduce further the time of this operation it is proposed to use a bar drag, which will eliminate the bottom board and striking off. A bar drag consists of a nowel with bars through it. By packing the sand between these bars, the need for a bottom board will no longer exist. At Station 3 the drag is turned over on its trunnions and lowered to the mold conveyor, where the clamps are knocked off and the pattern is drawn. These operations require 20 sec. Four men perform all of the operations of the drag molding machine, one of whom operates the valves controlling the raising, lowering and turning of the machine. The operation of the machine per complete revolution takes 12 sec. After the drag has been placed on the conveyor the pan core and center core are set and the chaplets are placed.

There are also three stations at the cope machine. At Station 1, the pattern is brushed, following which the dry sand dish, the head block and sprues are inserted. Then the facing ring is placed and one riddle of facing is applied, after which the cope and chiller (handled as one piece, being bolted together) are placed. These are not cast in one piece because the chiller wears out faster than the cope. Following the



Lateral Cross Section of the Plant, Showing to Advantage the Relationship of Equipment

placing of cope and chiller two riddles of sand are applied through a No. 4 riddle, a shovelful of sand is placed in the dish and peened around the dish core. All of the operations at Station 1 are performed in 55 sec. At Station 2 the operator draws sand, gives two jolts and strikes off at a level with the cope bars. He then applies a ramming plate and gives seven jolts, removes the ramming plate and vents the dish. These operations take 55 sec. At Station 3 the operator raises the cope, turns it over, swabs the chiller, applies the dust, turns over again and closes the mold. The average time required at Station 3 is one minute. The time in turning and raising the machine averages 12 sec. per complete operation.

Owing to the fact that the three stations at each machine are operating simultaneously, the time for the completion of a flask, drag or cope averages only 1 min. 15 sec. For the convenience of the molders a molding sand hopper and a facing sand hopper are located above each machine. The machines, designed by the Griffin Wheel Co., were constructed by the Omaha Steel Works.

Mechanical shakers provided for shaking out are as ingenious as those used for molding. The shake-out floor is connected by a swing crane which is elevated and lowered vertically, while it is swung radially from its pivot column by motor. The beam of the crane may also be turned on its own axis by motor. Molds are transferred by a jib crane from the rectangular conveyor to a jolt machine in the shake-out room where the sand is shaken out of the flask. The shake-out crane is then swung adjacent to the jarring machine and is turned so that the wheel may be pushed into a jaw on the end of the crane beam. Upon the return of the jaw to vertical position so that the wheel cannot roll out, a laborer knocks off the header. Then the crane swings the wheel to another jolter,

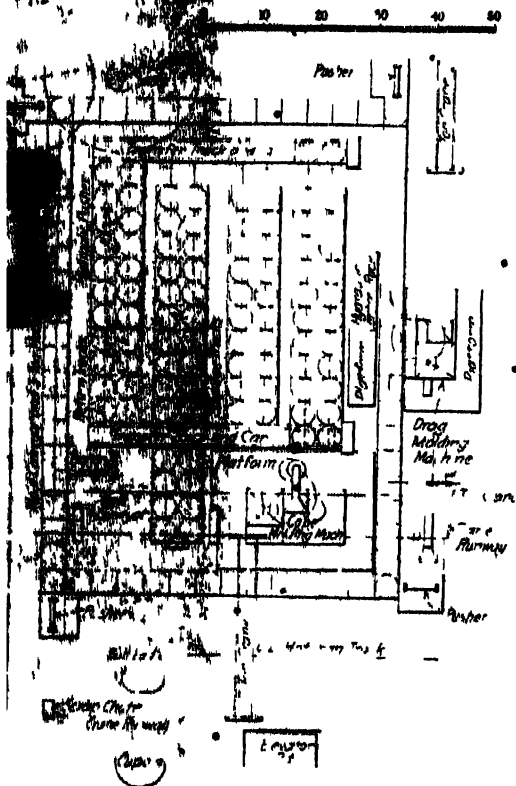
where the crane beam is again turned so the jaw is in a horizontal plane and the wheel rests flat on the table of the machine. Here further jolting shakes any remaining sand off the surface of the wheel and a pin in the center of the machine knocks out the bore core. Thereupon lifting tongs are inserted into the bore of the wheel and it is transferred, by the swing crane, to a car on the hot wheel track which runs between the shake-out floor and the cooling pits. This car, operated by motor-driven winch, is moved to a point opposite the cooling pit into which the wheel is to be lowered. The wheel is transferred from car to pit by one of four cranes which operate the entire length of the four rows of soaking pits. In this case also the lifting is effected by inserting tongs into the bore of the wheel.

The hydraulic swing cranes on the shake-out floor were designed by the company's engineering staff and constructed by the Omaha Steel Works. There are two of these machines, one for each half of the molding room. The jolting machines on the shake-out floor, as well as those used for molding, were furnished by the Herman Pneumatic Machine Co., Zellenople, Pa. There is a difference of opinion on the proper characteristics of a jarring machine. Some foundry engineers prefer a short drop and a quick jolt, producing a vibration effect, while others favor a longer drop and fewer jolts. The machines in this plant are of the latter type, having a drop of 2 in. and producing 80 jolts per min.

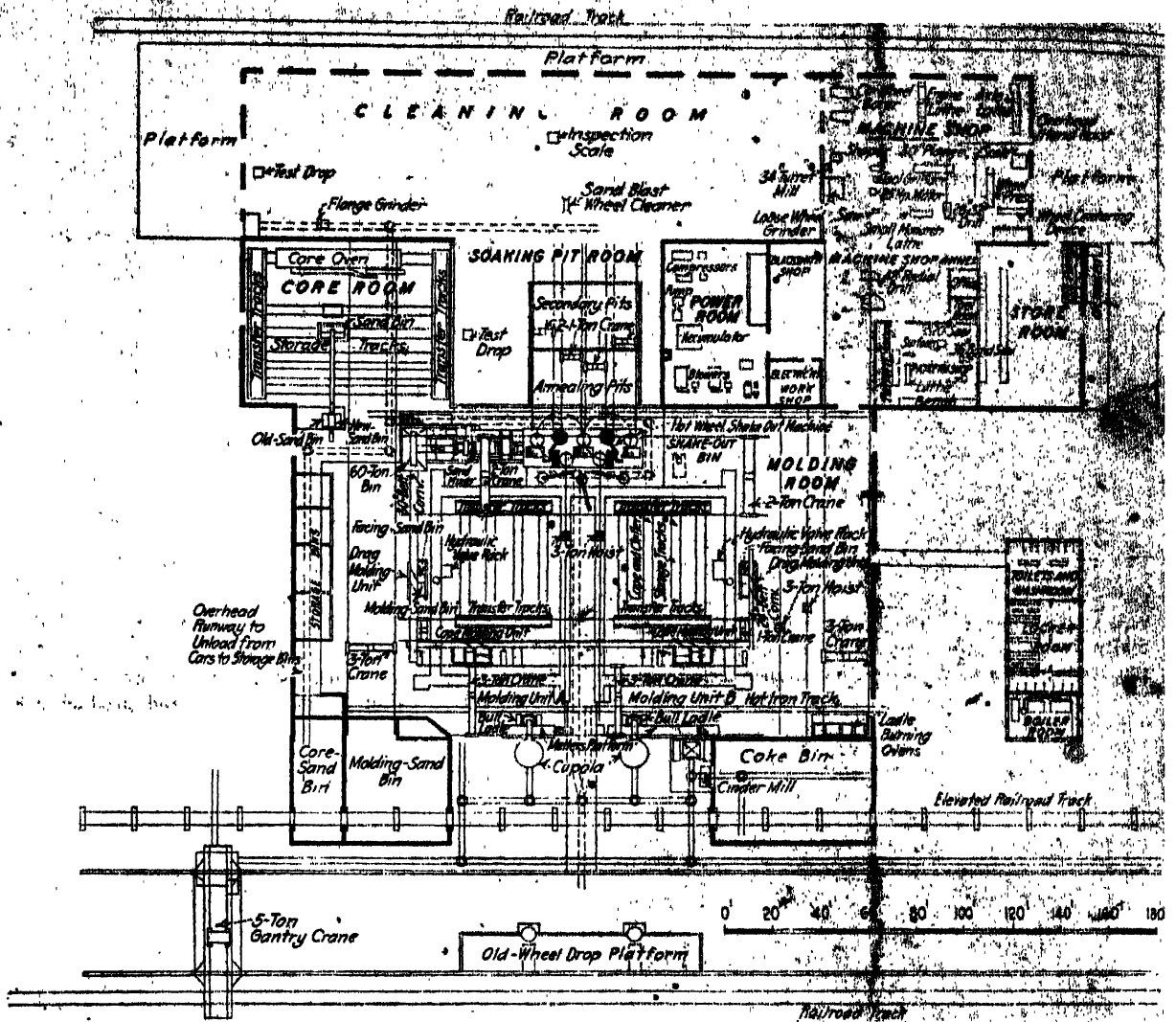
Under the well-planned method of routing of materials, there are no unnecessary movements in the progress of the work. This scheme of direct-line handling of materials is evident in the design of the entire plant and that so well-thought-out a plan is highly important is evident from the tonnage handled per day. The foundry was constructed for a capacity of 700 wheels per 8-hr. day. The daily tonnage of raw materials required includes 250 tons of iron, 30 tons of coke, 20 tons of sand, besides a large number of smaller items. It is therefore essential that the heavy tonnage should be unloaded in the storage yard conveniently to the cupola, and that it should move in direct line successively from the yard to the cupola, to the pouring station, to the pits, to the cleaning room and to the shipping track. The plan of the Council Bluffs foundry meets all these requirements.

It will be noted that the pouring station is in close proximity to the bull ladle, that the core room is near the spot where the cores are used, and accessible to the new sand storage and the old sand is returned from the cleaning room, that the castings department for the manufacture of chillers, copes, nowels, bottomboards, etc., is convenient for pouring and also for delivery to the machine shop for machining; and that the machine shop, which in a wheel foundry is used principally for mounting wheels on axles, is conveniently located in relation to the cleaning room, from which the wheels are received for boring, and also to the store room for receiving supplies. Inasmuch as the machine shop foreman also has charge of the pattern shop and power room, these also are adjacent to the machine shop. Thus the whole plant is a well organized unit with proper relationship between all its component parts. All departments are under one roof and there is no yard storage for any material except pig iron and scrap.

Handling of the molten iron deserves mention. The cupolas are tapped into bull ladles, stationed directly in front of them in the molding room. The rated capacity of each bull ladle is 15 tons, but actually this may be varied between 10 and 15 tons, according to how the ladle is lined. Pouring ladles are filled from the bull ladle and conveyed by 2-ton overhead traveling cranes directly over the mold conveyor, all de-



Unit B of the Rectangular Mold Conveying System is Symmetrical About the Axis at Left, with Unit A. Each handles the products of one cupola and one set of molding machines, consisting of one cope machine and one drag machine. The hot wheels at top of unit carry molds to the jolt shake-out machine, where the hot wheels are transferred at once to the annealing pits.



Compactness and Freedom from Lost Motion Are Essential Features of the Plant Layout. This illustration covers the entire plant except the transformer house and main office building, both of which lie at the right (east) of the upper part of the cut.

scribed before. As a protection against interruption in operations, in case the mold conveying system should break down, an overhead monorail system has been well distributed throughout the molding room. This is equipped with 2- and 3-ton hand-operated Shepard hoists.

In a bay extending the whole length of one end of the molding room is a floor devoted entirely to the molding of chillers, copes, nowels, bottom-boards, etc. Iron is brought to this floor from the bull ladles on a hot iron track. A 3-ton overhead traveling crane, used for conveying the ladle to the molds for pouring, also carries the completed castings directly into the machine shop to be turned. Swinging doors have been provided where the crane passes into the machine shop, so that the two departments may be shut off from each other completely, except when the crane is passing through.

At the same end of the molding room, next to the hot iron track, are oil-heated ladle drying ovens. Here the ladles are given a preliminary heating the day they are lined, and every day subsequently before going into service they are heated until the lining is red.

Facilities provided for handling the car wheels after they leave the shake-out grates are fully as complete in their mechanical features as the equipment in the molding room. There are two sets of soaking pits, those next to the hot wheel track being used for primary cooling and the others for secondary cooling. This system of two-stage pitting was adopted for the reason that the primary pits must be kept at a high tempera-

ture for incoming wheels. The wheels remain for 24 hr. in the primary pit and for 24 hr. in the secondary pit. Each pit has a capacity of 20 wheels and the cover of the pit is removed by inserting the same scissors-like tongs which are used in handling the wheels. There is sufficient reserve space in the cooling pit room so that the soaking capacity can be practically doubled.

The soaking pit room connects with the cleaning room, which is a large department, 70 x 24 ft., with ample space for the storage of wheels prior to shipment. After leaving the pits the wheels are rolled into a sand blast, where sand is blown against the surface for a period of about 15 sec., after which the wheels are rolled out and stored on the cleaning room floor. The sand blast, designed by the sufficing so far as sand is here that the sand from the shaken out.

The dust generated in by exhaust fan and deposited in an excavated port sand drops into a tunnel it is hoisted by bucket elevator from which the sand plus sand from the sand car through the tunnel to chine, where it is mixed with exhaust fan similar to the although developing a mu nested with hose used for Several tests required b

culation rules are conducted in the cleaning room. The drop test requires the wheel to stand a certain number of blows without fracturing. A 650-lb. wheel must drop 9 ft. ten times without breaking, a 700-lb. wheel 10 ft. twelve times, a 750-lb. wheel 12 ft. twelve times, and an 850-lb. wheel 12 ft. fifteen times. The fracture test is taken to determine the amount of chill. A wheel is deliberately broken for this purpose and the determination of whether the chill is too high or too low

rests with the judgment of an inspector. The thermotest consists of pouring a ring of molten iron around the wheel, causing the periphery of the wheel to expand, while the hub remains cold. If the wheel does not fracture within a period of two minutes, it passes the test. The failure of a wheel in any one of these tests results in the rejection of all wheels of the same cast.

(To be concluded)

Gasoline Powered Industrial Lift Truck

The elevating platform truck shown in the accompanying illustrations is an addition to the line of the Clark Tractor Co., Buchanan, Mich. It is known as the Truklift, and among the advantages claimed are low initial cost, ease of maintenance, flexibility and continuous 24-hr. service.

The truck is intended for use in transporting material in departmental and interplant haulage and also for charging core and annealing ovens. It is designed to climb a 10 per cent grade with a 4000 lb. load. Two speeds in each direction are provided. The length of the machine is 107 in., the width 35½ in., height 51 in., and the weight 2500 lb.

The loading platform is 26 by 54 in., and will elevate its load of 4000 lb. from 11 in. minimum to 16 in. maximum, from the floor, in 8 sec. Automatic stops provide for both up and down limits and the elevating can be stopped at any point by the hand control lever.

The lifting mechanism is operated by hydraulic pressure. Power for locomotion and elevating the load

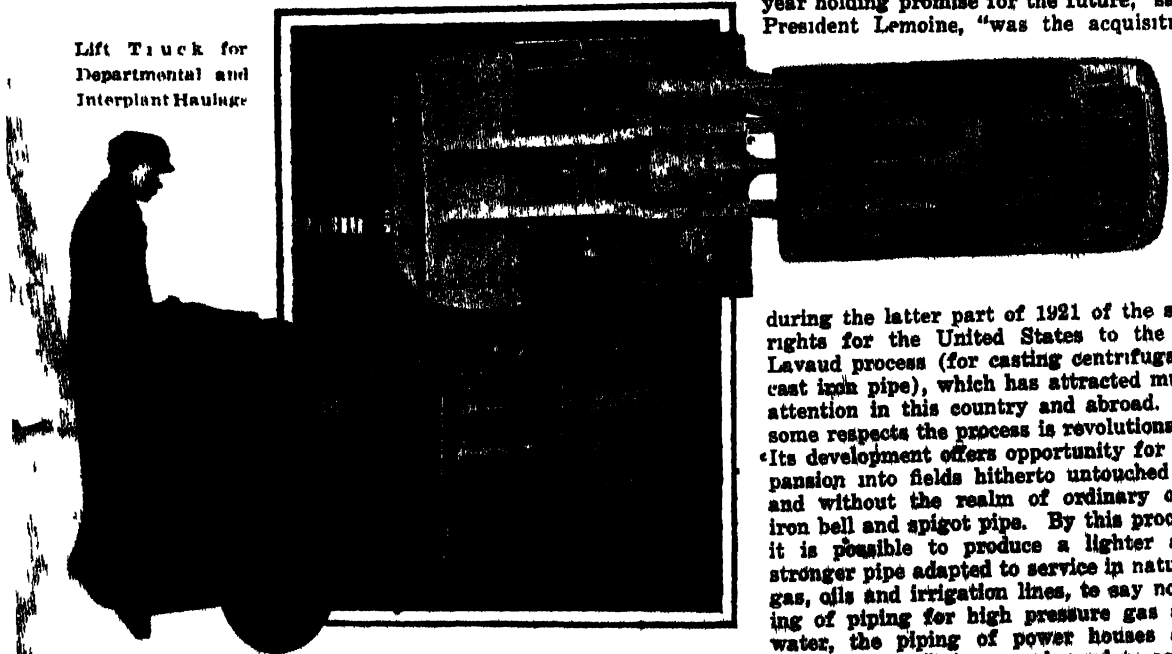
to wherever possible so that the machine can be serviced by any automobile or truck mechanic. A feature emphasized by the maker is the provision made for accessibility, the hinged hood permitting ready inspection of the engine, and, when necessary, the machine can be stripped down to the chassis in less than 20 min.

U. S. Cast Iron Pipe & Foundry Co. Makes Small Profit

The annual report of the United States Cast Iron Pipe & Foundry Co. shows that for the year 1921 the net profit was \$100,841 compared with \$851,592 for 1920. President Lemoine says that when one considers the serious depression in iron and steel so much in evidence throughout 1920 with drastic readjustments so patent in many directions reflected by heavy losses reported by many corporations, it is pleasing to record even this small net for the year. He adds that with the turn of the year the general situation improved and the outlook is brighter.

"Perhaps the most notable event of the year holding promise for the future," says President Lemoine, "was the acquisition

Lift Truck for
Departmental and
Interplant Haulage



is from a 15-hp., 4-cylinder tractor engine with a 3½ in. bore and 4½ in. stroke. A three-point suspension is used, the steering wheel forks being supported in a ball casting which is pivoted at the center of the frame on a chrome-nickel steel pin 2 in. in diameter. The drive is through a bevel gear axle which is equipped with ball and roller bearings and located under the loading platform. Driving wheels are of cast steel with pressed-on rubber tires, 10½ by 5 in., and steering wheels are of cast steel, disk type, also with rubber tires, 16 by 8½ in.

Driving and elevating controls are mounted on the side of the engine compartment. The operator drives the machine with the hand lever pedal being under his foot and the hand control lever being under his foot and the hand control lever being under his foot and the hand control lever being under his foot.

The construction has been adhered

during the latter part of 1921 of the sole rights for the United States to the de Lavaud process (for casting centrifugally cast iron pipe), which has attracted much attention in this country and abroad. In some respects the process is revolutionary. Its development offers opportunity for expansion into fields hitherto untouched by and without the realm of ordinary cast iron bell and spigot pipe. By this process it is possible to produce a lighter and stronger pipe adapted to service in natural gas, oils and irrigation lines, to say nothing of piping for high pressure gas and water, the piping of power houses and buildings, etc. It is now planned to equip

gradually, as the demand warrants, for sizes 4" to 12 in. diameter, allowing larger sizes to come as a possible development. It is not expected that this pipe will immediately, though it may ultimately, replace the smaller sizes of ordinary sand cast bell and spigot pipe. It is thought, however, that it will find its way into the wider fields referred to in which the lighter and stronger pipe is desirable."

At the annual meeting of the Colorado Fuel & Iron Co., Kingston Gould and E. H. Wetzel were elected directors, succeeding D. H. Taylor and W. H. Gould of New York. Mr. Taylor was the Gould representative on the board. Mr. Wetzel of Pueblo is general manager. The other directors were re-elected. There were no changes in the principal officers.

Design of Open-Hearth Furnaces

Regenerator and Flue Calculations for Frictional Resistance to Passage of Air and Gases— Summation of Losses

BY A. D. WILLIAMS*

FRictional resistance in the checkers can be approximated by the formula of Mojarow, which is also used in arriving at the frictional resistance of the flues and other passages through which the air and gas pass. This formula is:

$$F = m \frac{SL}{A} v_i p_i$$

in which:

- F = the frictional resistance expressed as inches of water or, if the metric system is used, millimeters of water or kilograms per square meter;
- m = coefficient of friction as determined by Mojarow = 0.002076 (or, for metric values, 0.016). This coefficient was determined by observation on Cowper stoves. Murgie determined a coefficient for mine galleries of one-third this value, or 0.001026;
- S = perimeter of the passage or passages through which the gas flows;
- L = length of the passage or flue;
- SL = total wall surface of the passage or flue;
- A = sectional area of the passage or, where this varies, the mean sectional area;
- v_i = average velocity of flow per second, at t_i ;
- p_i = specific weight of a unit volume of gas at t_i ;
- t_i = average temperature of the flowing gas in the section examined.

Regenerator Computation

	Gas on Gas	Air on Air	Gas on Waste Gas	Air on Waste Gas
Friction in Checker-work:				
SL = Heating surface, sq. ft. =	24,675	45,830		
A = Area of passes, sq. ft. =	118.63	228.51		
$SL \div A$ = hydraulic radius =	208	200.5		
v_i = Velocity, ft. per sec. =	6.53	4.93	8.24	4.97
p_i = Weight, lb. per cu. ft. =	0.0702	0.0805	0.0824	0.0824
t_i = average temperature, Deg. Cent. =	850	750	1,200	1,100
Deg. Fahr. =	1,562	1,382	2,192	2,012
$1 + at$ for average t_i =	4.120	3.753	5.404	5.037
$p_i = p_o \div (1 + at)$ =				
lb. per cu. ft. =	0.01704	0.02145	0.01543	0.01636
m = coefficient of friction =	0.003076			
Frictional loss, inches of water F =				
$0.003076 \times 208 \times$				
$6.53 \times 0.01704 \times$	0.0712			
$0.003076 \times 200.5 \times$				
$4.93 \times 0.02145 \times$		0.0654		
$0.003076 \times 208 \times$				
$8.24 \times 0.01543 \times$			0.0814	
$0.003076 \times 200.5 \times$				
$4.97 \times 0.01636 \times$				0.0501

As the gases leave the checkerwork they make a 90-deg. turn, and the same when they enter the checkerwork.

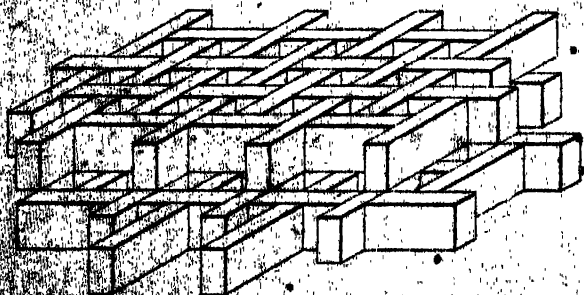


Fig. 4. Method of Laying Up Checker Brick in Regenerator Chambers

The space required in the checkerwork may be determined by the man, which is in proper units. The space required in the checkerwork may be determined by the man, which is in proper units. The space required in the checkerwork may be determined by the man, which is in proper units.

gases. The pressure in inches of water required for this purpose is:

	Gas on Gas	Air on Air	Gas on Waste Gas	Air on Waste Gas
$H = 0.19345 p_i$ ($v_i^2 \div 2g$) =	0.00217	0.001558	0.003181	0.002181

Calculations for regenerator chambers:

Width of chamber.....	113.75	211.25 in.		
Some allowance must be made in both width and length for expansion of brickwork:				
Thickness of walls.....	4.5 in.			
Flue width in clear....	18.25 in.	1.52 ft.		
Number of flues.....	6	9		
Number of walls.....	4	8		
t_i = temperature below checker, Deg. Cent. =	500	300	800	600
Deg. Fahr. =	932	572	1,472	1,112
$1 + at$ = gas factor... =	2.835	2.101	3.936	3.210
Q_o = volume, std. conditions cu. ft. =	188	300	181	27
$Q_i = Q_o (1 + at) =$				
cu. ft. =	533	630	712	88
B = total width of flues, ft. =	6.08	12.16		
H = height of flues, ft. =	3.50			
$A = B \times H$ = area of flues, sq. ft. =	21.28	42.56		
S = total perimeter of flues, ft. =	33.16	69.32		
L = total length of chamber, ft. =	27.29			
SL = wall surface, sq. ft. =	905	1,619		
$SL \div A$ = hydraulic radius =	42.53	38.04		
p_i = specific weights... =	0.0702	0.0805	0.0824	0.081
$p_i = p_o \div (1 + at) =$				
lb. per cu. ft. =	0.0248	0.0383	0.0309	0.021
$v_i = Q_i \div A$ = ft. per second =	25.06	10.62	23.48	34.1
F = inches of water =	0.0271	0.0159	0.0305	0.014

The resistance to flow is approximately equal to full volume flowing one-third the length L .

$$F = m \frac{SL}{A} v_i p_i$$

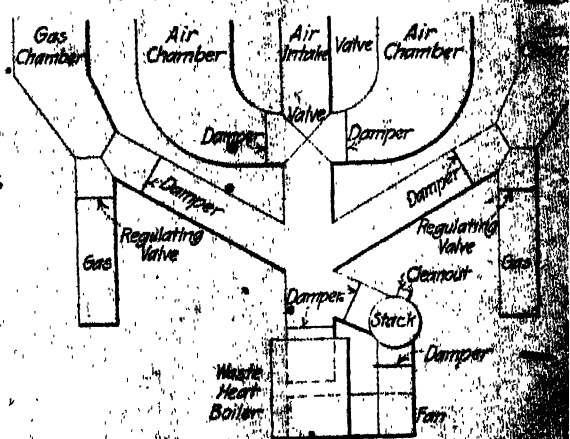


Fig. 6. Schematic Layout of Regenerators, Flues, Valves, Waste-Heat Boiler and Stack

The space required in the checkerwork may be determined by the man, which is in proper units. The space required in the checkerwork may be determined by the man, which is in proper units. The space required in the checkerwork may be determined by the man, which is in proper units.

	Gas on Gas	Air on Air	Gas on Waste Gas	Air on Waste Gas
t = temperature of gases, Deg. Cent.	1,200	1,200	1,600	1,600
Deg. Fahr.	2,192	2,192	2,912	2,912
$1 + at$ = gas factor	5.404	5.404	6.872	6.872
Q_0 = volume of gases, cu. ft.	188	300	181	270
$Q_1 = Q_0 (1 + at)$	1,016	1,621	1,244	1,855
Cu. ft.	28.77	45.81	35.23	52.53
Cu. m.	827.8	2,108	1,241	2,759
Q_2 = width of chamber: Ft.	9.48	17.65		
Meters	2.89	5.37		
B^2 =	8.55	28.84		
$B^2 t$ =	10.020	34.616	13.360	46.150
$X = \sqrt[3]{Q_1^2 \div B^2 t}$	0.4356	0.3995	0.4529	0.3909
A = coefficient =	3.36	3.56	3.36	3.56
$A_1 = A \times$				
Height in meters =	1.525	1.401	1.522	1.392
Height in feet =	5.00	4.59		
This distance is the height from the top of checker to center of gravity of arch segment				
Use of arch over chamber, in	9	15.63		
Height to skewbacks, ft.	4.50	3.61		
Height to arch at center, ft.	5.29	3.29		
Height of flue below checker, ft.				3.50
Height of checkerwork, ft.				23.00
Height to soffit of arch, ft.				26.50
Height arch to port sill, ft.				31.79
Height between levels, ft.				19.21
				42.00

The frictional resistance to flow is approximately equal to the full volume flowing one-third the length L ,

	Gas on Gas	Air on Air	Gas on Waste Gas	Air on Waste Gas
$N = (2 \times 5.00) + (2 \times 9.50)$	29.00			
$N = (2 \times 4.64) + (2 \times 17.60)$		44.48		
L = length of chamber, ft.	27.29			
SL = wall surface, sq. ft.	791.4	1,214		
A = sectional area, sq. ft.	47.50	81.67		
$SL \div A$ =	16.66	14.47		
$v_1 = Q_1 \div A$ = ft. per sec.	11.22	7.71	14.99	10.59
$p_1 = p_0 \div (1 + at)$ = lb. = in. water friction loss =	0.01299	0.0149	0.01199	0.01199
Chimney effect of checkers and uptakes: not $H = 40$ ft.	0.0008	0.0006	0.0007	0.0006
$H = 0.19245 H$ (pair = p_{gas}) d inches of water, average temperature, Deg. Cent.	85.0	150	1,200	1,100
Deg. Fahr.	1,562	1,382	2,192	2,012
p_{air} = lb. per cu. ft.	0.0805			
p_{gas} = lb. per cu. ft.	0.0170	0.0215	0.0154	0.0164
p_{air} = inches of water	0.0635	0.0590	0.0651	0.0641
p_{ann} = annulus	0.4887	0.4541	0.5011	0.4934

Gas and Air Necks

It is assumed that the gas and air necks will have the same average area and perimeter as the upper portion of the checker chambers.

	Gas on Gas	Air on Air	Gas on Waste Gas	Air on Waste Gas
L = length in feet of neck =	12.25	13.25		
SL = wall surface, sq. ft.	355	590		
A = sectional area, sq. ft.	47.50	81.67		
$SL \div A$ =	7.474	7.224		
v_1 and p_1 are the same as in the preceding computation.				
F = in inches of water =	0.0034	0.0026	0.0041	0.0028

Frictional resistance in the cinder pockets will be assumed as equal to that in necks.

	Gas on Gas	Air on Air	Gas on Waste Gas	Air on Waste Gas
For the uptakes Q_1 in cu. ft.	1,016	1,621	1,244	1,855
A = uptake area sq. ft.	21.65	50		
n = number of uptakes =	1	2	Circle	Square
v_1 = velocity, ft. per sec.	46.92	32.42	57.46	37.1
S = perimeter, ft.	16.50	40.00		
L = height, ft.	13.21			
$SL \div A$ =	4.647	10.568		
p_1 = specific weight, lb.	0.01299	0.0149	0.01199	0.01199
$p_{annulus}$ =	0.0087	0.0016	0.0095	0.0014
p_{water} = velocity pressure =	0.0355	0.0468	0.1183	0.0484

Frictional resistance of the fantails for gas and air:

	Gas on Gas	Air on Air	Gas on Waste Gas	Air on Waste Gas
t = average temperature, Deg. Cent.	500	150	800	800
Deg. Fahr.	932	302	1,472	1,112
$1 + at$ = gas factor =	2.835	1.551	3.938	2.862
$Q_1 = Q_0 \times (1 + at)$ = cu. ft.	533	465	712	865
$p_1 = p_0 \div (1 + at)$ = lb.	0.02476	0.0519	0.03094	0.02573
S = perimeter (average) = ft.	22.0	34.0		
L = length (average) ft.	16.0	19.0		
A = average section, sq. ft.	32.00	57.00		
$SL \div A$ = hydraulic radius =	11.0	11.33		
v_1 = average velocity, ft. per sec.	16.66	8.16	22.25	15.18
F = friction, inches of water =	0.0140	0.0146	0.0157	0.0135
H_1 = velocity, inches of water =	0.0205	0.01032	0.03093	0.01772
v_1 = velocity below checker =	25.05	10.62	33.46	14.58
H_2 = velocity, inches of water =	0.0466	0.0129	0.0584	0.0163
$H_2 - H_1$ = additional to increase velocity = inches of water =	0.0260	0.0026		
v_1 in necks, cinder pocket and above checker = ft. per sec.	11.22	7.71	14.99	10.59
H_3 = pressure to impress this velocity, inches of water =	0.00489	0.00265	0.00805	0.00402

Flues Between Valves and Stack

	Stack Flue to Boiler or Stack	Stack Flue from Gas Valve	Stack Flue from Air Valve
t = average temperature, gases in flue, Deg. Cent.	630	750	550
Deg. Fahr.	1,166	1,382	1,022
$1 + at$ = gas factor for average	3.312	3.7525	3.0185
$Q_1 = Q_0 \times (1 + at)$ = cu. ft.	1,494	880	815
$p_1 = p_0 \div (1 + at)$ = lb. per cu. ft.	0.0249	0.0220	0.0273
A = area of flue, sq. ft.	60.00	36.00	38.00
$v_1 = Q_1 \div A$ = average velocity, ft.	24.90	24.44	24.70
L = length of flues in feet =	20.00	25.00	16.00
S = perimeter of flue in feet =	32.00	24.00	23.00
$SL \div A$ = hydraulic radius =	10.67	16.67	11.15
F = friction in inches of water =	0.0203	0.0276	0.0239
H = pressure for velocity, in. of water =	0.0461	0.0393	0.0498

Valve Resistances

	Gas on Gas	Air on Air	Gas on Waste Gas	Air on Waste Gas
Valve, nominal size in inches =	54	66	54	66
A = area in sq. ft. =	15.90	23.76	15.90	23.76
t = temperature at valve, Deg. Cent.	500	50	750	550
Deg. Fahr.	932	122	1,392	1,022
$1 + at$ = gas factor =	2.835	1.1835	3.7525	3.0185
$p_1 = p_0 \div (1 + at)$ = lb.	0.02476	0.06805	0.0220	0.0273
$Q_1 = Q_0 \times (1 + at)$ = cu. ft.	533	355	880	815
$v_1 = Q_1 \div A$ = ft. per sec.	33.52	14.94	55.34	34.38
As this velocity must be created twice, due to 180 deg. bend in valve.				
$H = 2 \times 0.19245 p_1$ ($v^2 \div 2g$)				
H = velocity pressure, in. of water.	0.1663	0.0908	0.4627	0.1929

Summation of Losses

All values in inches of water

	Gas on Gas	Air on Air	Gas on Waste Gas	Air on Waste Gas
Pressures Required for Impressing Velocity				
Uptakes	0.0855	0.0488	0.1183	0.0494
Cinder pockets	0.0049	0.0037	0.0081	0.0040
Chamber above checker.	0.0022	0.0014	0.0021	0.0011
Checkerwork	0.0260	0.0026	0.0584	0.0163
Flues below checker	0.0205	0.0103		
Fantails				
H_1 between valves and ports	0.1391	0.0660	0.1879	0.0708
Friction Losses				
Uptakes	0.0037	0.0018	0.0073	0.0014
Cinder pockets	0.0034	0.0028	0.0041	0.0018
Necks	0.0034	0.0028	0.0041	0.0018
Chamber above checker.	0.0008	0.0008	0.0007	0.0005
Checkerwork	0.0712	0.0024	0.0314	0.0021
Flues below checker	0.0271	0.0129	0.0388	0.0140
Fantails	0.0140	0.0146	0.0257	0.0125
F between valves and ports	0.1391	0.1023	0.1879	0.0708

	Gas on Gas	Air on Air	Gas on Waste Gas	Air on Waste Gas
H ₂ Valve resistance....	0.1663	0.0908	0.4627	0.1829
F ₂ Friction waste gases .....	.....	.....	0.0276	0.0239
H ₂ Velocity pressure of waste gases in flues..	.....	.....	0.0393	0.0498
F ₂ Stack flue friction...	.....	.....	0.0203	.....
F ₁ Chimney effect of checkers, etc.	0.4887	0.4541	0.5011	0.4934
F ₁ Friction between valves and ports....	0.1286	0.1033	0.1463	0.0849
F ₂ Friction waste gas flues .....	.....	.....	0.0276	0.0239
Pressure for velocity H ₂	0.1286	0.1033	0.1739	0.1088
H ₂ Valve resistance....	0.1391	0.0660	0.1879	0.0708
H ₂ Flue gas velocity...	0.1663	0.0908	0.4627	0.1829
F ₂ Chimney effect of checkers	0.4340	0.2601	0.8638	0.4123
Available for port velocity	0.4887	0.4541	0.5011	0.4934
Draft depression required	0.0547	0.1940	.....	.....
If Murge's coefficient of friction is used, the	.....	.....	1.3649	0.9057

pressure available for port velocity will be increased by
The draft depression reduced by
Available for port velocity Depression required, ...

	Gas on Gas	Air on Air	Gas on Waste Gas	Air on Waste Gas
.....	0.0857	0.0689	.....	.....
.....	.....	.....	0.0975	0.0566
.....	0.1104	0.2629	1.2674	0.8491

The value for the coefficient of friction determined by Mojarow, in his investigation of the Cowper stove, is probably too high when used for large, comparatively straight gas passages. Murge found the coefficient of friction in mine galleries, at ordinary temperatures, to be but one-third that determined by Mojarow. The values of Murge are probably more accurate, as an extended series of observations was available. A further verification of the conservatism of these values, is given by the fact that the investigation of some furnaces gives negative results, that is to say, the computations indicate the necessity for forced draft. Nevertheless, the furnaces are in operation without forced draft, but in a more or less defective manner, for they give operating trouble and their campaign or run is shorter than normal.

Manufacture of Stainless Steel Cutlery*

Forging, Heat Treatment, Grinding and Finishing—Proper Chemical Composition—Stainless Tests

I HAVE read a great mass of information compiled by several engineers as to the general characteristics of stainless steel for cutlery. I shall not attempt to discuss their opinions upon this particular steel for cutlery as they see it, but I will give instead the information as it has been worked out successfully at the fire and wheel.

I have found great difficulty in studying the data, as submitted by different authorities, as there seems to be a great divergence of opinion as to practically all essential points, including the exact chemical specifications, and a very wide range of opinion as to the subsequent handling and heat treatment of this steel.

Proper Chemical Composition

In enumerating these experiments, I shall not attempt to segregate them under separate headings but simply give them to you in abstract form. As to the analysis for cutlery, I would recommend the carbon content to be between 0.30 and 0.45 per cent and the chromium between 13 and 15 per cent. Dr. Hatfield recommends 13 per cent. The Brearley patents call for chromium between 9 and 16 per cent, while Elwood Haynes has covered in his patents up to 16 per cent. It is, however, the opinion of the writer and others that nothing is gained in stainless characteristics or corrosion by exceeding 15 per cent chromium. Phosphorus and sulphur should be below 0.03 per cent with silicon and manganese about 0.30 and 0.50 per cent respectively.

The steel generally used for cutlery is bought in round rods in convenient lengths to handle according to methods used in its manufacture. Some companies work this steel from the bar while others fabricate it to the desired lengths. The writer prefers the latter method because of its convenience and its economy as to scrap.

Great care should be used in this method with reference to the tools used in the fabrication because the cutlery troubles begin at this point. The steel should always be kept well annealed and, if the tools are kept sharp, there should be no difficulty in cutting to the desired lengths. Dull tools at this point have a tendency to tear off the steel whereby small cracks are started in the end of some of the pieces, which generally lead to seamy portions in the blades. Steel

manufacturers are often blamed for seamy stock when in reality the trouble has been due to dull tools. I might say right here that, in the early stages of this steel for cutlery, great difficulty was experienced at the mills in manufacturing this steel free from seams, but to-day I believe this has been reduced to a minimum.

The Drop Forging Operation

After the steel is cut into the desired lengths it is taken to the drop forging room, where it is forged into the desired shape, and from there it passes on to the rolls where the blade is rolled out. Great care must be taken in these operations to keep the heat at proper forging temperature, especially at the roll, cause at this point a part of the blade has nearly reached its desired thickness while the remainder of the piece is still in its original round shape. The heat generally used at these stages of the manufacture ranges from 1650 deg. to 1750 deg. Fahr.

The work must be kept as free as possible from oxidation because any scale rolled into the steel at this time may form a seat of corrosion even after the blade has been finished. When working with small thin sections, never allow it to cool on a damp, cold floor, on account of the air hardening qualities of the steel. Strains will be set up which will later develop into cracks, thus rendering the blade useless.

The next step in the manufacture is the annealing operation. The work is usually put into a receptacle and brought slowly up to about 1380 to 1400 deg. Fahr. generally in a muffle furnace, after which it is allowed to cool slowly. From here the blades are blanked out into the desired shapes and great care should be used at this point to see that the tools are kept sharp at all times, thus reducing the possibilities of cracks. These cracks caused by dull tools are not seen at the particular point, and sometimes do not show up until considerably more labor has been expended.

Hardening and Tempering

The next step is the hardening operation, which is one of the most difficult in the making of the whole knife. The hardening and tempering of stainless steel have much to do with its stainless characteristics, so great emphasis should be placed on its proper handling.

Stainless steel may be hardened in air, oil or water, the quenching temperature really depends on the method used. In my opinion, it should always be done in oil from a temperature ranging between 1650 to 1900 deg. Fahr., depending on the carbon and chromium

*From a paper read at the first sectional meeting of the American Society for Steel Treating in New York, March 8. The author, R. G. Hall, is research engineer, R. Wallace & Sons, Ltd., Washington, Conn.

content of the steel. Most low carbon steels in a hardened and undrawn condition have a low elastic limit and one rather indefinite. It is only after drawing that a definite elasticity is established. Tests have shown that the elastic limits increase for a time with the drawing temperature in stainless steel and then begin to fall off like any other steel as the drawing temperature increases. Time limit enters into this phenomenon to a very large extent. A properly hardened blade must be drawn long enough to relieve the internal strains, but this change must not be too speedy.

The tempering colors appear in stainless steel at about twice the temperature of ordinary steel and are not altogether reliable, so I am firmly convinced that the temper should be drawn to a definite temperature in a salt bath or an electric furnace.

The Grinding Process

The blades thus hardened and tempered are taken next to the grinding machines to be ground to the desired thickness and then tapered properly. Here extreme care should be taken not to force this operation on account of the steel being unusually fine grained, thus being very susceptible to that characteristic which the cutters call the grinder's scorch. This particular kind of scorch polishes off very easily, but at the same time renders the steel, directly under the scorch, quite susceptible to stain, which characteristic must be avoided at all times.

If any oxidation has taken place during previous operations, care should be taken at this point to see that it is thoroughly ground out, for, as I have said before, any scale, no matter how small, will form a seat of corrosion which will invariably pass the inspectors and seldom show up until after the knives have been in use for a period of time. Following the grinding operation, the blades are tested for temper or in other words must stand an elastic limit of 1 to 5 in. Stainless steel to be used for cutlery and to be in the most perfect condition should show a Brinell hardness between 525 and 530.

After the tempering test, the blades are glazed to remove all coarse grinding marks, and this operation, while simple, requires an extra amount of work with different grade of emery from that required for ordinary carbon steel. The knives are next taken to the inspection room, where they are inspected to see the glazers have removed all coarse grinding marks.

The blades are then sent to the finishing room, where the blades are mounted in handles. Here the racks, rims, points, bolsters and necks are finished. The blade is then given the final glaze and any other finishing touches needed to make it a first-class knife.

Tests for Stainless Qualities

The knife then goes to be tested for stainless qualities and if the blade is found to stain or copper plate after a two-minute test with a concentrated solution of copper sulphate, the knife is rejected. After passing this test they are etched and passed to the stock room ready for shipment.

The reagents for grading stainless steel are as follows:

1. *Copper Sulphate*
4 grams CuSO_4
18 grams H_2SO_4
90 grams H_2O
Time: 6 minutes.
2. *Ordinary Writing Ink, Pomeroy and Signet*
Time: 3 minutes.
3. *Nitric Acid*
Specific gravity 1.20.
Time: 2 minutes.

It might be interesting to some to show the results of some of the different stainless steels which have found their way into the market. I have endeavored to take steel with wide differences in their chemical composition as to the two principal elements, carbon and chromium. These samples were all forged at about 700 deg. Fahr. and were hardened at different quenching heats according to their analysis, the quenching ranging from 1500 to 1900 deg. Fahr. These samples have been confirmed by three tests made up of concen-

trated solutions of acetic, tartaric and hydrochloric acids. The tests are as follows, viz:

Steel No.	Carbon	Chromium	Stained in Minutes	Cutting Efficiency
1	0.30	11.93	28	O. K.
2	0.26	12.21	35	Fair
3	0.10	13.60	13	O. K.
4	0.31	15.90	75	O. K.
5	1.10	23.32	43	Very Good

While there are some 40 operations through which these blades pass during their manufacture, I have simply endeavored to touch the high spots, which I trust will give you some idea of how this latest development in cutlery is manufactured.

In summarizing, it will be seen that the manufacture of a stainless steel blade, while not materially different in shape or size from that of an ordinary carbon steel blade, in that the wear and tear on tools, furnaces, fires, extra operations, and rejections together with the extra price of stainless steel, which is seven or eight times the price of good carbon steel, makes the blade a very costly article.

Improvement in Bridgeport District

Thirty-one manufacturing companies in Bridgeport, engaged mostly in metalworking lines, which report to the Manufacturers' Association of Bridgeport, have shown a steady gain in activity since early in January. The improvement really dates from Oct. 1, 1921, but there was a falling off in the early part of January, probably due to shutdowns for inventory at that time.

For the week ended March 11 the reports show that the 31 manufacturing plants were working at an average of 54.9 per cent as regards the number of employees and at 48.5 per cent as regards the number of man hours. The basis taken as 100 per cent was not the maximum number of men employed during the war boom, but what the various manufacturers estimated they would be doing to-day under normal condition of business.

The estimated normal number of employees for the 31 factories is 25,318, working an average of 49 hr. per week, or a total of 1,240,582 man hours. During 1921 the highest point reached was in the week ended March 5, when 71 per cent of the normal number of employees were engaged and the percentage of man hours was 60.4. From that date there was a steady decline, the low point being reached in August and September. While the first three months of this year, so far as recorded, are about on a par with the last three months of 1921 as to the number of workmen engaged, there has been an increase in the number of man hours, the week ended March 11, for example, showing a gain of 3 per cent in this respect over the preceding week.

Similar data collected by the Manufacturers' Association of Connecticut, Inc., relating to the manufacturing districts of Ansonia, Derby, Shelton, Seymour, Bridgeport, Bristol, Danbury, Hartford, Middletown, New Britain, New Haven, Southington, Stamford and Waterbury, has not yet been completed for February, but the January figures show an average industrial activity of 63.6 per cent (calculated in man hours) for that month, while the number of workmen engaged was 72.5 per cent of the normal number. It is noted that the average weekly operating schedule during a normal period is 52.3 hr. per week, while in January the average schedule was 45 hr.

Joint Meeting of Machinery Dealers and Manufacturers

In connection with the Birmingham convention of the Southern Supply and Machinery Dealers' Association, and American Supply and Machinery Manufacturers' Association, it has been decided to hold a joint executive session of the two associations on the morning of Tuesday, April 25, for discussion of business subjects of mutual interest.

The dealers have requested that the following subjects be listed for consideration at the session: Business Situation, Freight Allowances, The Shipping Terms, Standardization.

The Manufacture of Brass Forgings

Called Also Die Pressing or Hot Forging—Details of a Process Developed in the United States During the War—Physical and Other Properties

BY C. T. RODER*

THE method of forging brass was developed in Germany and Great Britain about 1900. The procedure is called stamping, although the work is formed under a power press. In this country the term forging or die pressed casting is used, as our interpretation of stamping is something cut from sheet metal by the use of a die.

It was not until the early stages of the war that brass forgings were commercialized in the United States. Our Government realized the unnecessary and costly wastage of cutting and machining shrapnel parts such as time, graze and percussion fuses from raw stock, and therefore called upon American manufacturers for assistance. Many responded to the call, among which were the Mueller Metals Co., Port Huron, Mich., and also its sister plant, the H. Mueller Mfg. Co., Sarnia, Ontario. Thus, in the development of

there is a furnace tender who regulates the heat and keeps the furnace filled with pills. The ordinary small shapes are forged under 100,000 lb. pressure. However, presses are used having capacities up to 400 and 600 tons. With a 200-ton capacity press it is not practical to undertake the forging of a shape over 4 in. in diameter. With the continuous operation of a press and a skillful operator, large production can be obtained and one press can average 5000 and up to 10,000 forgings per day.

Types of Presses Used

Two types of presses are used, single and double action. Small forgings of simple design, where the metal does not have to flow far, are produced in a single action press. Where the shape is unusually intricate and where it is necessary for the metal to flow

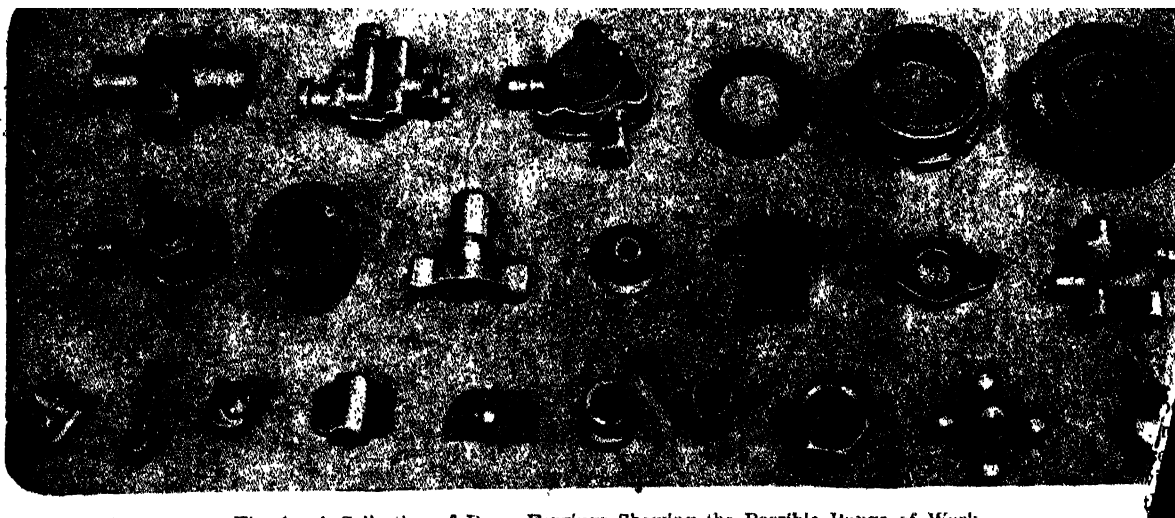


Fig. 1. A Collection of Brass Forgings Showing the Possible Range of Work

brass forgings, a tremendous saving was effected for both the Government as well as the manufacturer.

It can be said that the forging of brass is the highest type of the metal craftsman's skill. There are some machined parts which can accomplish their purpose only when forged. Requisites, such as high tensile strength and metallic density, as required in oxygen gas valves, are found only in brass forgings, due to their resistance to great pressure.

Description of the Process

The process of forging brass is to heat a pill or slug, which has been cut from extruded rod to a suitable shape, in a specially constructed furnace which is open at both ends. The pill is heated to a cherry red heat, which on the average is approximately 1300 deg. Fahr. The temperature of the pill varies depending upon the size and construction of the piece to be forged.

The presses are usually operated continuously and require one operator at the press, while a tender or helper feeds the pill into the press. In addition to this

over a long distance, double action presses are used. The functioning of the first stroke of the press is merely the closing of the lower die which holds firmly the heated blank and prevents more or less fin or flash. The second stroke might be termed an extrusion operation, and its function is to produce the completed forging.

The accompanying illustrations of forgings, which have been successfully manufactured by the Mueller Metals Co., indicate the possibilities of commercial work by this process. Fig. 1 shows a collection of forgings illustrating the wide range of work possible. Fig. 2 shows a group of parts arranged to illustrate the three stages of forging operations. Insert "A" is the blank metal, pill or slug; second, the shape of forging as it leaves the die, a portion of which is surrounded with what is known as flash, a characteristic in forging; third, the completed rough forging after having gone through a trimming operation in a trimming press.

It sometimes is practical to extrude a specially shaped pill or slug, which in its crude form is an approach to the finished shape of the forging to be made, as in inserts "F" and "G," in Fig. 2. The special ex-

truded shape has a great similarity to that of the finished forging.

Brass forgings are 80 per cent stronger than sand castings, the physical properties comparing as follows:

	Brass Forgings	Sand Castings
Tensile strength, lb. per sq. in.	55,000	30,000
Yield point, lb. per sq. in.	28,000	15,000
Elongation, per cent	30	20

The writer knows of instances where forgings have been made to equal a tensile strength of 105,000 lb. per sq. in., this being accomplished by a special mixture of metals. Dimensions can be held to 0.005 in. on diameters and 0.010 in. on lengths. Such operations as buffing, polishing and nickel plating are held to a minimum on account of the smooth surfaces and freedom from scale. Tools last much longer and turning speeds on machines are faster than is possible on sand castings. On account of the great pressure under which they are made, the result is a metal fine grained as tool steel.

Probably the most noteworthy advantage secured in forgings is the saving of high priced metal and the elimination or minimizing subsequent machine work, which represents a great saving in labor costs. It is readily seen that the process of forging provides a density through which there can possibly be no seepage, no porosity; the metal also has additional strength.

Construction of the Dies

The most important and fundamental element involved in the forging brass is die construction. The general design, workmanship and composition of steel used are the underlying features in the utility of such a die. Economy lies in the use of a high-speed tungsten steel for the actual section of the forming die, due principally to the high temperature under which they operate. Other portions, such as the die block or subsidiary parts, usually are made from a cheaper grade of carbon steel and, in many cases, machine steel. Some manufacturers have adopted a non-shrinking die steel but, as it is more or less experimental, it is not used to any extent.

The life of the die varies depending upon the shape of the piece. Some dies can be used for 10,000 to 20,000 forgings and others up to 50,000 and 60,000. The most skillful tool and die makers must be used in forging die

construction, as an error in the laying out or even a slight difference in design results in success or failure. One of the important points in construction is allowances for shrinkage and proper venting to eliminate air pockets.

The latter is very important, as its functioning deals with the free flowing of the metal. Very small holes are usually used, which permits the escape of air and, while small tips or flash result from same, they are easily broken off or are forced out through pressure of the succeeding stroke. Considering the heat to which dies are subjected through the continuous insertion of the heated pill or plug, also the cooling which takes place, it can be easily seen that the die is subjected to extreme wear. However, with the continual application of oil to each stroke, this condition is held to a minimum.

It is obvious that the forging process will, in a decade or two, supplant practically all parts now being cast in sand or machined from bar stock, providing such parts are used in quantities. It, of course, is not advisable to adopt the use of forgings unless the requirements are such as to warrant the initial outlay for die and tool equipment, which is usually two or three times greater than pattern equipment.

Probably the largest users of forgings to-day are automobile manufacturers. The reader must appreciate that the process is comparatively new. In a few years brass forgings will be in great demand, particularly those consumers who require the assets of a forging which cannot be secured in sand casting.

There has been considerable discussion as to the correct application of the term, brass forgings, to this new and important process. A great many writers term it as die-pressing or hot forging, either of these two being more logical as a title than brass forgings, for the reason that the finished part is brought about from the use of an extruded rod or shape, it being hot forged or die pressed. The term die-pressed casting is misleading and unfair to manufacturers of this product. In speaking of the word "forging," one thinks of metal being shaped under blows of a hammer, and as this is not the true process, the question remains in doubt as to what would be a correct title, which is left entirely to the discretion of the individual.

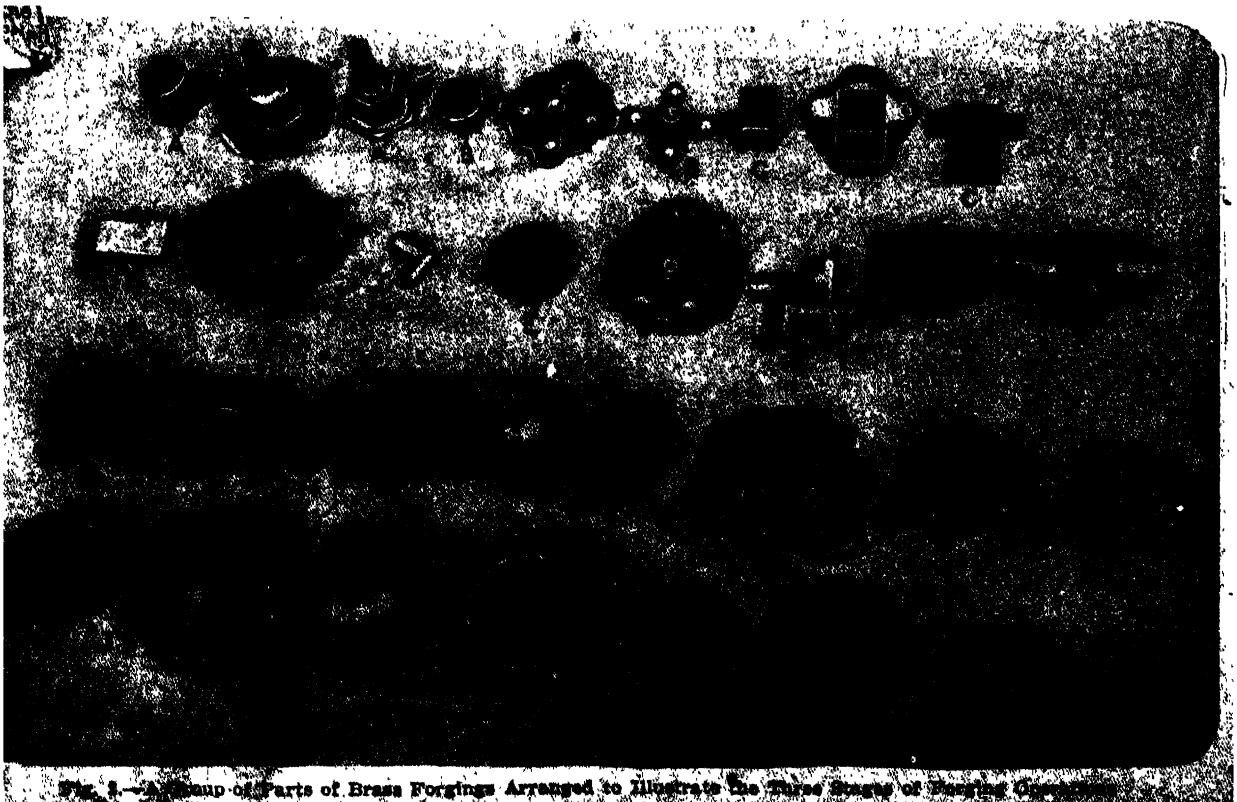


Fig. 1.—A Group of Parts of Brass Forgings Arranged to Illustrate the Range of Forging Operations.

NEW YORK CENTRAL OPENING

Railroad Receives Bids on Large Number of Steel Products

The New York Central Railroad had a public opening of bids on steel products on Wednesday, March 22, at the office of W. C. Bower, general purchasing agent in New York. The material advertised for included several thousand tons of plates, shapes, bars, sheets, bolts, track material, axles, fabricated bridge material, seamless tubes, etc. Some of the bids submitted by various companies follow:

Interstate Iron & Steel Co., Chicago.—Standard wire nails, \$2.80 per 100 lb. keg, base, Chicago; galvanized fence staples, \$3.45 per 100 lb., Chicago; polished fence staples, \$2.95 per 100 lb., Chicago; steel bars, 1.65c., base, Chicago.

Pittsburgh Forge & Iron Co.—Car and tender axles, rough turned, 2.25c.; car axles for axle light system, rough turned, 2.35c.; driving and trailer truck axles, 3.25c.; front engine truck axles, 2.75c., all per lb. f.o.b. Youngstown.

Falcon Steel Co.—Black sheets No. 28 gage, 3c.; galvanized, No. 28 gage, 4c.; blue annealed, No. 10 gage, 2.15c., No. 14 and lighter, 2.25c., all per lb. f.o.b. Youngstown.

Bourne-Fuller Co.—Track bolts, oval neck, not heat treated, 3.75c.; heat treated, 3.75c.; another type of oval neck bolts, 4.65c. for non-heat treated and 5.65c. for heat treated; square neck track bolts, 2.75c. for non-heat treated and 3.75c. for heat treated, extras on the first item, \$1 per 100 lb. for lengths under 4 in., on second item, 50c. per 100 lb. for lengths under 4 in., and on the third item no extra; black sheets, No. 28 gage, 3.10½c.; galvanized sheets, No. 28 gage, 4.10½c.; blue annealed, 2.35½c.; bars and shapes, 1.60½c. all per lb. f.o.b. Cleveland; billets, \$36. Cleveland.

Jones & Laughlin Steel Co.—Bars, shapes and plates, 1.60½c. per lb., Youngstown; standard wire nails, \$2.40 per 100 lb. keg; galvanized fence staples, \$3.05 per 100 lb.; polished fence staples, \$2.55 per 100 lb., delivered Youngstown; steel billets, \$35, Youngstown; track spikes, 2.10c. and 2.20c., according to specification, no extras; bridge material, 5.28c. per lb., delivered Lowville, N. Y.; 7.04c. per lb., delivered Philadelphia; 5.37c. per lb., delivered Bay View, N. Y.

Penn Bridge Co.—Bridge material, 7.87c. per lb., delivered Philadelphia; 4.85c. per lb., delivered Bay View, N. Y.

Cambria Steel Co.—Angle bars, 2.65½c., Youngstown, bids were submitted on driving and truck tires varying from 5c. to 7½c. per lb., delivered Newberry Junction; axles, from 2.20½c. to 3.40½c. delivered Youngstown, and from 2.24½c. to 3.44½c. delivered Mahaffey, Pa.; standard wire nails, \$2.50½ per 100 lb. keg, Youngstown, \$2.57½, Mahaffey; bars, shapes and plates, 1.50c. per lb., base, Pittsburgh; billets, \$34.10, Youngstown, \$34.94, Mahaffey, carbon extra \$1.

Oliver Iron & Steel Co.—Track bolts, 2.37c. per lb. not heat treated, and 3.57c. per lb. for heat treated on both oval neck and square neck bolts; extra 15c. per 100 lb.

Carnegie Steel Co.—Angle bars, 2.60c. per lb., Pittsburgh; blank splice bars, 2.60c. per lb., Youngstown; axles, from 2.10½c. to 3.55½c. per lb., Youngstown; bars, shapes and plates, 1.50½c. per lb., Youngstown.

Railway Steel Spring Co.—Tires, from 5c. to 7½c. per lb., Youngstown, according to specification, with an extra of ¼c. per lb. if finished bored.

American Steel & Wire Co.—Standard wire nails, \$2.40, galvanized fence staples, \$3.05; polished fence staples, \$2.55, all per 100 lb., Farrell, Pa.

Buffalo Bolt Co.—Track bolts, both oval neck and square neck, heat treated only 3.69c. per lb., no extras, f.o.b. North Tonawanda, N. Y.

Illinois Steel Co.—Track bolts, oval head and square head, either heat treated or not heat treated, 3.30c., base, delivered Toledo, Ohio; track spikes, 2.30c., base, delivered Toledo; angle bars, 2.456c., Chicago; blank splice bars, 2.456c., Chicago; axles, 2.05c. to 3.50c., according to specification, per lb., Chicago; bars, shapes and plates, 1.50c., base, Chicago; billets, \$33, base, Chicago, with \$1 extra for carbon.

Erie Forge Co.—Axles, 3.30c. per lb. f.o.b. Cleveland.

Pittsburgh Steel Products Co.—Seamless tubes, 2 in., 12.25c. per ft.; 2½ in., 13.78c.; 3 in., 28.56c.; 5½ in., 43.86c.; 5½ in., 45.88c.; 4 in., 28.09c.; 3½ in., 22.10c.; 3 in., 20.93c.; 1½ in. x 1 13/16 in., 26.79c.; 1½ x 2½ in., 44.82. (The variation in two prices on 3 in. tube was due to slightly different specifications.)

Edgewater Steel Co.—Tires, 5.55c. to 6.55c. per lb., according to specifications, with an extra of ¼c. per lb. if finished bored. Prices f.o.b. Homestead, Pa.

McClintic-Marshall Co.—Bridge material, 6.50c., delivered Lowville, N. Y.; 7c. per lb., delivered Philadelphia; 4.36c. per lb., delivered Bay View, N. Y. The first two items cover structural steel, castings and rollers and the third item structural steel only.

Lackawanna Steel Co.—Bars, 1.50c.; shapes, 1.60c. and plates, 1.60c., delivered West Seneca, N. Y.; billets, \$33 delivered West Seneca; track bolts, 2.65c. per lb. heat treated or not heat treated, delivered West Seneca; track spikes, 2c. per lb., West Seneca, extra for copper, angle bars, 2.40c. per lb.; blank splice bars, 2.40c.

Republic Iron & Steel Co.—Billets, \$31, Youngstown; bar and plates, 1.50c. per lb., Youngstown; black sheets, 3.30½c. per lb., galvanized, 4.0½c. and blue annealed, 2.30½c., all per lb., base, Youngstown.

National Bolt & Nut Co.—Track bolts, 2.85c. per lb. for non-heat treated.

Wheeling Steel Products Co.—Black sheets, 3.10½c., galvanized, 4.10½c., blue annealed, 2.35½c., all per lb., base Youngstown; billets, \$36.38, delivered Toledo, Ohio.

Alan Wood Iron & Steel Co.—Blue annealed sheets, 2.61c. per lb., base, delivered Newberry Junction; plates, 1.86c. per lb., delivered Newberry Junction.

Phoenix Bridge Co.—Bridge material, 6c. per lb. for structural steel, castings and rollers delivered Lowville, N. Y.; 7c. per lb. for structural steel, castings and rollers delivered Philadelphia; 5c. per lb. for structural steel, delivered Bay View, N. Y.

Mount Vernon Bridge Co.—Bridge material, 7½c. per lb. for structural steel, castings and rollers, delivered Lowville, N. Y.; 7½c. per lb. for structural steel, castings and rollers delivered Philadelphia; 5½c. per lb. for structural steel, delivered Bay View, N. Y.

Reeves Mfg. Co.—Black sheets, 3c., galvanized sheet 4c., f.o.b. Minerva, Ohio.

Cumden Forge Co.—Axles, 3.70c. per lb., delivered Newberry Junction.

Wheeling Corrugating Co. (Whitaker-Glesner Co.)—Black sheets, 3.10½c.; galvanized, 4.10½c., blue annealed, 2.35½c., all per lb. f.o.b. Youngstown.

Donner Steel Co.—Bars, 1.50c.; small shapes, 1.50c. per lb., f.o.b. Buffalo, billets, \$33, Buffalo.

Globe Seamless Steel Tube Co.—Seamless tubes, 2 in., 12.57c., Cleveland, 12.83c., Elkhart Ind.; 2½ in., 14.15c., Cleveland, 14.11c., Elkhart; 3 in., 29.30c., Cleveland, 29.86c., Elkhart; 3½ in., 22.62c., Cleveland, 23.09c., Elkhart; 3 in., 21.48c., Cleveland, 21.90c., Elkhart; 1½ x 1 13/16 in., 36.95c., Cleveland, 37.43, Elkhart; 1½ x 2½ in., 61.92c., Cleveland, 62.76c., Elkhart. The two prices on 3 in. are due to slightly different specifications. All prices are per ft.

Detroit Seamless Tube Co.—Seamless tubes, 2 in., 12c. 2½ in., 13.50c.; 3 in., 28c.; 5½ in., 43c.; 5½ in., 45c.; 4 in., 27.45c.; 3½ in., 21.60c.; 3 in., 20.50c.; 1½ x 1 13/16 in., 26.3c.; 1½ x 2½ in., 44c. All prices per ft., delivered New York Central tracks. Variation in prices of 3 in. due slightly different specifications.

National Tube Co.—Seamless tubes, 2 in., 12.25c.; 2 in., 13.79c.; 3 in., 28.57c.; 5½ in., 43.87c.; 5½ in., 45.89c.; 4 in., 28.09c.; 3½ in., 22.1c.; 3 in., 22.97c.; 1½ x 1 13/16 in., 36.35c.; 1½ x 2½ in., 60.84c. All prices per ft., with delivery at Youngstown. Variation in prices on 3 in. due slightly different specifications.

Pittsburgh Seamless Steel Tube Co.—Seamless tubes, 2 in., 12.25c.; 2½ in., 13.75c.; 3 in., 27.50c.; 5½ in., 43c.; 5½ in., 45.75c.; 4 in., 25.50c.; 3½ in., 22c.; 3 in., 22c.; 1½ x 1 13/16 in., 25.50c.; 1½ x 2½ in., 44.75c. All prices per ft., delivery at Youngstown. Variation in prices on 3 in. due to slightly different specifications.

American Sheet & Tin Plate Co.—Black sheets, 3.10½c., galvanized, 4.10½c.; blue annealed, 2.35½c., all per lb., base, delivery at Porter, Ind., or Youngstown.

Pittsburgh Steel Co.—Standard wire nails, \$2.40 per 100 lb. keg, Pittsburgh.

Sheidan Steel Hoop Co.—Black sheets, 3c.; blue annealed, 2.25c., per lb., base, Youngstown.

Standard Forgings Co.—Axles, 1.95c. per lb. to 3.50c. per lb., according to specifications. Delivery at Indiana Harbor Ind.

Dilworth, Porter & Co.—Track spikes, 2.10½c. to 2.25½c. no extras, delivery at Pittsburgh.

Superior Sheet Steel Co.—Black sheets, 3c.; galvanized, 4c. per lb., base, Pittsburgh.

Trumbull Steel Co.—Black sheets, 3.06½c.; galvanized, 4.06½c.; blue annealed, 2.31½c., all per lb., base, Youngstown.

United Alloy Steel Corporation.—Black sheets, 3c.; galvanized, 4c.; blue annealed, 2.25c.; Canton, Ohio, freight equalized with Pittsburgh.

Bethlehem Steel Co.—Bridge material, 5.71c. for structural steel, castings and rollers, delivered Lowville, N. Y.; 6.48c. for structural steel, castings and rollers, delivered Philadelphia; 4.51c. per lb., structural steel, delivered Bay View, N. Y., all per lb.; steel bars, 1.85½c.; shapes, 1.81½c.; plates, 1.81½c. for ¼ in. and heavier and 1.96½c. for up to ¼ in.; track bolts, 3.41c. per lb. not heat treated and heat treated, 4.36c. per lb.; angle bars, 2.77c.; blank splice bars, 2.77c.; black sheets, 3.32c.; galvanized, 4.32c.; blue annealed, 2.57c.; axles, 3.35c. per lb.; billets, \$37.32. All

the above prices, except where otherwise indicated, are for delivery at Newberry Junction.

Lukens Steel Co.—Plates, 1.82c. per lb., base, delivered at Newberry Junction.

American Rolling Mill Co.—Billets, \$32, base, Cleveland, carbon extra, \$1 per gross ton; black sheets, 3.10½c.; galvanized, 4.10½c., and blue annealed, 2.35½c., per lb., base, Youngstown.

Lake Erie Bolt & Nut Co.—Track bolts, 3c. per lb. for non-heat treated, heat treated, 4c. Extras of 15c. and 30c. per 100 lb.

King Bridge Co.—Bridge material, 7½c. per lb. on structural steel castings and rollers for delivery at Lowville, N. Y., 9½c. per lb. on structural steel castings and rollers, for delivery at Philadelphia, 42c. per lb. on structural steel for delivery at Bay View, N. Y.

Standard Steel Works Co.—Tees, 5½c. to 8c. per lb., Pittsburgh, according to specifications. Extra of 3c. per lb. if finished bored. Axles, 4.40c. per lb., Pittsburgh.

Schenck Iron & Steel Co.—Black sheets, 3c. per lb., Buffalo.

Mesta Machine Co.—Axles, 2.70c. per lb., rough turned, f.o.b. West Homestead, Pa.

Canton Sheet Steel Co.—Black sheets, 3.12½c.; galvanized, 4.12½c.; blue annealed 2.37½c., all per lb., base, Alliance, Ohio.

Cleveland Steel Co.—Blue annealed sheets, No. 10 gage, 2.02c., Nos. 11 and 12, 2.10c., per lb., Cleveland; steel plates, 1.60c. per lb., base, Cleveland.

Inland Steel Co.—Track bolts, oval neck, 2.25c., for non-heat treated, heat treated, 3.50c. per lb.; track spikes, 2.25c. to 2.35c. per lb.; angle bars, 2.40c. per lb.; black sheets, 3.35c.; galvanized, 4.38c.; blue annealed sheets, 2.68c.; bars, shapes and plates, 1.50c., all f.o.b. Indiana Harbor, Ind.

Brier Hill Steel Co.—Black sheets, 3c.; galvanized, 4c.; blue annealed, 2.25c., all per lb., base, f.o.b. Pittsburgh, plus freight to Youngstown.

Pollak Steel Co.—Axles, 1.98c. to 2.18c. per lb., delivered Chicago; 3.18½c. to 4.28½c. per lb., delivered at Toledo, Ohio.

Uses and Abuses of Molding Sands*

Typical American Sands and Their Composition— Sand for Various Metals—Discussion

SAND for foundry use is a subject about which very little information can be obtained from books or technical papers. This probably is due to the fact that each foundryman requires a material best suited to the class of castings he is to produce. Different methods of molding—floor molding, bench molding, and rammed and air pressed machine molding—require different grades, as also do heavy and light castings, castings which require a fine finish and those in which finish is unimportant.

Steel, malleable iron, cast iron and brass, melted at different temperatures in the order named, require different refractory conditions in the sand. Gases generated in different lines require varying conditions of porosity. Both conditions are governed by the silica content of the sands selected. As the silica content is increased the sand is weakened. In castings where there are deep pockets or close corners to be lifted, a water bond is required. This bond is controlled by varying alumina or iron oxides. The predominance may be noted by the color, iron giving the yellowish shades.

Up the foregoing, there are but two required: Bond and porosity, alumina and silica. In simpler words, clay and sand; for example, almost entirely silica, and clay for brick molding purposes, mainly alumina, neither being suitable for molding. Other oxides appear to have no particular value for molding purposes, lime in particular being detrimental to the finish of the casting in some cases. The finish is controlled by the texture or grain of the sand. The fineness is determined by running the sand through a series of sieves ranging from 10 mesh to 100 mesh.

There does not appear to be any set place or condition of mining. Good molding sands exist in almost every State, freight rates being the determining factor as to price in most foundries. It is sometimes taken from the hill tops, again from the prairies and sometimes in very deep banks in the hills with gravel pits below. From some of our Illinois farms it occurs in layers from 1 to 3 ft. deep. After the topsoil is removed, the No. 1 grade or finer sand comes from the top layer, usually 12 to 20 in. deep, the No. 2 grade below, being a little coarser, with the No. 3, still coarser next, followed by a clay soil.

In parts of Wisconsin different grades of sand varying in texture appear at the surface 100 to 500 ft. apart, and not in layers as above explained. It appears in some cases that certain grades of sand are the results of glacial deposits. It has always appeared to me that our fine sands in the West could be traced by drawing a line from the lower central part of Wis-

consin southeast, curving through central Illinois, central Indiana and northern Kentucky to the Virginias. In the hills of Kentucky turning over the sod sometimes shows the finest of molding sands. Along the line mentioned can be found sands equivalent to the French prepared sands or the equal, if not the superior, of the Albany sands which are so well known throughout the country. The fame of the Albany sands dates from the time when our original foundries were located in the East. At that time, as now, water transportation was much in the public mind. Then, however, they did not have railroads at all; so the molding sands were sent down the Hudson and along the coast.

It is noticeable that all Eastern sands are high in silica and very open and can be rammed very hard without harm to the casting, whereas the same treatment of our Western sands would result in loss. But their sands will not retain the bond as long as ours. Freight rates prevent a greatly desired interchange of sands between the East and the West, each having that which the other needs for blending purposes. Blended or milled sands are furnished by some dealers and samples shown are always attractive because of their uniform texture, but there is nothing to show that they are suitable for the class of castings to be produced, and in some cases the blending only serves to cover up features which would otherwise be objectionable.

No foundryman should confine himself to one grade of sand. At least two grades should be carried, one high in bond or alumina, the other high in silica for use in opening up sands when losses occur from blow, etc., and for facing purposes on heavier lines of work. The high alumina sands are to be added to the molding sand as a binder when it has been weakened by constant use or from other causes.

A good molding sand is often condemned on account of abusive practices by the foundryman. The excessive addition of new sand will invariably cause loss, both of castings and sand. Where sand is too strong or new it burns on the casting, causing waste. Excessive use of sea coal facing very often weakens the sand, the unburned portion in the molds after a short time destroying the bond by coating each grain with carbon. The sand becomes a deep black, whereas the natural color of burned sand is red. This condition can only be overcome by addition of a bonded sand.

Another weak condition comes from constant use of a sand for heavy castings, the bond being carried away with the casting and renewal being necessary. When an excess of core sand drops from the castings into the heap, increasing the silica, the sand is weakened and an increased bond is needed. As said before, silica is a weakener of sand, but is very necessary in the mold to create porosity to carry away the gases.

*Paper read before Chicago Foundrymen's Club, March 1. The author, Eugene W. Smith, is with the Crane Co., Chicago.

When castings are taken out of the sand and the sand is not sufficiently well knocked off the very best portion of the riddled sand is carried away and wasted. A common practice of pouring surplus metal into sand heaps causes a waste both of sand and of labor handling the metal. It is far better to furnish ingot molds for this purpose. Still another common practice of burning out, thawing or drying out new sand by pour-

has had one meeting thus far, while various sub-committees have met several times. The first step in the investigation, the preparation of a bibliography, has been completed. This was done by the secretary of the committee, R. E. Kennedy, who is also assistant secretary the American Foundrymen's Association. He not only listed all articles which have been written on the subject of sand and sand tests, but has abstracted

A Few American Molding Sands									
	Opener	Binders		Of No Particular Molding Value				Texture and Finish	
	SiO ₂ , Per Cent	Fe ₂ O ₃ , Per Cent	Al ₂ O ₃ , Per Cent	CaO, Per Cent	MgO, Per Cent	Alkalies, Per Cent	SO ₃ , Per Cent	Fineness	
Tennessee	92.96	3.10	4.92	...	...	0.26	...	98.58	Fine Weak Open Coarse Weak Open Coarse Strong Open Coarse Strong Open Medium Strong Open Medium Strong Open
Long Island, N. Y.	89.16	2.92	4.66	...	0.33	0.33	...	0.53	Open Coarse Weak Open Coarse Strong Open Coarse Strong Open Medium Strong Open Medium Strong Open
New York	82.34	1.24	8.50	0.96	0.40	1.79	0.54	1.70	Open Coarse Strong Open Coarse Strong Open Medium Strong Open Medium Strong Open
Indiana	82.50	2.70	8.90	0.16	0.61	1.47	...	0.59	Open Coarse Strong Open Medium Strong Open Medium Strong Open
Wisconsin	82.87	2.67	8.15	0.80	0.89	1.00	Trace	57.3	Open Coarse Strong Open Medium Strong Open Medium Strong Open
Indiana	79.66	9.74	3.36	1.34	0.68	2.50	...	75.34	Open Coarse Strong Open Medium Strong Open Medium Strong Open
South Carolina	79.30	4.10	10.70	1.19	1.29	...	...	...	Open Coarse Strong Open Medium Strong Open Medium Strong Open
Kentucky	76.16	4.24	12.02	...	0.72	1.21	...	...	Open Coarse Strong Open Medium Strong Open Medium Strong Open
Ohio	77.14	6.44	9.20	Trace	0.91	1.10	...	...	Open Coarse Strong Open Medium Strong Open Medium Strong Open
Illinois	75.70	13.46	3.00	0.60	1.08	2.15	0.19	0.60	Open Coarse Strong Open Medium Strong Open Medium Strong Open
Illinois	56.80	5.09	14.43	6.40	5.60	3.15	0.14	70.24	Open Coarse Strong Open Medium Strong Open Medium Strong Open Very close

ing metal into it is extremely wasteful both of metal and sand.

Sometimes a sand is highly recommended by one foundryman to another as having given him wonderful results. Its appearance being favorable, a supply is ordered without considering that his own work is heavier, the result being that the sand is soon burned out and weakened, with a consequent loss of product. Thus it is very apparent that one standard will not suit all lines of work.

Herewith I give a few sands taken at random from different States, showing variations in the elements and composite fineness of most of them. I intentionally omit names and brands of sands. A study of the table should show the variation met with in all molding sands. It would be a very desirable feature if all sands sold could be accompanied by a standard analysis. This should particularly apply to blended or milled sands where the texture has been changed and sometimes an otherwise unsuitable sand is made to appear satisfactory.

The present practice of selling and purchasing molding sands appears very crude. Small spoonful samples are shown by the salesman and are supposed to represent the contents of carloads to be shipped. The purchaser squeezes it into a ball to test the bond and finish by "feel," and sometimes puts it to his ear and rubs it to test its openness by "sound." All that is left for him to do is to taste it. If the Bureau of Standards, universities and technical men can devise some form of table, such as is presented here in an incomplete shape, it would prove a great help both to the producer and consumer.

Discussion

Among those who participated in the discussion were R. A. Bull, research director the Electric Steel Founders' Research Group, Chicago, and chairman the Joint Molding Sand Research Committee of the American Foundrymen's Association and the National Research Council; C. S. McNeal of the Garden City Sand Co., Chicago, and H. S. Vrooman. Mr. Bull outlined the broad scope of the work undertaken by his committee and told of the progress which had been made

all information which might be of use to the committee.

The importance of the work undertaken by the committee is indicated by the fact that \$7,500,000 was spent in 1920 for molding sand alone. Mr. Bull stated that the problem confronting the investigators was particularly difficult because no standards have been established by which to gage the quality and suitability of various sands for different purposes and no satisfactory tests have been devised for ascertaining such standards. The next step in the work, he said, would be on the subject of tests. The committee has found, for instance, that even tests for fineness are not uniform. Sieves may have the same number of meshes per square inch, but owing to the fact that there is a difference in the diameter of the wires, the results of different tests are not conclusive. The personal equation in sifting also prevents accuracy in fineness testing.

It is difficult also to determine the percentage of moisture in sand, and even when it is determined it does not always have the same significance. It has been found, for instance, that it is better to store high bond sand in a moist atmosphere than to permit it to dry out and then to restore the moisture subsequently. The reason for this is not yet clear.

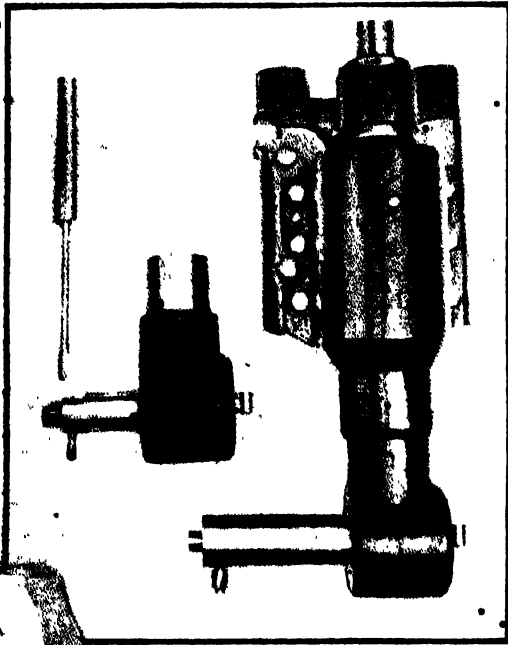
A satisfactory test for bond is also lacking. One method is to push a bar of sand over the edge of a table and measure the length of the portion which drops off. Others take the weight of the portion which drops, but in either case much depends upon the surface of the table top, the speed at which the bar is moved and the friction between the bar and the table.

These are just a few of the problems confronting the committee. Mr. Bull stated that one important result of the investigation would be to make available to the foundry industry many sand deposits which have not yet been exploited. A number of important sources of supply, he stated, would soon be exhausted, and heretofore there has not been much investigation of new deposits. When suitable standards have been devised, however, State geologists will be able to locate new deposits suitable for molding use. The meeting was unusually well attended.

Heavy Duty Offset Drilling Attachment

What is called a maximum duty, minimum space offset drilling attachment for drilling, milling, counter-sinking and counterboring port holes and grooves in air tools, such as rock drills, pneumatic hammers, drills and riveters, has been placed on the market by the H. E. Harris Engineering Co., Bridgeport. It is made to fit any standard drill press.

The attachments are made to reach into the main bore and drill or mill the vents or ports from the inside and their use permits drilling to a specified depth, counterboring or milling circular, transverse or longitudinal slots. Because of the small space in which the tools must work and the comparatively long overhang, there are no clearances, the offset or horizontal arm being made as large as the bore of the air chamber and the depth of the drilling or milling will permit.



The Offset Drilling Attachment is Shown in the Illustration. Driving spindle appears at extreme left.

The entire patented transmission and the offset arm are made from tool steel and are accurately ground and lapped after heat treatment.

There is no lost space inside the arm itself, all internal clearances being kept to a very small margin, which is possible by grinding and lapping. This is intended to retain all the metal that can add to the strength of the arm and contributes to the extreme rigidity of section required.

The special shank drills, mills and counterbores are ground and lapped to fit the special spindle in the outer end of the arm and run true. These are readily changed and have a limited adjustment for depth to allow for grinding and setting.

At the extreme right in the illustration one of the heavy-duty attachments is shown mounted in a special bracket on the vertical slide of a Becker vertical milling machine. To the left of this is shown another offset attachment with a smaller arm which is for use on smaller work. This is interchangeable in the special bracket with the arm shown in the bracket. The driving spindle is also shown. This has a taper shank fitted to the machine spindle and at the lower end it is squared to drive the offset attachment. It will be noted that this is necked down in diameter between the squared end and the taper shank. This is intended to give increased elasticity and also provide a point of failure to prevent jamming of drills, mills or fixtures due to accident. The lower end is of cold rolled steel and is sweated into the taper shank with half and half solder; it is easily and inexpensively replaced.

The attachments may be used also for other purposes requiring inside drilling or milling, such as oil

grooves, straight or spiral holes for holding babbits in bearing boxes, end milling blind keyways to retain a feather or key in a hub sliding on a shaft, and other uses.

Coke Production Increased

Uniontown, Pa., March 25.—Seven hundred and fifty ovens are being added to-day and Monday (March 27) to the active list by the H. C. Frick Coke Co. This will bring the total of ovens fired during the past week to more than 1200 and will bring the coke production of the Frick company up to approximately 44 per cent. Included in the list of plants affected by increased coke production are the two Heclas and the Oliphant plant and the Whitney plant of the Hostetter-Connellsville Co., which has been idle for six months to a year.

Coke business in the region is firm and is showing a steady increase. Prices are firm at \$3.25 and \$3.50 for furnace grades and 75c. to \$1 higher for foundry grades, although little foundry coke is being shipped. Independent coke production also is showing a substantial increase.

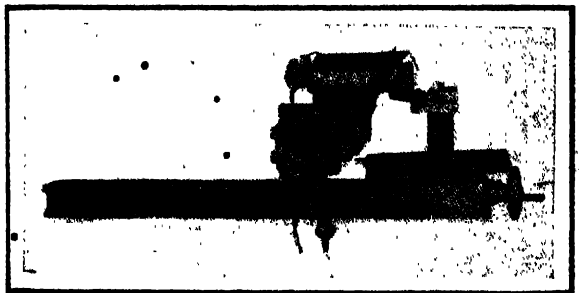
The increase in coke business, observers believe, is little affected by any threatened strike of miners in the union fields. Furnace production throughout the country is showing steady increase and this is being reflected in the Connellsville field.

Coal production during the past week has shown a substantial increase although the prices have softened. There is every indication here that the strike in the union fields will be a protracted one, but operators see no sensational price flurries on coal until reserve stocks accumulated by consumers during the past several weeks near exhaustion. Best grade Pittsburgh coal is quoted at around \$1.50, mines.

Cutter Grinder for Re-Turning Tool

The crankpin re-turning tool made by the Sawyer-Weber Tool Mfg. Co., Los Angeles, previously described, is now equipped with an electric cutter grinding attachment, as shown. It is intended to permit rapid sharpening of the tool bit and can be attached conveniently without altering the re-turning tool. The cutter is ground in from 2 to 5 min.

A ½ hp., 10,000 r.p.m. motor is used. The end thrust of the motor shaft is adjusted by the same collet which holds the wheel. The cutter to be ground is passed in the groove of the guide blade with the fingers, micrometer adjustments being made by the hand wheel



Crankpin Re-Turning Tool with Cutter Grinding Attachment

and dial of the re-turning tool. Simplicity of adjustment is emphasized as a feature.

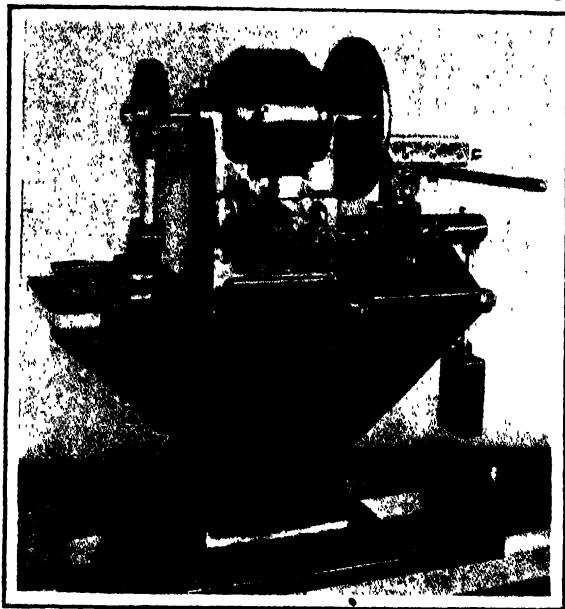
The tool itself when in operation rides around with the crank-pin, the handle resting on the bed of the lathe. The cutting tool is fed into the pin by means of the handwheel at the end of the re-turning tool shown in the illustration. The wheel has a dial below it that is graduated in thousandths of an inch. The dial is locked in any position by a set screw, which is intended to facilitate turning the pins to exactly the same size. The cutter is clamped securely in a V-slot and is parallel to the back plate at all times, thus generating a true circle. Graduations on the V-plate are used in setting the block for different diameter pins.

New Badger Grinder

The accompanying illustration shows the new No. 2 grinder added to the line of the Badger Tool Co., Beloit, Wis.

Various forms of equipment are applicable to this machine, the illustration showing the right end equipped with 16-in. disk wheel, faced with the company's new Diacarbo abrasive disk, which is $\frac{3}{8}$ in. thick. This disk is served with the universal lever feed table, as shown. The left end of spindle is extended to receive 12-in. solid grinding wheel, which is served with adjustable work rest.

A General Electric Co. 3-hp. motor is used and fitted with special end frames and SKF ball bearings, both radial and thrust. The motor is fully inclosed



The Universal-Lever Feed Table Serves Disk, as Shown

with forced ventilation passing down through the machine pedestal. A push button station and automatic starter are provided. The weight complete is 1300 lb.

German Machine Tool Exports

WASHINGTON, March 28.—An analysis by the industrial machinery division of the Department of Commerce, based on the latest figures received from Germany, indicates that there has been a considerable decrease in the volume of Germany's machine-tool exports during 1921, as compared with 1920 and the pre-war year 1913.

Exports for the seven months, May to November, 1921, were 39,046 metric tons. Exports for the full twelve months of 1920 were 94,921 metric tons. Taking the total of 39,046 metric tons for the seven months of 1921 and employing the same ratio for the missing months, 1921 would give a total of approximately 67,000 metric tons, a falling off in volume of 27,921 tons and 23,279, as compared with 1913.

Not Afraid of Coal Shortage

YOUNGSTOWN, March 28.—Little or no concern is voiced by leading steel interests over a possible coal shortage in event the threatened coal miners' strike materializes, unless it should be prolonged beyond all expectations.

Both large and small industrial plants have sufficient reserves on hand to meet their requirements for several weeks, even though union mines were to completely suspend. One large independent in the Mahoning Valley, for instance, has piled over 100,000 tons of coal, while other plants are fortified equally as well. So large are their accumulations that some interests are now buying only in a moderate way, and prices of both coal and coke are characterized as soft, on account

of this condition. Trunk line railroads have large fuel supplies, as well as public utilities and waterworks plants, insuring uninterrupted operations.

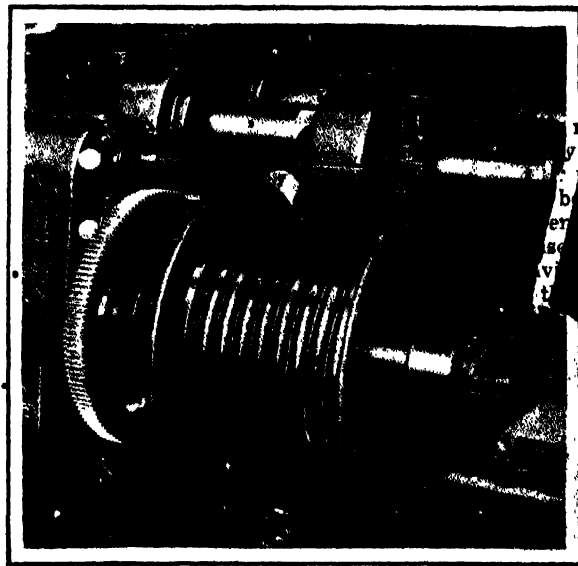
Improves Crane Magnet Cable Drum

The Pawling & Harnischfeger Co., Milwaukee, has developed a new feeder cable retriever intended as an improvement over ordinary types of cable take-up drums which have positive-gear or chain-sprocket drives for both hoisting and lowering directions.

The new design, shown in the illustration as applied to a 5-ton crane, has been developed on the principle of keeping the cable taut at all times. A fixed but moderate tension in the feeder cable is maintained, the cable winding up and paying out without slack or undue strains. The cable drum is driven only in the hoisting direction. The drive consists of gearing from one of the shafts of the hoisting mechanism, the final drive to the drum being by friction. The gearing is proportioned to drive the drum at a peripheral speed greater than the speed at which the magnet is being hoisted. This arrangement is intended to cause the friction drive to slip, producing moderate tension in the magnet cable which may be adjusted by tightening the thrust spring of the friction drive.

The cable drum is not driven in the lowering direction, a pawl and ratchet wheel attached to the driving friction preventing it from revolving. The cable is then unwound, due to the pull of the cable while the magnet is lowered. Raveling or too rapid unwinding is said to be prevented by the resistance of the stationary friction against the cable drum which produces the same tension or pull on the cable in the lowering direction as in the hoisting.

Large flanges are provided on both sides of the drum and all bearings are bronze bushed. Collector rings and brushes are of the same construction as slip rings of the alternating current motor, the brushes being of the carbon type with a constant pressure on



The Drum Is Driven Only in the Hoisting Direction

the rings. The collector is enclosed in a housing and mounted at the end of the shaft, a hinged cover providing access to the parts.

The magnet cable leads are securely attached and no electrical contacts left exposed.

More than 1,000,000 tons of sheets have been rolled on the sheet mills of the Youngstown Sheet & Tube Co., Youngstown, Ohio, since the plant was originally operated 20 years ago, in April, 1902. A fair average of the product has been sheets of No. 24½ gage. The original plant consisted of six mills which rolled chiefly puddled iron sheets. The first of these were used for roofing buildings in the new plant and some are still in good condition. There are now 15 units,

Portable Crane for Heavy Lifting

The crane truck shown in the accompanying illustration, a development of the Elwell-Parker Electric Co., Cleveland, is similar in design to machines of that company previously described.

It is intended for heavy-duty use in stacking materials in yards and warehouses and in the assembly of heavy or bulky units in machine shops. The machine is essentially an electric truck having a carrying capacity of 3000 lb. with a revolving counter-balanced crane mounted on it. The crane will handle loads up to 3000 lb., picking up 1000 lb. at 8 ft. outreach at the



With Outriggers in Position, as Shown, the Crane Will Lift 3000 Lb. at 6 Ft. Reach

or end of the platform. With the outriggers in position, as shown, the crane will lift 3000 lb. at 6 ft. reach. The boom may be lowered to permit entry through doorways. The outriggers are quickly adjusted and not in use are folded and swung in beside the column.

In this design a heavy vertical steel column having a bearing in the steel pedestal which is bolted in the steel platform of the truck, supports a 12-ft. boom. The boom may be racked in or out by the operator without leaving the driving position. The hoist is operated by a separate motor direct connected to an inclined hoist mechanism, the controller being located on the dash in front of the operator. The hoist is mounted on a steel frame which houses the battery, the battery, hoist and motor being arranged to act as counterbalance. A special trip switch mounted on the front of the battery box stops the inward motion of the boom as set.

A single battery furnishes power to propel the truck, as well as operate the crane. Large wheels permit using the truck in yards and all four wheels steer. A coupler is provided on the rear to permit use of the unit for intermittent tractor service. Motors, differential worms, wheels and crane pillar column are fitted with ball bearings.

Further Improvement in Business

In a preliminary summary of March business conditions, the Department of Commerce finds that "business is gradually working its way back toward normal. This movement is not always evenly distributed among the different industries, but, having regard to those fundamental industries which constitute the backbone of American business, there is a marked improvement over the conditions recorded a few months ago."

The most fundamental change in recent weeks is the improvement in agricultural products. There is an increase of 20 per cent in cotton consumption, compared with a year ago, in spite of present widespread labor troubles in New England. Both pig iron and steel ingot production show recent increases. Coal production has continued to increase. Building contracts are showing substantial gains. Transportation and unemployment conditions have improved. All of these factors have been reflected in a slight increase in wholesale price index numbers, and in an upward movement in the stock market.

New Full Automatic Cylindrical Grinder

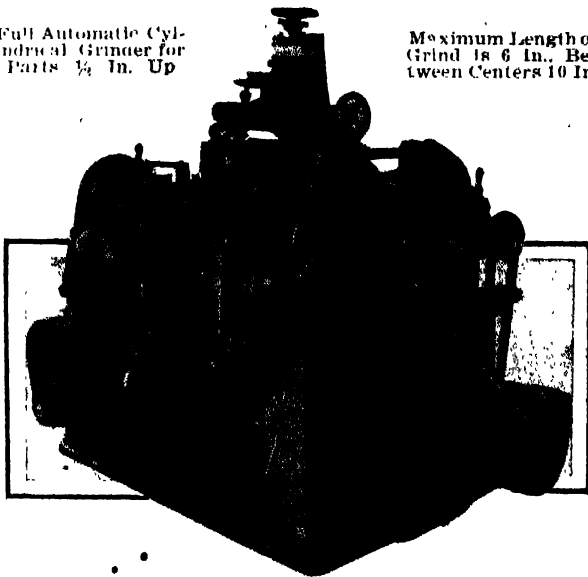
A recent new offering in machinery for cylindrically grinding machine parts on centers is represented in the full automatic machine shown in the accompanying illustration, a development of the Warren F. Fraser Co., Westboro, Mass.

Increase of production from 200 to 400 per cent over the usual grinder is claimed for this machine, the output of piston pins of average size, $\frac{1}{2}$ in. in diameter by $\frac{1}{4}$ in. long, at the rate of 5 per min. being given as an example. It is intended for grinding shafts, shackle bolts, king bolts, valve tappets, telephone receivers, fountain-pen barrels and caps and a diversity of other machine parts from $\frac{1}{2}$ in. diameter upward. The maximum length of grind is 6 in., the maximum length between centers being 10 in.

The wheel head is heavily constructed and the spindle designed to carry a grinding wheel 18 in. in diameter and up to 6 in. face. Bearings are lubricated by

Full Automatic Cylindrical Grinder for Parts $\frac{1}{2}$ In. Up

Maximum Length of Grind is 6 In. Between Centers 10 In.



forced feed. The machine is self contained and driven by a 15 hp. motor with $4\frac{1}{2}$ in. belt. It may also be arranged for drive from overhead shaft. The weight is 7000 lb.

A smaller machine weighing 4000 lb. which will be ready for the market soon, will be for work $\frac{1}{2}$ to $1\frac{1}{2}$ in. in diameter, up to 2 in. in length of grind and 8 in. between centers.

The Hendee Mfg. Co., Springfield, Mass., motorcycles, will increase its output to 1400 machines, contrasted with 600 each this and last month. Incoming orders warrant the increased production.

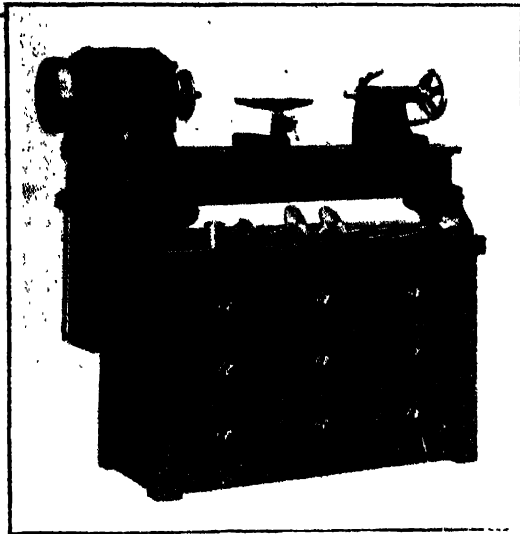
The General Electric Co., Schenectady, has received an order for \$1,000,000 of electrical equipment from the Southern California Co., Los Angeles. Half of this business will be filled by the company's Greenfield, Mass., plant in the form of transformers.

"Non-Metallic Impurities in Steel" was the subject of an address by F. W. Miller, Rochester Welding Works, Rochester, N. Y., before the monthly meeting of the Rochester Chapter of the American Society for Steel Treating, March 23.

Bench Type Pattern Shop Speed Lathe

A new 12-in. alternating current motor headstock lathe for use in pattern shops and vocational schools has been placed on the market by the J. G. Blount Co., Everett, Mass. The lathe is regularly for use on a combination bench although long legs are provided if desired.

The headstock is of $\frac{1}{2}$ hp. capacity, fully inclosed and equipped with SKF ball bearings. The spindle is



Motor Headstock Lathe. The cabinet shown is not part of regular equipment

of 45 point carbon steel with a hole $\frac{5}{8}$ in. in diameter bored the entire length and provided with a Morse No. 2 large taper. The spindle nose is $1\frac{1}{2}$ in. outside diameter, 10V-threads per in., the rear end of the spindle having the same diameter, with left hand thread. An outside face plate and pulley combined, 8 in. in diameter, can be used for belting to auxiliary equipment. The bed has a flat top and is cross braced. The lengths supplied are 4, 5 and 6 ft., the maximum distance between centers being 25, 37 and 49 in. respectively.

The controller has four running positions for spindle speeds of 575, 1160, 1750 and 3450 r.p.m. It is placed within the headstock end, a set of bevel gears connecting the controller with the handle shown in the accompanying illustration. A safety switch, used in connection with the controller, is located on the end of the bench and easily thrown on or off by the foot.

The tailstock has a broad flat base $6\frac{1}{2}$ by $7\frac{1}{2}$ in. The bearing for the spindle is 8 in. long and the rear handwheel 8 in. in diameter. A Morse No. 2 large taper is used for the center. The rest holder is large and clamps by means of a binding handle threaded to a stud; is quick and positive and extends from side of the rest. For clamping the rests a binding screw is located conveniently on the right side of the rest holder.

The machines are regularly equipped with one spur and cup center, 3 tee rests, $5\frac{1}{2}$ in. face plate with holes for wood screws, a 3-in. screw chuck, a $2\frac{1}{2}$ by 4 in. right angle rest, a knockout rod for center and a wrench. Other equipment shown in the illustration is extra.

The Sioux Falls Corrugating Co., sheet metal products, has awarded a contract to the Carlson & Snitkey Construction Co., Sioux Falls, S. D., for a one-story factory building 145 x 150 ft. of brick and steel, work to start at once.

Six Months' Reduction in Steel Prices

In response to the request of a correspondent, the following table showing the prices of the articles named, in mid-September of 1921 and mid-March of 1922, has been prepared. It will be noted from the last column that the largest percentage of reduction has occurred in bars, beams and plates; these have since advanced. Following these, wire nails and open-hearth rails show large reductions. Tin plate, Bessemer rails, pig iron and billets follow in the order named.

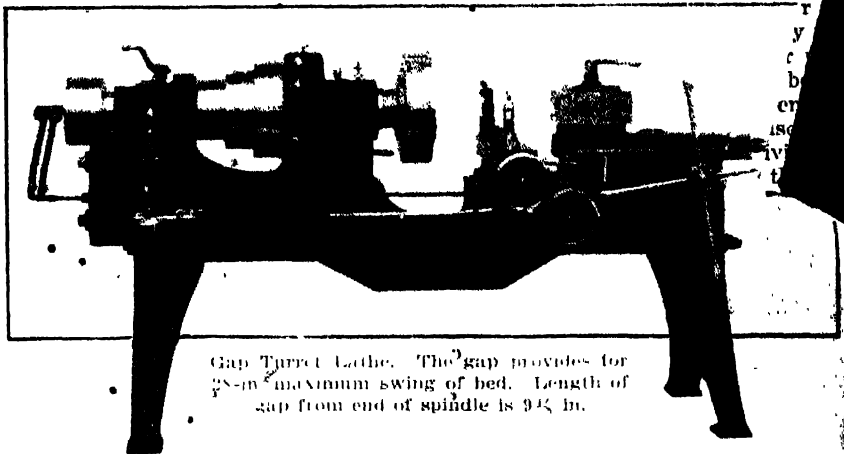
	Sept. 12, 1921	March 12, 1922	Percentage of Decrease
Pig Iron (Composite)	\$19.81	\$18.25	7.9
Billets	29.00	28.00	3.5
Open-Hearth Rails	47.00	40.00	14.9
Bessemer Rails	45.00	40.00	11.1
Bars	1.60	1.35	18.2
Beams	1.50	1.35	18.2
Plates	1.60	1.35	18.2
Wire Nails	\$2.20	\$2.10	17.2
Tin Plate	5.75	4.60	12.4

Work of Engineering Standards Committee

The activities of the American Engineering Standards Committee have developed to such an extent that work is now underway on 79 distinct projects, such as industrial lighting, structural steel shapes specifications for fire tests, a safety code for abrasive wheels, ball bearings, a safety code for compressed air machinery, a safety code for foundries, gears, a safety code for machine tools, a safety code for power presses and specifications covering non-ferrous and ferrous metals. In its work, 160 bodies of national importance are cooperating, these having designated more than 500 individuals as official representatives to serve on sectional committees working under the auspices of the committee. An account of the work of the committee is given in a 32-page pamphlet published by the committee at 29 West Thirty-ninth Street, New York, Dr. P. G. Agnew, secretary.

Gap Turret Lathe

A departure from the standard design of turret machinery is represented in a new gap turret lathe



Gap Turret Lathe. The gap provides for 28-in. maximum swing of bed. Length of gap from end of spindle is 9 $\frac{1}{2}$ in.

brought out by the Acme Machine Tool Co., Cincinnati.

The dimensions of the machine are in general the same as those of the 20-in. Cincinnati Acme turret lathe, except that the gap provides for 28-in. maximum swing of bed. The length of gap from the end of the spindle is 9 $\frac{1}{2}$ in. The machine has been equipped with an air chuck and also power feed to cross travel, to cut-off rest, and power feed to longitudinal travel of the turret; but any combination can be provided.

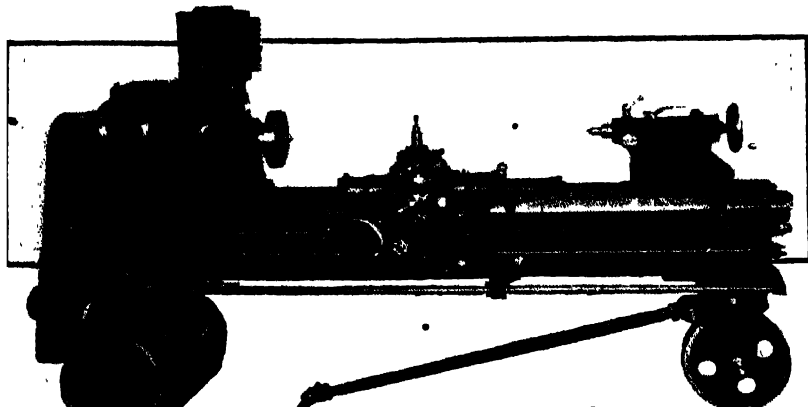
In this machine the minimum distance from end of the spindle to the turret face is 14 $\frac{1}{2}$ in. and minimum from end of the spindle to the inside edge of the cross slide, 8 $\frac{1}{2}$ in. The feeds to the cross slide are 40, 70 and 120; those to the turret 24, 48, 78 and 123. The cross movement of the cross slide is 7 in. and the lateral movement 4 in. The maximum distance from the inside of cross slide to end of the spindle is 12 in.

Portable Engine Lathe

The Lehmann Machine Co., St. Louis, is offering a portable type of its geared-head engine lathe, intended particularly for railroad and other shops doing large work where it is frequently necessary to bring the tool to the job.

The lathe is shown in the accompanying illustration. It is built in two sizes, 16-18½ in. and 18-20¼ in. swing. Direct motor drive through belt and idler is employed, the motor running at 1800 r.p.m. It is mounted in the cabinet leg at the head end, as shown, the pulley, belts and other parts being adequately safeguarded.

The headstock gives 16 spindle speeds in almost geometrical progression, with the use of 10 gears. The headstock forms an airtight casing enclosing all run-



Portable Geared-Head Engine Lathe for Shops Doing Large Work and Where Bringing the Tool to the Job Is an Advantage. The motor is mounted in the cabinet leg at the head end, as shown

ning parts. Shafts in the headstock run on ball bearings with the exception of the spindle, which is of alloy steel, hardened, and runs in phosphor-bronze bearings amply lubricated. The spindle nose has two diameters, both hardened and ground. These give two bearings for face and chuck plate, one in front and one behind the threads on the spindle nose.

Forward and reverse to the spindle is obtained through patent friction clutches, running in oil, with control handles located at the apron and at the head end of the lathe. It is claimed that the clutches require no adjustment at any time and will always pull a little more than the load imposed.

In addition, the new portable lathe includes the features of the company's machines, such as the quick-change mechanism, tailstock spindle lock-device, rod and screw shift and others.

Production of Fire Clay Brick Reported Slowly Increasing

PITTSBURGH, March 27.—The monthly report of the Refractories Manufacturers' Association, based upon reports from the membership of that organization, for the month of February shows that at the end of that month the production of fire clay brick had reached 44 per cent of monthly economical producing capacity, as against 38 per cent at the end of January; shipments during the month were 38 per cent, as compared with 40 per cent in January and the stock on hand at the end of February was equal to 187 per cent of capacity, against 176 per cent one month before. New orders for February were equal to 46 per cent of capacity, against 41 per cent in January, while unfilled orders at the end of February were 39 per cent of capacity against 30 per cent a month previously. In 1921, 100 per cent of economical monthly producing capacity was stated as 27,305,500 9-in. equivalents.

The report shows that production of silica brick for February was 24 per cent of monthly economical producing capacity, the same rate as in January. Shipments were 27 per cent of capacity, against 30 per cent in January; stocks 181 per cent, as compared with 133 per cent; new orders 36 per cent, against 35 per cent in the previous month and unfilled orders 41 per cent

of capacity, compared with 37 per cent in January. In 1921, 100 per cent equalled 78,645,942 9-in. equivalents.

Marketwise, refractories do not show much change. Improvement in the steel business is fairly closely reflected in the demand for the various kinds of refractories, but the complaint still is heard that the makers of iron and steel are inclined to keep their purchases down pretty close to actual requirements and there are apparently as many deviations from quoted prices now as there were recently. Quotations of \$28 per 1000 for Pennsylvania silica brick have not entirely ceased and on high duty Pennsylvania fire clay brick there are still some makers who are willing to take business at \$30 per 1000. These prices are \$2 per 1000 below what most makers are trying to get. Most of the recent business is magnesite brick has been at \$53, Baltimore, but there are reports that less than that has been done.

Similarly, although \$40 per net ton is supposed to be minimum on chrome brick, business has been lost at that price.

We quote per 1000 f.o.b. works:		
Fire Clay	High Duty	Moderate Duty
Pennsylvania	\$32.00 to \$35.00	\$30.00 to \$32.00
Ohio	30.00 to 35.00	28.00 to 30.00
Kentucky	32.00 to 35.00	30.00 to 32.00
Illinois	32.00 to 35.00	30.00 to 32.00
Missouri	32.00 to 35.00	28.00 to 32.00
Silica Brick		
Pennsylvania		30.00
Chicago		35.00 to 37.00
Birmingham		40.00
Magnesite Brick		
Standard size per net ton (f.o.b. Baltimore)		53.00
Grain magnesite per net ton (f.o.b. Baltimore)		28.00
Chrome Brick		
Standard size, per net ton		40.00 to 42.00

The secretary of the engineering section of the Society for Technical Aid to Soviet Russia, 110 West Fortieth Street, New York, sends out a letter saying that the section has been appealed to by the Russian scientific and engineering societies for books, bulletins, pamphlets and current literature on the scientific and industrial progress in the United States, particularly since 1914. Individual members have donated toward a fund created by the engineering group in order to send such literature to Russia. The demand, however, is so great that the New York organization cannot meet it and an appeal is made to others to supply the literature wanted, the Russian societies promising to reciprocate with copies of their new publications.

To try out the Roberts type ovens on high volatile Pennsylvania coal, the Granite City plant of the St. Louis Coke & Chemical Co., operated on 100 per cent of that fuel for one week ending March 25. The results of the experiment were gratifying. The average coking time was 12 hr. for 30 tons of coal per oven per day. This is believed to be the largest tonnage of this kind of coal put through a coke oven in a day. The record of one of the larger Eastern coking plants using the same coal is 17 hr. for 19 tons per oven per day. The Eastern high volatile coal contains about 2 per cent less volatile than Illinois coal while its moisture content averages 8 per cent as against 3 to 3½ per cent for Illinois coal.

Increased Efficiency in Many Steel Plants

Fewer Workers Necessary Than During the War—Exclusive Surveys in the Mahoning Valley—Operating Organizations Improved

YOUNGSTOWN, OHIO., March 28.—Since the war there has been an appreciable increase in efficiency of workmen in iron and steel plants, say Valley operating managers. As a consequence, as units approach normal operations, employers find that the number of workers necessary to carry on production, is substantially less than during the war. Improved mechanical appliances are constantly being installed in steel plants, likewise, thereby reducing manual labor, quickening operations and enlarging production.

More efficient methods adopted by the mills are also responsible for this situation, which in the aggregate, is proving a substantial factor in cutting costs to the minimum. Exhaustive surveys have been conducted by Valley steel industries in an effort to promote efficiency, eliminate waste and reduce production costs. As a result of these efforts men have been eliminated wherever possible, without impairing efficiency.

At first, foremen, superintendents and production managers were inclined to complain and to resent the action. But workmen in the mills responded to changed conditions with alacrity, especially as operations grew slack and they realized it was a matter of the survival of the fittest. In some instances, results were achieved in this respect which exceeded expectations of executives.

Keen Competition for Jobs

Individual efficiency and production likewise advanced as competition for even ordinary jobs in the mills became keener. The careless, inefficient, lazy workers were simply eliminated. Operating organizations were combed and combed again under the pressure of reducing costs to meet keen competitive conditions in the steel market.

In consequence of this process of elimination, operating organizations of plants in this territory are at a high rate of efficiency. Managers are likewise alert for new mechanical developments which may aid in reducing costs. One large plant each month awards prizes to its workmen for suggestions to promote economy and reduce waste, and many valuable ideas have been evolved in this manner. For instance, last month a prize was given the suggestion of an oil sprayer which an employee constructed on an automatic thread milling machine. Another suggestion which was similarly rewarded was that steel bushings be installed in the spindles on concrete fence machines.

A Valley independent has been conducting intensive experiments with an advanced type of open-hearth furnace, and reports favorable results have been achieved in reducing the time required per heat and in other respects.

Metallurgists have been engaged experimenting to produce a better type of refractory, which will last longer and exhibit greater resistant qualities to intense heat applications.

Shipments of fuel and steel by water have received attention of the industry in its efforts to lower costs. A suggestion now receiving consideration is that barges which haul products down the Ohio River and return empty be employed to haul fluorspar from the mines in Kentucky on the return trip. Such a plan would effect a saving in transportation charges of several dollars a ton, states the traffic manager of a steel plant. Fluorspar destined for open-hearth steel plants in the Pittsburgh and Youngstown districts could be shipped to advantage in this manner, it is contended.

Economy of Cleanliness

The economy of cleanliness constituted the subject matter of a recent statement to employees of a large machine-building interest with plants at Pittsburgh,

Youngstown and Canton, by a department head. "During the war work was pushed ahead at such a rapid rate of speed that each department was strained to the limit," says this operating official. "During this time workmen, superintendents, owners in fact, all—cared little about expense as long as it was not exorbitant. 'Produce' was the cry of the hour. Strictness gave way to swiftness, economy gave way to extravagance, bank accounts were big and buying was bulgy. What happened during these 'soft' times? Some of our departments became so busy that wherever a 'bottle neck' occurred we squeezed and squeezed through it, as long as we possibly could without widening it."

"This 'bottle neck' can be taken to mean a great many things. Let us start with the outside yards where our bulky raw materials are handled. These materials came upon us with such haste that within a short time our yards were in such a condition that one thing was piled upon another in no neat manner."

"We did the best we could, to be sure, but the burden was too heavy to be neatly handled. With production setting a new world's speed record, our foot became huge sand piles at times and our finishing departments looked like the dumping grounds for tire production, especially when cars were difficult to obtain for shipment. Workmen dropped their tools with the whistle, in order to have them on the job next day. Sometimes they were and sometimes they

Materials Wasted

"For instance, if we needed what we would estimate as one pound of nails to complete a job, we got a pound, to make sure we would have enough. We would need two feet of pipe, we took the first pipe laid hands on even though it was six feet long. We became of the other pound of nails and the foot of pipe? They stayed close to the job until the rusty, rarely were they returned to their proper place."

"If a job was completed which left a pile of bricks, sand, chips or refuse of any kind, it remained where it lay until it had to be removed. I use illustrations because they are memories, and vivid. How will cleanliness prove economy? In this place, a clean plant creates a better satisfied employee. He gets an appetite for work, just as his stomach creates a keener appetite for food when he eats in a clean, savory restaurant."

"A neat and clean plant is an efficient plant. Material should be stocked in an orderly manner, so no time is lost in trying to find it. Materials should be placed in such a manner or in such a place that their handling is easily facilitated without interfering with other work. Take pride in the appearance of your work bench or character of your work."

"There is always a better way to do some thing, no matter how highly perfected one might believe the present state of affairs."

Operations of Plants at Niles, Ohio

All eight mills are being operated by the Steel Co., Niles, Ohio, a sheet interest, with orders sufficient to engage its capacity into June. Falcon Tin Plate Co., controlled by the same interest is operating six of nine tin plate mills at its plant, acquired from the Carnahan Tin Plate & Co. It is also rolling some specialty sheet at Canton for enamel ware. General offices of both companies are housed in a modern brick building at the entrance to the Niles property.

A four-mill addition to the plant at Niles is considered by the company, but an official state-

undetermined whether construction will proceed this year, depending altogether on the situation in the sheet market. The additional capacity is desirable, an official points out, because a 12-mill plant could be operated as economically in many respects as an 8-mill plant, with no additional overhead.

Virtually all of the operations carried forward at the Niles property are done mechanically, the mills ranking among the most modern in the country in this respect. Manual labor has been reduced to a minimum. Running full, the company is able to produce 7000 tons of blue annealed, black and galvanized sheets per month. Its plant consists of seven sheet mills and one jobbing unit, with roughing mills, cold mills, pickling and galvanizing equipment. It has three galvanizing pots.

The two companies purchase their sheet bar requirements in the open market and are covered by long-time contracts.

The Falcon Tin Plate Co. is adding new connections in addition to the regular customers of the old Carnahan company and its business is gradually growing. Its plant consists of a roll train of nine hot mills and one cold mill, driven by two steam engines, and four tandem cold mills, electrically driven. It has black and white pickling departments and ample annealing capacity. It will produce between 40,000 and 45,000 tons of tin plate per year, or between 800,000 and 900,000 base boxes.

The Niles plant is entirely electrically driven. At Niles the company owns a 114-acre tract, and 13 acres at Canton.

Sales of both companies are being handled at present by Lloyd Booth, president and treasurer and by Paul Wick, vice-president and secretary. Both were formerly connected with the Trumbull Steel Co. at Warren in official capacities.

Serious Labor Troubles in China

WASHINGTON, March 28.—Prime importance is attached by Commercial Attache Arnold, at Peking, in a cable to the Department of Commerce summarizing in China as of March 19, to the strike settlement in the Chinese Seaman's Union and the shipwrecking. The strike itself paralyzed foreign trade in South China, partially stopped ocean trade, excepting junk trade, also inflicted shipowners engaged in river traffic, and merchants and producers at Canton and Shanghai. The strike settlement, accomplished by arbitration, brought about a recognition of labor through the granting by the Hongkong government of the privilege of registration of labor guilds as members of the union, the granting of reasonable but higher wages, and the assurance that in the future the union would resort first to arbitration on all questions of remedy for any substantial grievances.

High Wages in Australia

Trade Commissioner Sanger cables to the Department of Commerce from Melbourne: "Newcastle Steel Works of the Broken Hill, will close completely in the near future. The reason for the closing is given, by Commissioner Ferrin, who is in Australia, that it is part of a wide campaign on the part of employers for a reduction in labor costs, which have been repeatedly declared by the Broken Hill and other interests to be unduly high, in view of the depressed markets for metals and metal products. The Broken Hill mines have been working part time for a long while, and practically all the other mines in the commonwealth, except coal, have long been closed. This view of the cause of the Newcastle shutdown is strengthened by Mr. Sanger's cabled statement that the conference of representatives of capital and labor from the six States, called by the Prime Minister, has broken up without practical results, and that labor unrest and strikes are anticipated."

More Metal Workers at Higher Wages

Iron and steel plants, according to figures of the Bureau of Labor Statistics, show for February a gain of 10,545 employees in 108 establishments. This gain of 9.3 per cent was accompanied by a gain of 15.7 per cent in amount of payroll and a corresponding gain in the February pay envelope from \$40.20 to \$42.57, or 5.9 per cent.

In the automobile industry the gain in 49 establishments was 4.8 per cent in number of employees and 58 per cent in payroll total. This is probably a reflection of an increase in full time employment, rather than wholly an increase in wage rates. In car building and repairing there was a loss of 3 per cent in number of employees in 64 establishments, but a gain of 10.5 per cent in amount of payroll, due probably to increase in percentage of full time workers.

Wages in car building and repairing, due to the continuance of war time wages in railroad repair shops, are considerably higher than in the other industries mentioned. The excess in February over steel mill wages was 37.8 per cent, and over wages in automobile plants 8.1 per cent. Details are shown in the table.

Period	Number of Establishments	Number of Men	Half-Month Payroll	Average Pay Envelope
Iron and Steel				
January, 1922...	108	113,656	\$4,568,269	\$40.20
February, 1922...	108	121,201	5,286,929	42.57
February, 1921...	109	144,679	9,393,391	64.93
Automobiles*				
January, 1922...	49	85,524	3,335,828	39.09
February, 1922...	49	89,647	4,863,720	54.25
February, 1921...	48	58,536	2,762,104	47.19
Car Building and Repairing				
January, 1922...	61	58,787	3,025,456	51.47
February, 1922...	64	57,006	3,343,661	58.65
February, 1921...	63	62,878	4,220,085	67.12

*Payroll figures are reported as "weekly"; they have been made "semi-monthly" by multiplying by 2 1/6.

Gratifying Accident Reduction

"Every employee in our mills is to be congratulated on the excellent showing made in accident reduction during 1921," states J. M. Woltz, safety director of the Youngstown Sheet & Tube Co., Youngstown, Ohio, in a message to workers. "It is gratifying to the safety department because it proved what we have shown before, that accidents can be cut down if a real effort is made by all hands to do so. It has saved hours and days of suffering, physical pain and has relieved our employees and their dependents many hours of mental stress."

During 1920 there were 11 fatal accidents at the company's plants, and but one in 1921. So far this year there has been none.

"Let every man in the company strain each nerve, let him be ever vigilant, let him condemn in unmeasured words the chance-taker that may endanger his own or other's life," admonishes Mr. Woltz.

Less Unemployment in Pennsylvania

Reports of all of the employment offices of the Pennsylvania State Department of Labor and Industry, covering the first two weeks of March, show a fairly good decrease in the number of idle workmen. According to the estimates, the unemployed decreased 575, or approximately 5 per cent. The total number of unemployed in the State is now estimated at 262,965, as compared with 278,540 two weeks ago. The Pittsburgh district reports the biggest increase in the number of men returning to work, with a total of 2950. Johnstown, McKeesport, New Kensington and Altoona, where conditions during the winter were considered bad, report an approximate increase of employed of more than 4000. Civic co-operation in Erie has reduced the number of unemployed; the estimated number idle is now placed at 15,490, a decrease of 610 in two weeks. Philadelphia reports 148,000 idle as compared with 155,400 two weeks ago, while both Harrisburg and Williamsport also show decreases in idleness.

